

Expanplast FCA



CONSTRUCTION CHEMISTRY

Foam concrete admixture

Uses

- For the production of foamed low density concretes. Typical applications of foamed concrete include:
- Trench filling for permanent, non-sink reinstatement
- Void filling for elimination of fire risk, health hazards and control of progressive collapse in areas such as disused solvent and fuel tanks, below railway platforms, old mine workings and redundant sewers
- As a lightweight insulating material for roof screeds, suspended floors and basements
- As a semi-structural support in cases such as embankments, bridge abutments, tunnels and arches

Advantages

- Produces a consistent, stable pre-foam when used with a Expanplast Foam Generator*.
- Easily controlled addition of pre-foam to pre-batched mortar allows close control of finished density.
- Expensive blending equipment is not required as mixing can be carried out in the drum of a ready mix truck.
- Produces a highly mobile foamed concrete which is easily placed without compaction.
- Foamed concrete retains its volume and does not sink during or after hardening.

Description

Expanplast FCA is a concentrated solution of selected surfactants. When used with a Expanplast Foam Generator* and a suitable water supply, Expanplast FCA produces a consistent pre-foam that is stable under alkaline conditions and suitable for use in the production of foamed concrete.

Foamed concrete is the industry term used for the product of a controlled addition of a pre-foam to a cement grout or sand: cement mortar. This can be done to produce a range of densities, typically from 900 to 1500 kg/m³. Foamed concrete is lightweight and highly mobile, able to flow for long distances under its own hydraulic head, and is an ideal material for uses such as void filling, roof screeds and trench reinstatement.

Technical support

Fospak provides a technical advisory service for on-site assistance and advice on admixture selection, evaluation trials, foam generators and other dispensing equipment.

Technical data and guidance can be provided for a wide range of admixtures and other products for fresh and hardened concrete.

Typical dosage

The dosage of Expanplast FCA depends upon the original starting materials and the desired final density of the foamed concrete. Typical dosages are in the range of 0.6 to 1.50 liters per 100 Kg. of cement of finished foamed concrete over a density range of 900 to 1500 Kg/m³.

The optimum dosage of Expanplast FCA to meet specific requirements should always be determined by trials using the materials and conditions that will be experienced in use.

Use at other dosages

Dosages outside the typical range suggested on this data sheet may be used if necessary and suitable to meet particular mix requirements. Contact the Fospak Technical Service Department for advice in these cases.

Properties

Appearance:	Clear golden liquid
Specific gravity:	Typically 1.05 at 20°C
Alkali content:	Typically less than 3 mg. Na ₂ O equivalent / liter of admixture. A fact sheet on this subject is available

Instructions for use

Foam production

A pre-foam is produced by feeding Expanplast FCA and water through a Expanplast Foam Generator*. A range of generators, including petrol, electric and water powered models, are available for varying customer requirements.

Each generator is fitted with a proportional feeder unit calibrated and set to correctly dilute 4 liters of Expanplast FCA with 100 liters of water, to give a 4% solution.

Only potable water should be used for the pre-foam. Concrete wash water or water from other sources containing high levels of calcium ions should not be used.



Separate sheets on Foam Generator operating procedures are available for each type of equipment. Instructions given on these sheets should be followed to produce the pre-foam. On-site demonstrations of the use of this equipment can be given by Fospak field technicians and dispenser engineers. Please contact the Fospak Technical Service Department for further information and assistance.

Initial mortar mix

A sand :cement mortar should be pre-batched into the ready mix truck. Best results will be obtained with fine sands having a high proportion of material passing a 300 µm sieve. The sand must contain a negligible amount of material larger than 2 mm in diameter as otherwise the foamed concrete will be less stable, particularly at lower densities. Best results at lower densities will usually be obtained by using soft building or mortar sands.

The required mix design for the starting mortar will depend on the desired combination of compressive strength and final density. A richer starting mortar allows the production of a stronger foamed concrete for a given density.

Table 1: Typical mortar mix proportions for initial trials

Target dry density kg/m ³ :	800	1000	1200	1400	1600
Target wet density kg/m ³ :	860	1060	1260	1460	1660
Sand :cement ratio (by weight):	1:1	3:2	2:1	3:1	4:1

Table 1 gives typical starting values for use in trials based on broad classes of final desired density. The figures given are approximate values only and are supplied as initial guidelines and as a basis for estimation. Trials should always be carried out using the relevant materials and conditions in order to determine optimum mix details and levels of pre-foam required to meet specific requirements.

Mortar mix proportions may be varied from the suggested starting values on Table 1 if trial results indicate that this is necessary and suitable to meet particular requirements.

Initial mortar workability

The delivered mortar should be batched for a workability equivalent to a collapsed slump before adding the pre-foam. The water content to give this will typically result in a water : cement ratio between 0.5 and 0.6 but may vary with the sand grading. Where appropriate to the needs of a particular job or necessary due to the water demand of local materials, values outside these limits may be used.

An alternative method of assessing a suitable workability for the starting mortar is to observe it in the ready mix truck

prior to the addition of the pre-foam. With the drum on slow spin, a suitable mortar should appear to virtually self level in the drum and should flow freely over the back blade.

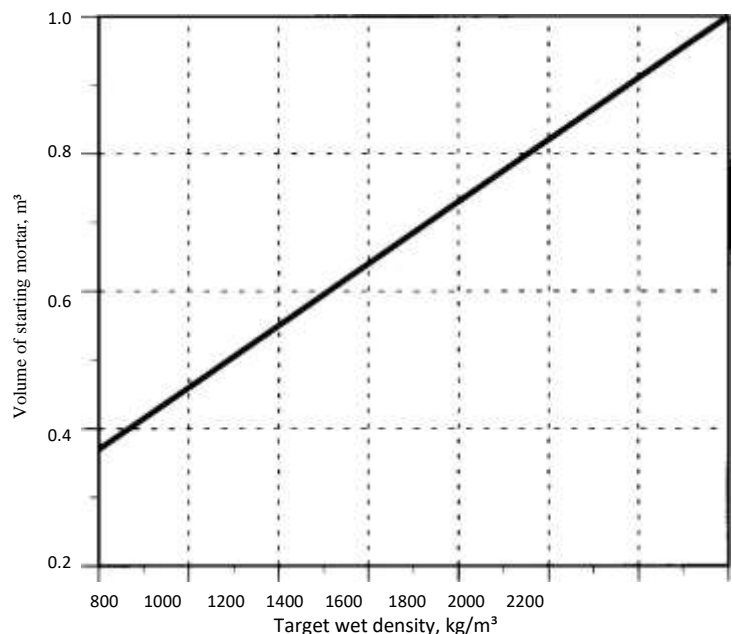
The workability of the delivered mix is particularly critical to the amount of foam required for a desired final density.

Mixes of lower workability than that suggested above may cause difficulties in blending the pre-foam into the mortar and, therefore, extended mixing periods may be required. If the pre-foam does not blend into the mortar after 3 to 4 minutes fast spin, a further 10 to 20 liters of water should be added into the back of the truck and the fast spin period repeated.

Volume of starting mortar required

It is clearly important that there is sufficient free space in the ready mix truck drum to accommodate the volume increase caused by the addition of the pre-foam. The batch weights of the starting mortar should be determined with this in mind. Figure 1 shows the approximate volume of starting mortar required per cubic meter of finished foamed concrete over a range of densities.

Figure 1: Typical volume of starting mortar required per cubic meter of finished foamed concrete



Foam addition procedure

Full instructions on the volume of pre-foam required to make foamed concretes of particular densities are given on the data sheets for Expanplast Foam Generators*. These instructions must be used in conjunction with the information on this data sheet. The pre-foam produced is added into the back of a ready mix truck drum containing a pre-batched mortar.



After addition, foamed concrete will be of a fluid, self leveling consistency. It is usually more convenient for the pre-foam to be added on-site to a mortar delivered in a ready-mix truck rather than dosing the truck at the batching plant. If foamed concrete is transported for long distances, or if there are long delays in placement, some breakdown of the foam may occur. This breakdown will increase density and reduce yield of the foamed concrete.

The required amount of pre-foam is added to the mortar in the ready-mix drum with the drum on fast spin. The rotation of the drum blends the pre-foam and mortar together to produce the finished foamed concrete. Fast spin should be maintained for 2 to 4 minutes after the addition of the pre-foam to ensure complete blending.

The density of the foamed concrete should always be checked after blending to ensure that the desired value has been obtained. The foamed concrete is then ready for placing. The mortar is self leveling and can be flowed into place directly, or down trenches, gullies or pipes. The foamed concrete can also be pumped using standard concrete pumping equipment. Contact the Fospak Technical Service Department for further information.

Compatibility

Expanplast FCA is suitable for use with Portland cement. Cement replacement materials such as PFA, GGBFS and micro silica may be incorporated in the pre-mixed mortar. Trials should be carried out to determine the effects that this will have on the properties of the system.

Expanplast FCA is generally compatible with other Fospak admixtures used in the same mix. Admixtures should be added separately and must not be mixed together prior to addition. Trial mixes should be used to ensure that the desired performance is obtained.

Consult the Fospak Technical Service Department for further advice.

Effects of overdosing

An overdose of the amount of foam added to the pre-batched mortar will produce lower densities and reduced compressive strengths.

Curing

Where appropriate, good curing practice should be maintained. Water spray, wet hessian or a Expancure* spray applied curing membrane can be used. However, application may have to be delayed to prevent damage to the surface of the foamed concrete before it has set.

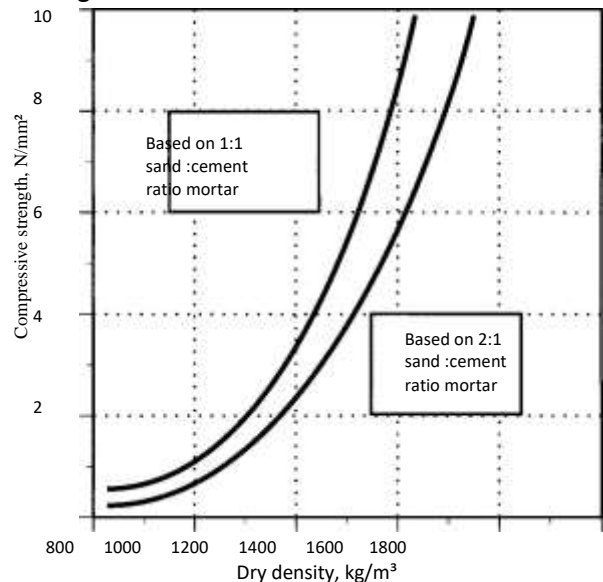
Typical performance

Many variables in concreting materials and conditions can affect the selection and use of an admixture. Trials should be made using relevant materials and conditions in order to determine the optimum mix design and admixture dosage to meet specific requirements.

Compressive strength

The compressive strength of a hardened foamed concrete is proportional to its density and also to the cement content of the original mortar. Figure 2 gives typical compressive strength values from selected tests carried out for the assessment of the performance of Expanplast FCA. These results are representative of the results obtained and should be taken as illustrations of the performance only. A number of factors, such as water : cement ratio and the materials used, can affect the compressive strength. Trials should be performed using the conditions that will apply in practice. A fact sheet giving further information on the compressive strength of foamed concretes is also available.

Figure 2: Typical values for 28 day compressive strength of foamed concrete



Limitations

Expanplast FCA is not intended for direct addition to mortar and use in this manner will not produce foamed systems.

Expanplast FCA may not be suitable for use with certain sands, in particular coarse sands. Sands containing a significant amount of particles greater than 2 mm in diameter should be avoided.

Pre-foam should not be made using concrete wash water or water from other sources containing high levels of calcium ions.



CONSTRUCTION CHEMISTRY

Estimating

Yield

Unless extremely tight control is exercised, which will require extra time, the density of a foamed concrete is likely to vary by $\pm 100 \text{ kg/m}^3$. This variability should be allowed for in estimating the possible volume of material required.

Some factors may affect density and yield. Losses will not always occur but the possibility should be considered. Possible causes include transport of foamed concrete over long distances, such as when pre-foam is added at a batch plant instead of on-site, delays in placing and pumping.

If foamed concrete is placed against a dry substrate there is the possibility of foam collapse due to suction of water out of the foamed concrete. If this situation exists, the substrate should be wetted before placing the foamed concrete to reduce the likelihood of the problem.

Packaging

Expanplast FCA is available in 210 and 25 liter drums.

Storage

Expanplast FCA has a minimum shelf life of 12 months provided the temperature is kept within the range of 5°C to 50°C. Should the temperature of the product fall outside this range then the Fospak Technical Service Department should be contacted for advice.

Should the product become frozen it must be completely thawed and thoroughly remixed before use.

Precautions

Health and safety

Expanplast FCA should not be swallowed or allowed to come into contact with skin and eyes.

Wear suitable gloves and eye/face protection.

Splashes on the skin should be removed with water. Prolonged contact with the skin should be avoided, as some degreasing of the skin may occur. In case of contact with eyes rinse immediately with plenty of water and seek medical advice. If swallowed seek medical attention immediately - **do not** induce vomiting.

For further information consult the Product Safety Data Sheet available for this product.

Fire

Expanplast FCA is water based and non-flammable.

Cleaning and disposal

Spillages of Expanplast FCA should be absorbed onto sand, earth or vermiculite and transferred to suitable containers. Care should be taken in the disposal of excess or waste material, due to the high chemical oxygen demand (for the purposes of initial assessment this should be taken as approximately 2000 mg/g). Disposal should be carried out in accordance with local water and waste authority regulations.

* Denotes the trademark registered

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