

Cormix® AFL3

A HIGH PERFORMANCE ALKALI-FREE LIQUID HARDENING ACCELERATOR FOR SHOTCRETE

DESCRIPTION

Cormix AFL3 is a high-performance alkali-free liquid hardening accelerator specially formulated to provide lower dosage, less rebound in shotcrete, while reducing the safety hazards associated with traditional alkaline shotcrete accelerators. It may be used for shotcrete applied by dry or wet spraying. Complies of ASTM C1141, Type II & Grade 9, Class A.

USES & ADVANTAGES

Cormix AFL3 can be used with shotcrete in tunneling, mining, and slope stabilization. It is ideally suited for wet mix sprayed concrete for rock support.

Advantages include:

- Quick setting properties which allow for rapid work progress and the ability to construct thick sprayed concrete linings via layered application during construction sequence.
- Lower dosage
- Less rebound
- Easy handling, as well as facilitating accurate addition to the concrete.
- Very low dust production and therefore a good working environment.
- Provides improved working safety and less environmental impact.
- Early-age strength development, excellent long-term strength and durability.
- High resistance to carbonation.
- Reduced water permeability.
- Better adhesion.
- Reduced rebound.
- Alkali free.

PROPERTIES

Appearance:	Turbid Liquid
pH Value	≥ 2.5
Density:	Approx. 1.30-1.35 kg/ltr.
Na₂O:	<0.1%
Chloride Content (Cl-):	<0.01%

** Properties are typical under laboratory conditions and do not constitute a specification. Field trials are recommended.*

Initial Setting Time:	< 3 minutes ASTM C1398
Final Setting Time:	≤ 4 min 30 sec

APPLICATION

Prior to use, fully agitate the product by mechanical stirring or re-circulation pumping. Agitation by compressed air is strictly not advised. According to the required setting time and early strengths, **Cormix AFL3** can be added at a dosage of 2.5-9% by weight of binder. Overdosing may result in decreased strength. The dosage depends on temperatures, reactivity of cement used, required thickness of layers, setting time

and early strength development required. The use of fresh cement is recommended.

Dosage equipment and pumps must be made of acid-resistant materials.

Mono pumps (screw pumps) and squeeze pumps (rotary pumps) can work well, but piston pumps, pressure tanks and gear pumps should not be used. It is preferable to use concrete with cement contents of no less than 400 kg/m³ for high early strength.

Cormix AFL3 can be sensitive to different types of cement. It is suggested to use 100% clinker Portland cement for earlier setting time.

During wet-mix spraying, the w/c ratio should be below 0.5 (preferably below 0.45) to achieve better results. The water content in aggregate must be taken into account in the calculation of water-cement ratio.

Cormix AFL3 is added at the nozzle through a separate accelerator hose.

Before **Cormix AFL3** is used, the entire dosing equipment must be thoroughly cleaned with a lot of water. During concreting and work breaks the system must remain closed to avoid blockage.

Cormix AFL3 must not be stored in steel containers. The storage containers must be closed tightly to avoid the evaporation of the water and resulting film formation on the surface.

Prior to and after using Cormix AFL3, clean the hoses, pumps, and other instruments thoroughly with plenty of water.

Do not mix Cormix AFL3 with any type of accelerator produced by another manufacturer, as this could cause immediate clogging of pumps and hoses.

All necessary suitability tests must be performed before use.

GENERAL INFORMATION - SHOTCRETE MIX DESIGN

Typical Shotcrete Mix Design

Ordinary Portland Cement Type I	420 kg/m ³
River Sand	700 kg/m ³
Crushed Rock Fines	500 kg/m ³
Aggregates <10 mm	450 kg/m ³
Water	189 litre/m ³

The above is a typical shotcrete mix design excluding superplasticizers, silica fume, steel fibres, accelerators and other additives.

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Gradation Limits for Shotcrete Aggregate

Sieve Sizes (mm)	% by Weight Passing Individual Sieves Gradation		
	No.1	No.2	No.3
19	-	-	100
12.5	-	100	80-95
9.5	100	90-100	70-90
4.75	95-100	70-85	50-70
2.36	80-100	50-70	35-55
1.18	50-85	35-55	20-40
0.60	25-60	20-35	10-30
0.30	10-30	8-20	5-17
0.15	2-10	2-10	2-10

Dry Mix

Dry mix shotcrete must allow for increased rebound composed mainly of larger aggregate, unlike wet mixes increase aggregate contents to allow for loss in application is not a problem. Below is a typical dry mix shotcrete mix design. In dry mix shotcrete usually the only type of admixtures used are accelerators combined with silica fume and steel fibres.

Sample Dry Mix (Design 1 m³):

Aggregate (Gradation No.2)	1,670 kg
Cement	350-400 kg
Silica Fume (Cormix SF1)	50 kg
Steel Fibres (if required)	40-60 kg

Wet Mix

Wet mix design is similar to pumpable concrete mixes. The material must be flowable enough at low water cement ratios to flow through the hose stay in place once blown onto the surface and rapidly gain strength. Wet mix shotcrete typically contains Superplasticisers (**Cormix SP1**), Air Entrainers (**Conair**), Silica Fume (**Cormix SF1**) and Steel Fibres.

Below is a typical wet mix shotcrete design:

Sample Wet Mix (Design 1 m ³)	
Aggregate (Gradation No.2)	1,600 kg
Cement	420 kg
Silica Fume (Cormix SF1)	40 kg
Superplasticiser, Water Reducer (Cormix SP1, Cormix R1)	
& Air Entrainer (Conair)	5-10 kg
Water (approx.)	210 kg
Steel Fibres (if required)	40-60 kg

Cormix International technical service department is available to advise on shotcrete mix design and the appropriate additives to use.

Dry & Wet Shotcrete Additives Available from Cormix

Dry Mix Additives

Cormix AFP	Alkali Free Powder Accelerator
Cormix SF1	Silica Fume

Wet Mix Additives

Cormix AFL3	Alkali Free Liquid Accelerator
Cormix SP1	Superplasticiser Admixture
Cormix SF1	Silica Fume
Conair	Air entraining Additive

PACKAGING

Cormix AFL3 is supplied in 1,000 litre IBC tanks.

STORAGE & SHELF LIFE

Cormix AFL3 must be stored at a minimum of +5°C and maximum of +35°C. **Cormix AFL3** has to be kept in closed containers made of plastic, glass fibre plastic or stainless steel. **Cormix AFL3** must not be stored in normal steel containers as the pH can cause corrosion that may affect the performance of the product.

After prolonged storage we recommend that **Cormix AFL3** always be fully agitated prior to use by mechanical stirring or re-circulation pumping. Agitation by compressed air is strictly not advised.

If stored in tightly closed original containers under the above given conditions, **Cormix AFL3** has a shelf life of 3-6 months.

Open containers will allow prolonged contact with air leading to skin film and lumps being produced that may cause blocking of accelerator system.

It is recommended that your local Cormix International representative be consulted prior to the use of any product that has been frozen.

Performance testing should always be carried out before use.

HEALTH & SAFETY

Wear rubber gloves and goggles to avoid eye and skin contact. If contact occurs, clean with plenty of water. In case of eye contact, seek medical advice.

TECHNICAL SERVICE

The Cormix International Technical Service Department is available to assist you in the correct use of our products and its resources are at your disposal entirely without obligation.

Cormix® AFL3**A HIGH PERFORMANCE ALKALI-FREE LIQUID HARDENING ACCELERATOR FOR SHOTCRETE****QUALITY ASSURANCE**

ISO 9001 : 2015 verified by TUV Nord.

ISO 14001 : 2015 verified by Lloyd's Register International.

DISCLAIMER

Performance data is achieved testing in accordance with International Standards. Testing by others may result in different results from those published as a result of external factors such as poor sampling, incorrect mixing, varying temperatures, curing, crushing procedures etc. Cormix does not take responsibility nor need to defend others testing that does not achieve the published data.

The user must test the products suitability for the intended application and purpose. Cormix reserves the right to change the properties of the product.

Site conditions and differences in materials are such that no warranty or fitness for a particular purpose, nor liability can be inferred from the published data sheet, written recommendations or from other advice offered.

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