Cormix ® AFL

ALKALI-FREE LIQUID HARDENING ACCELERATOR

DESCRIPTION

Cormix AFL is an alkali-free liquid admixture formulated to provide hardening acceleration 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 AFL can be used with shotcrete in tunneling, mining, and slope stabilisation. It is ideally suited for wet mix sprayed concrete for rock support due to:

- The quick setting properties which allow for rapid work progress and the ability to construct thick sprayed concrete linings via layered application during construction sequence.
- The product formulation which provides continual early-age strength development whilst also achieving excellent long-term strength and durability.
- **Cormix AFL** being a liquid product provides easy handling, as well as facilitating accurate addition to the concrete.
- Very low dust production and therefore a good working environment. Product is also non aggressive, it provides improved working safety and environmental impact.

Advantages include:

- Quick setting.
- Early-age strength development, excellent long-term strength and durability.
- High resistance to carbonation.
- Reducing water permeability.
- Very low dust production.
- Improves safety and non-toxic.
- Better adhesion.
- Reduced rebound.
- Alkali free.

PROPERTIES

Appearance:	Turbid / Opaque Liquid
pH Value:	≥ 2.5
Density:	Approx. 1.36-1.42 kg/ltr.
Na_2O:	<0.1%
Chloride Content (Cl-):	<0.01%

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

APPLICATION

According to the required setting time and early strengths, **Cormix AFL** can be added at a dosage of 3-10% 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. We recommend the use of fresh cement.

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/m^3 for high early strength.

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

To facilitate dosage it is recommended to agitate **Cormix**

AFL before hand, as the material is self-thickening, or rather has a tendency to sedimentation after long term storage.

Before **Cormix AFL** 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 AFL 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 AFL**, clean the hoses, pumps, and other instruments thoroughly with plenty of water.

Do not mix Cormix AFL 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 superplasticisers, silica fume, steel fibres, accelerator sand 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**), Retarders (**Cormix R1**), Air Entrainers (**Conair**), Silica Fume (**Cormix SF1**) and Steel Fibres.

Below is a typical wet mix shotcrete design:

Sample Wet Mix (Design 1 m³)

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 GA2	Standard Powder Accelerator
Cormix SF1	Silica Fume
Steel Fibres	

Wet Mix Additives

Cormix GA1	Standard Liquid Accelerator
Cormix AFL	Alkali Free Liquid Accelerator
Cormix SP1	Superplasticiser Admixture
Cormix R1/P4	Retarding & Plasticising Admixture
Cormix SF1	Silica Fume
Conair	Air entraining Additive
Steel Fibres	

PACKAGING

Cormix AFL is supplied in 200 litre open top plastic drums or 1,000 litre IBC tanks.

STORAGE & SHELF LIFE

Cormix AFL must be stored at a minimum of +15°C and maximum of +35°C. **Cormix AFL** has to be kept in closed containers made of plastic, glass fibre plastic or stainless steel. **Cormix AFL** must not be stored in normal steel containers as the pH can cause corrosion that may affect the performance of the product. Do not allow the product to freeze.

After prolonged storage we recommend that **Cormix AFL** 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 AFL** 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.

QUALITY ASSURANCE

ISO 9001 : 2015 verified by TUV Nord.

CONTACT DETAILS

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