Fosroc Conbextra HF

constructive solutions

Non-shrink cementitious, free flow, precision grout

Uses

Conbextra HF free flow precision grouting is used in a wide range of applications. These critical uses include but are not limited to, heavy-duty support beneath machine base plates, bridge bearings, crane rails and pile caps.

Advantages

- Unique non-metallic dual expansion system compensates for shrinkage in both the plastic and hardened states.
- Excellent initial flow and flow retention.
- High early strength facilitates rapid installation and early operation of plant.
- High ultimate strength and low permeability ensure durability of the hardened grout.
- Hydrogen-free gaseous expansion.
- Chloride free.
- Suitable for pumping or pouring over a large range of application consistencies and temperatures.

Standards compliance

Conbextra HF conforms fully to U.S. Corps of Engineers Specification for non-shrink grout CRD-C-621-82A and ASTM C-1107-91 (Type C).

Figure (1) Typical Specification drawing

Shuttering details: Installation and grouting of base plates.

Description

Conbextra HF cementitious precision grout is supplied as a ready to use dry powder. The addition of a controlled amount of clean water produces a free-flowing precision grout for gap thicknesses up to 125 mm. In addition the low water requirement ensures high early strength and long term durability.

Conbextra HF is a blend of Portland cements, graded fillers, micro-silica and chemical additives which impart controlled expansion in both the plastic and hardened states. The filler grading minimizes segregation and bleeding over a wide range of application consistencies.

Technical support

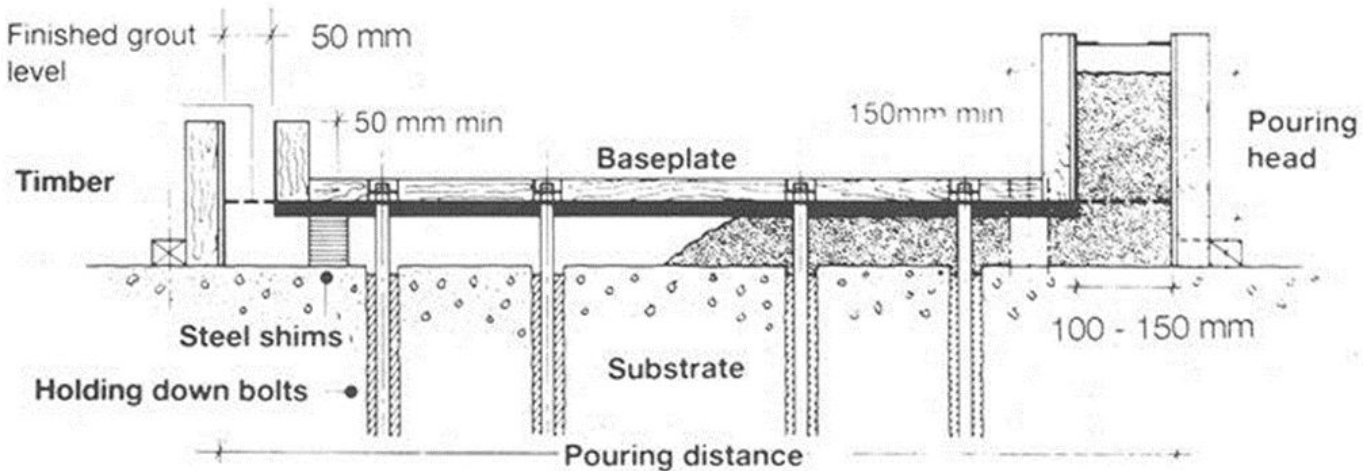
Fosroc offers a comprehensive range of high quality, high performance construction products. In addition, Fosroc offers a world-wide technical support and on-site service to specifiers, end-users and contractors.

Specification clauses

Performance specification

All precision grouting (specify details and areas of application) must be carried out with a pre-packaged cement based product, which is non-metallic and chloride-free.

It shall be mixed with clean water to the required consistency and not exhibit bleed or segregation.



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A volumetric expansion of up to 2% shall occur while the grout is in a plastic state by means of a gaseous, hydrogen-free system. The grout must also be compensated for shrinkage in the hardened state.

The compressive strength of the grout must exceed 40 N/mm$^{2\ at}$ 7 days and 60 N/mm^2 at 28 days.

The grout shall fully conform to the requirements of US Army Corps of Engineers Specification for non-shrink grout CRD-C-621-82A or ASTM C-1107-91.

The storage, handling and placement of the grout must be in strict accordance with the manufacturer's instructions.

Properties

The following results were obtained at a water powder ratio of 0.21, and a temperature of 20°C.

Test method for		Typical results
Compressive strength ASTM C109 / C109M-13	:	20 N/mm² at 1 day 50 N/mm²at 7 days 64 N/mm² at 28 days
Flexural Strength EN 196-1:2016	:	2 N/mm² at 1 days 5.5 N/mm² at 7 days 6 N/mm² at 28 days
Flow characteristics (Efflux time) CRD-C Cone	:	25 - 45 seconds
Setting time BS4550 Part 3 1978		
Initial set	:	5.5 hours
Final set	:	7.5 hours
Time for expansion		
Plastic state	:	**Start** 15 minutes **Finish** Initial set
Hardened state	:	**Start** Initial set **Finish** Up to 28 days
Fresh wet density	:	Approximately 2100 kg/m^3 depending on actual consistency used

Expansion characteristics:
An expansion of up to 2% when measured according to ASTM C-940 overcomes plastic settlement in the unset material. Longer term expansion in the hardened state is designed to comply with the requirements of ASTM C-1107-91 to compensate for drying shrinkage

Supplier specification

All precision grouting (specify details and areas of application) must be carried out using Conbextra HF manufactured by Fosroc and used in accordance with the manufacturer's data sheet.

Application instructions

Preparation

Foundation surface
The substrate surface must be free from oil, grease or any loosely adherent material. If the concrete surface is defective or has laitance, it must be cut back to a sound base. Bolt holes or fixing pockets must be blown clean of any dirt or debris.

Pre-soaking
Several hours prior to grouting, the area of cleaned foundation should be flooded with fresh water. Immediately before grouting takes place, any free water should be removed. Particular care should be taken to blow out all bolt holes and pockets.

Base plate
It is essential that this is clean and free from oil, grease or scale. Air pressure relief holes should be provided to allow venting of any isolated high spots.

Levelling shims
If these are to be removed after the grout has hardened, they should be treated with a thin layer of grease.

Formwork

The formwork should be constructed to be leak-proof as Conbextra HF is a free flowing grout. This can be achieved by using foam rubber strip or mastic sealant beneath the constructed formwork and between joints.

In some cases it is practical to use sacrificial semi-dry sand and cement formwork. The formwork should include outlets of the pre-soaking water.

The unrestrained surface area of the grout must be kept to a minimum. Generally the gap width between the perimeter formwork and the plate edge should not exceed 150 mm on the pouring side and 50 mm on the opposite side. Gap at the flank sides should be kept to a minimum.

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Mixing

For best results a mechanically powered grout mixer should be used. For quantities up to 50 kg a slow speed drill fitted with a high shear paddle is suitable. Larger quantities will require a high shear vane mixer. Do not use a colloidal impeller mixer.

It is essential that machine mixing capacity and labour availability is adequate to enable the grouting operation to be carried out continuously. This may require the use of a holding tank with provision for gentle agitation to maintain fluidity.

The selected water content should be accurately measured into the mixer. Slowly add the total contents of the Conbextra HF bag, mix continuously for 5 minutes, ensuring a smooth, even consistency is obtained.

Consistency of mixed grout

To achieve the consistencies which are defined in CRD C-621-82A, the amount of clean water that is added to a 25 kg bag at 25°C is:

Trowellable	:	3.5 litres
Flowable	:	5.25 litres
Fluid	:	5.5 litres

Flow Properties

Grout Consistency		Gap depth mm	100 mm head	250 mm head
Flowable	:	10	360	1200
		20	950	2600
		30	1500	3000
		40	2200	3000+
		50	3000	3000+
Fluid	:	10	900	2500
		20	1900	3000
		30	3000	3000+
		40	3000+	3000+

Placing

Place the grout within 15 minutes of mixing to gain the full benefit of the expansion process.

Conbextra HF can be placed in thicknesses up to 125 mm in a single pour.

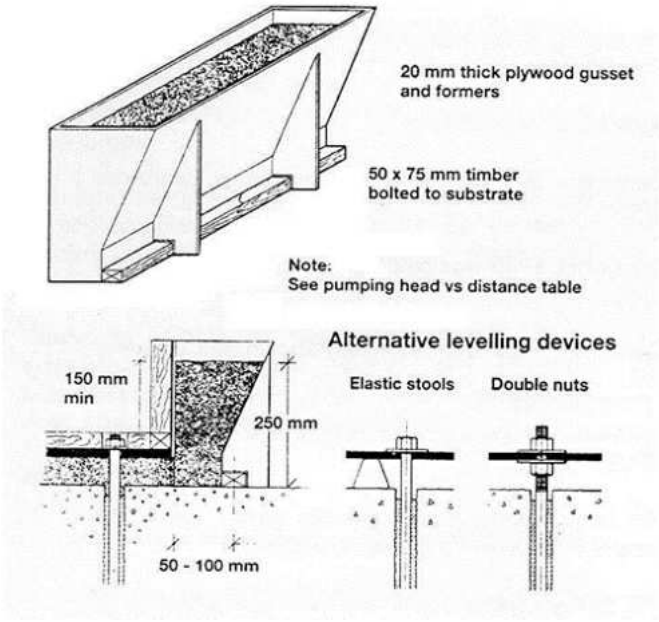
Any bolt pockets must be grouted prior to grouting between the substrate and the base plate.

Continuous grout flow is essential.

Figure (2) typical hopper system

Removable hopper: For larger pours the grout may be hand placed or pumped into a removable hopper (through).

Sufficient grout must be available prior to starting and the time taken to pour a batch must be regulated to the time taken to prepare the next one.



The mixed grout should be poured only from one side of the void to eliminate the entrapment of air or surplus pre-soaking water. This is best achieved by pouring the grout across the shortest distance of travel. Use of straps or chain may aid grout flow in wide applications.

Where large volumes have to be placed Conbextra HF may be pumped. A heavy-duty diaphragm pump is recommended for this purpose. Screw feed and piston pump may also be suitable.

For sections thicker than 125 mm, it is necessary to fill out the Conbextra HF with graded 10 mm silt free aggregate to minimize temperature rise. The quantity of aggregate should not exceed 1 part aggregate to 1 part Conbextra HF by weight.

Curing

On completion of the grouting operation, exposed areas should be thoroughly cured. This should be done by the use of Concure Curing Membrane, continuous application of water and/or wet hessian.

Cleaning

Conbextra HF should be removed from tools and equipment with clean water immediately after use. Cured material can be removed mechanically, or with Fosroc Acid Etch.

Limitations

Low temperature working

When the air or contact surface temperatures are 5°C or below on a falling thermometer, warm water (30 - 40°C) is recommended to accelerate strength development.

For ambient temperatures below 10°C the grout consistency should be flowable and the formwork should be maintained in place for at least 36 hours.

Normal precautions for winter working with cementitious materials should then be adopted.

water and medical advice sought.

High temperature working

At ambient temperatures above 35°C the mixed grout should be stored in the shade Cool water (below 20°C) should be used for mixing the grout.

Conbextra HF is alkaline and should not come into contact with skin and eyes. Avoid inhalation of dust during mixing. Gloves, goggles and dust mask should be worn.

If contact with skin occurs, wash with water. Splashes to eyes should be washed immediately with plenty of clean water and medical advice sought.

Estimating

Supply

Conbextra HF is supplied in 25 kg bags

Yield

Allowance should be made for wastage when estimating quantities required. The approximate yield per 25 kg bag for different consistencies is:

Consistency	Trowellable	Flowable
Yield (litres)	13.5	14.4

Storage

Conbextra HF has a shelf life of 12 months if kept in a dry store in sealed bags. If stored in high temperature and high humidity locations the shelf life may be reduced.

Precautions

Health and safety

Fire

Conbextra HF is non-flammable.

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Additional information

Fosroc manufactures a wide range of products specifically designed for the repair and refurbishment of damaged reinforced concrete. This include hand-placed and spray grade mortars, fluid micro-concretes, chemical resistant epoxy mortars and a comprehensive package of protective coatings. In addition, a wide range of complementary products is available. This includes joint sealants, waterproofing membranes, grouting, anchoring and specialized flooring materials.

Fosroc has produced several educational training videos with provide more details about the mechanisms which cause corrosion within reinforced concrete structures and the solutions which are available to arrest or retard these destructive mechanisms. Further information is available from the publication: 'Concrete repair and Protection - The Systematic Approach', available in seven language formats.

For further information about products, training videos or publications, contact the local Fosroc office.

Important note
Fosroc products are guaranteed against defective materials and manufacture and are sold subject to its standard Conditions for the Supply of Goods and Services, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification of information it may give is accurate and correct, it cannot, because it has no direct or continuous control over where or how its products are applied, accept any liability either directly or indirectly arising from the use of its products, whether or not in accordance with any advice, specification, recommendation of information given by it.

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