

Lafarge CEMBlend CEM III/A Concrete

Mix Design



bringing materials to *life*

Lafarge CEMBlend Blastfurnace cement (CEM III/A 42,5L) can be used in most applications where conventional Portland cement (CEMI) is used. However, simply substituting CEM III/A for Portland cement, weight for weight, in an existing concrete mix design is not always appropriate. This note describes the key modifications to concrete mix design required to optimise the performance of concrete containing CEM III/A.

However, when using CEM III/A for the first time, trial mixes are strongly recommended.

When using Volumetric mixers, the mix designs or calibrations preset by the equipment manufacturer may not always be suitable for CEM III/A concrete. The slightly lower density of CEM III/A compared to Portland cement (see section on sand content below), in particular, may be an issue.

The manufacturer of the mixer unit should be contacted in order to make the necessary adjustments.

Workability and water content

The smooth surface texture of the slag particles in CEM III/A reduce the water demand of the cement relative to Portland cement by about 3% for equivalent slump i.e.:

Water content (kg/m ³)	
Portland cement	CEM III/A
160	155
180	175
200	195
220	215

The setting time of CEM III/A concrete is increased relative to Portland cement concrete, this also reduces the rate of slump loss.

Strength and cement content

At a fixed cement content and slump, designated or designed CEM III/A concrete will develop a similar 28 day compressive strength to a Portland cement concrete. It should be noted that whilst CEM III/A concrete has relatively low early strength development, it will continue to gain significant strength after 28 days if properly cured.

In some cases it may be possible to take advantage of this post 28 days strength gain, by agreeing to specify the strength at 56 days. This would lead to possible economies in cement content. Trial mixes are recommended to determine the 28–56 day strength gain.

Sand content and sand grading

The typical particle density of CEM III/A at 3010 kg/m³ is lower than that of Portland cement (3150 kg/m³). Consequently CEM III/A occupies a slightly greater volume than the same batch weight of Portland cement.

If CEM III/A is directly substituted for Portland cement, conventional practice would be to reduce the amount of sand in the concrete mix to maintain yield. However, in practical terms, the additional volume of the cement is almost fully offset by the reduction in water content, and no reduction in sand content is normally required.

As the slag particles in CEM III/A are more angular than those in Portland cement, there is a tendency towards enhanced bleeding. It is therefore important to look at the overall sand grading as well as just the sand content of the mix. If the amount of fine sand in the concrete is too low, this can increase the tendency towards higher bleed levels and may make the concrete more susceptible to plastic settlement cracking in slabs or floors. Possible remedies for excessive bleed include, reducing the water content of the mix, using slightly finer sand, or replacing a proportion of the normal sand with finer material. A minimum fines content (passing 300 microns), and including the cement, of 450 kg/m³ is often recommended for concrete industrial floors.

Use of admixtures

Most concrete admixtures, designed to be used with Portland cement, will work equally well in CEM III/A concrete and at similar dosage rates (in terms of ml admixture/100 kg of CEM III/A). However, any retarding properties of admixtures will be magnified when used with CEM III/A cements. The admixture producer should be contacted for advice in the event of any admixture related problems.

For further information

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Customer services

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