

TECHNICAL BULLETIN – TB018

ARDEX SMOOTHING CEMENTS – LIGHT WEIGHT BULK FILLS

Date, Wednesday, 25 November 2015

INTRODUCTION & SCOPE

The use of a lightweight “Rapid Dry” screed in conjunction with the application of floor coverings is a fast track system with the added advantage of minimising additional weight loading to the subfloor.

The ARDEX FLC/SL Grade Polystyrene Bead or Inpro Perlite C500 topping mix designs are easily mixed and installed using similar mixing and placement equipment as for our range of self smoothing cements.

The addition of the SL Grade Polystyrene Bead or Perlite 500C to selected ARDEX smoothing cements reduces the flow properties, and an irregular surface is obtained.

To obtain a smooth flat hard surface a thin smoothing layer of self-smoothing cement is required.

IMPORTANT NOTES:

- 1) The load carrying capacity of the light weight topping is directly related to the compressive strength which is between 3MPa and 13MPa. Placing a thin smoothing layer of self-smoothing cement (F.L.C.) which has a higher compressive strength than the base, has no overall effect on the compressive strength of the insitu topping which remains the same.**
- 2) High point loadings such as heavy weights applied over small areas should be avoided.**
- 3) ARDEX K301 used in this installation is NOT intended to be a wear surface either for external or internal installations. For external installations it is ONLY recommended for usage under sheet membranes such as the Shelterbit products.**

SURFACE PREPARATION

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Concrete floors must be structurally sound with all previous coatings removed, clean and free of oil, grease, wax, latex compounds, curing compounds, efflorescence, laitance, dust and all foreign matter, back to an open porous matrix of the concrete. Professional cleaning by mechanical means in line with sound building industry practices is as suggested in “International Concrete Repair Institute Guideline No. 312.R2-2013” (formerly No. 03732-1997) <http://www.icri.org/publications/guidelines.asp>, will provide a surface profile of between CSP3 to CSP7 (CSP=concrete surface profile). Further information is supplied in Ardex Technical Bulletin TB041.

Subfloor shall be inspected and corrected for moisture in accordance with AS 1884-2012 or any other surface conditions that may affect the performance of the underlayment or finished floor covering.

PRIMER FOR STANDARD ABSORBENT CONCRETE SUBFLOOR.

Prime with ARDEX P51 Primer mixed, 1 Part ARDEX P51 with 2 parts water and apply evenly with a soft push broom. Do not leave any bare spots and remove all puddles and excess primer.

Allow to dry to a clear thin film (min 3 hours max. 24 hours) and bulk fill shall not be applied until primer is dry. Primer coverage is approximately 5 to 10 m² per litre.



PRIMER FOR EXTREMELY ABSORBENT CONCRETE

Make an initial application of 1 Part ARDEX 51 mixed with 3 parts water using a soft push broom. Do not leave any bare spots and remove all puddles and excess primer. Allow to dry thoroughly before proceeding with a second (2nd) application of primer, 1 parts water to one part ARDEX 51.

MIXING AND INSTALLATION

- a. Mix design for FLC/ SL Grade Polystyrene Bead or 500C Perlite is as follows:-

SL Grade Beads

1 x 20 kg ARDEX K80, K301, K12N, K15M or K009 powder with normal gauge water for the product

15 litres of SL Grade Polystyrene Bead (bead size 3 – 4mm)

or

500c Perlite

1 x 20 kg ARDEX K80, K301, K12N, K15M or K009 powder with the following gauge water ratios:

K80 or K301 with 4 to 4.5 litres of water

K12N, K15M or K009 with 4.5 to 5 litres of water

15-24 litres of C500 grade Perlite

Recommended method for batching of polystyrene bead. A length of 75mm PVC pipe has been taped into the mouth of the plastic bag holding the beads to make a pouring spout.

The beads are quickly and easily batched into a pre-marked measuring bucket. The easiest way to do this is put 15 - 20 litres of water into the container and mark with a water proof marker.



- b. Place the CORRECT AMOUNT of water into a minimum 60 litre mixing bucket. Warning - any additional mixing water will result in segregation of the SL Grade Polystyrene Bead in the matrix. Perlite C500 mixes have a range with a slight degree of nominal over-watering permitted.
- c. While using a heavy duty low speed electric drill fitted with a “**ribbon type**” mixing paddle add the ARDEX FLC powder to the cool clean water and mix for 1 to 1½ minutes until a lump free flowing mortar is obtained.

(Note this is an exception to Ardex’s normal recommendations to use a paddle type mixer). The use of severe mixing regimes can also crush the Perlite granules.



Pouring the Ardex FLC into the mixing container with the mixing water pre-batched using an Ardex water gauging bucket. The ribbon mixing paddle on the drill mixer can be clearly seen.

Note: this mix is quite thick and will over strain low power drills.



- d. When adding the lightweight aggregate the blades of the “ribbon type “ mixing paddle must be visible to ensure that the vortex action of the mixing paddle effectively draws the aggregate (this is particularly important with the SL Grade Polystyrene Bead) into the mortar to blend and coat the aggregate and provide even distribution of it throughout the mix.

The blades of the mixer are just visible in the centre and the beads are being drawn down into the mix by the vortex.



Swirling the mixer around the mixing container assists the distribution of the beads.



- e. Add the 15 or 20 litres of SL Grade Polystyrene Bead or 15-24 litres of C500 Perlite slowly to the liquid ARDEX FLC while mixing with the “ribbon type” mixing paddle until all the aggregate grains or beads are coated and evenly distributed throughout the mix. Mix time 1 – 2 minutes.
- f. Immediately install the mix to the prepared and primed floor by pouring the mixed mortar to a wet even edge and spread “without delay” using an ARDEX hand trowel, ARDEX stand-up thickness rake, or straight edge to the required height. **DO NOT OVER WORK OR ALLOW THE MATERIAL TO SEGREGATE.**

Warning - The Perlite mix has a shorter working time than the foam bead mix.



Pouring the mix to a wet edge. If the material becomes segregated due to overworking, it must be removed and discarded.

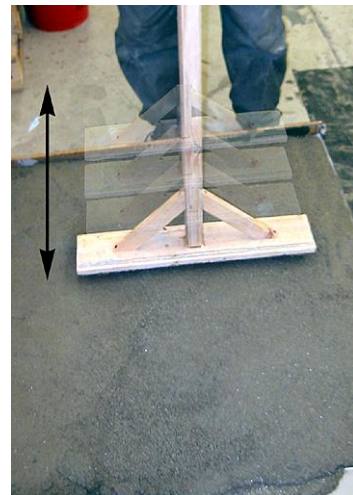


- g. **Minimum** installation thickness for the lightweight topping is **15mm**, however where a thinner thickness is required such as filling in slab deflections, neat ARDEX smoothing cements or A45 mortar can be used to provide a smooth transition to adjacent levels.
- h. Similar installation techniques as used when installing sand/cement screeds may be useful when installing the ARDEX lightweight topping.
- i. An ARDEX stand up smoothing spreader used at 90° to the surface can be used to shave off high points and assist in the smoothing process.

Final Finishing:

Tamping the mix down after it has been spread by thickness rake, straight edge or trowel.

The tamp is basically a length of timber 500-600mm long and 150mm wide and 19mm thick fitted with a handle approximately 1200mm long.



- j. Final finishing by using a tamping pad or hand trowel to pad down the surface will achieve a flat/tight finish.
- k. It is important that the placement of the ARDEX lightweight topping provides a flat finish to enable a maximum 3 – 4 mm smoothing layer of ARDEX F.L.C.
- l. The ARDEX lightweight topping should be left for 4 hours before walk-ability.
- m. The uneven surface finish of the ARDEX lightweight topping can be sanded or lightly ground to remove high points to provide a flat finish.
- n. Thoroughly vacuum to remove all loose residues of dust grit and SL Grade Polystyrene Bead or 500C Perlite.
- o. Allow the ARDEX lightweight topping to dry for 16 -18 hours at 20°C prior to priming with ARDEX P51.
- p. Prime with ARDEX P51 Primer mixed 1:2 with water and apply evenly with a soft push broom. Do not leave any bare spots and remove all puddles and excess primer. Allow to dry to a clear, thin film (min 3 hours max. 24 hours) and smoothing coat shall not be applied until primer is dry.
- q. Place ARDEX K15M, ARDEX K12N, ARDEX K009, ARDEX K80 or ARDEX K301 Levelling cements at an average 3 - 4mm to provide a smooth flat finish (5mm for K80).



- r. Underlayment can be walked on in 2 – 3 hours at 20° C
- s. Refer to the relevant ARDEX Levelling Cement for specific drying times prior to the installation of floor coverings.

TECHNICAL DATA

The following values are test results obtained using ARDEX K500 smoothing cement as originally specified in this system in 2004. They should be considered indicative of those that can be obtained using ARDEX K80, ARDEX K15M and ARDEX K301 which have similar general properties to the older ARDEX K500.

Strength properties:

Ardex K500 + SL Grade Polystyrene Bead (13.5kg/m³ Huntsman 6940 Bead)

Compressive Strength	Flexural Strength
At 3 days approx 4.3 MPa	2.2MPa
At 7 days approx 5.7 MPa	3.0MPa
At 28 days approx 6.9 Mpa	

A more recent test was performed using Ardex K12N and the following values were obtained at 28 days.

Compressive Strength – 7.6MPa and Flexural Strength 3.8MPa which as can be seen are comparable to the original mix design. These would be applicable to K009 as well.

Ardex K12N + Inpro Perlite C500 Grade (24 litre mix)

Compressive Strength at 28 days – 13MPa and Flexural Strength 3.8MPa

Note- the final properties obtained for a floor will be dependent on the quality of the beads, and effectiveness of the material mixing (distribution of the beads for example) and tamping down of the applied topping.

Specifiers should determine the floor loadings expected and confirm that the floor coverings are able to resist these loadings to avoid indentations or damage to the subfloor.

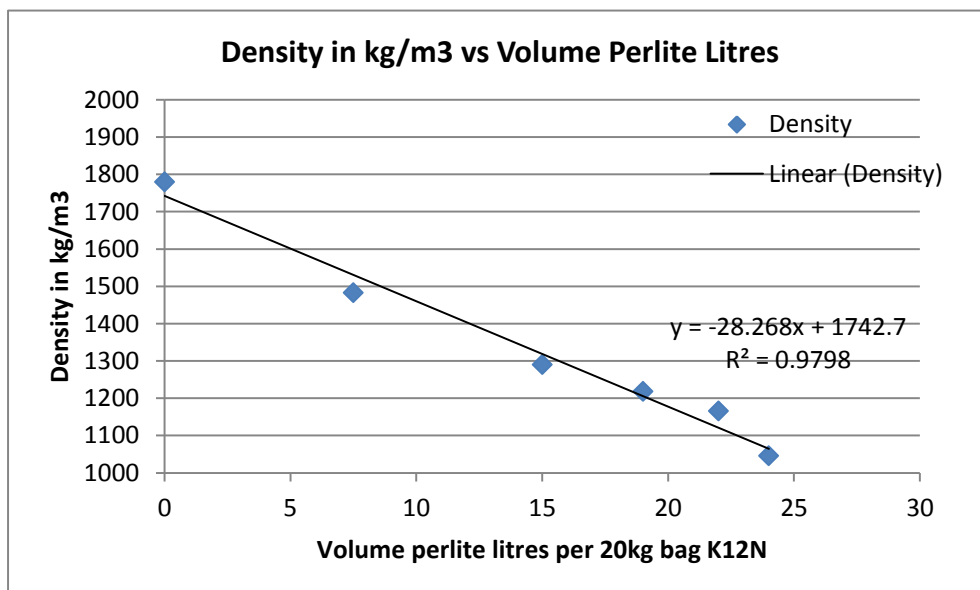
Mass Per unit Volume:

SL Grade Polystyrene Bead

1200kg per cubic metre for ARDEX K80 and
1100-1200 for ARDEX K15M, K12N, K009 or ARDEX K301.

Inpro Perlite C500 Grade

The density can be estimated from this graph.



Coverage

20kg of ARDEX smoothing cement mixed with 15 litres of SL Grade Polystyrene Bead yields approximately 20 litres of mixed mortar or covers 1m² at 20mm thickness.

20kg of ARDEX smoothing cement mixed with 24 litres of Perlite 500C yields approximately 23 litres of mixed mortar or covers 1.2m² at 20mm thickness.

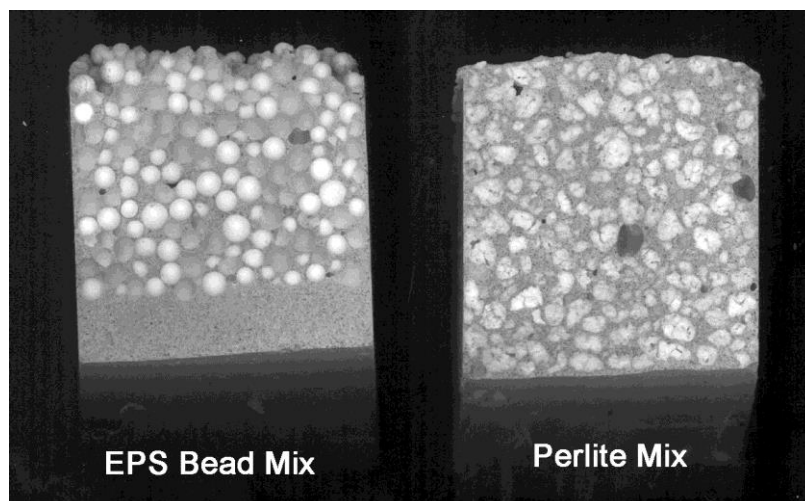
Further data

The use of non-engineering grades of expanded polystyrene foam beads of the same general size and rounded ball shape are possible, however the final topping properties will likely vary somewhat. The use of 'grist' (ground up foam of irregular size and shape) is not recommended.

Alternative sources of Perlite are feasible, but they must have the same general properties as Inpro 500C grade.

Typical Properties	Product Grades
	C500
Particle Size Distribution	Results as % cumulative retained on BS410 Sieves
4.75 mm / #4 Mesh	10%
4.00 mm / #5 Mesh	40%
2.80 mm / #7 Mesh	54%
2.36 mm / #8 Mesh	55%
2.00 mm / #10 Mesh	70%
1.18 mm / #16 Mesh	100%
0.60 mm / #30 Mesh	
0.30 mm / #50 Mesh	
0.15 mm / #100 Mesh	
Pan	
Loose bulk density (kg/m ³)	80 - 110
Ore Used	310 (1.18mm-3.35mm)

Ardex has not evaluated the longer term properties of FLC-Perlite mixes for generation of potential ASR (alkali silicate reaction) and interactions with components in the Ardurapid systems. These mixes should not be used in wet area type situations.



IMPORTANT

This Technical Bulletin provides guideline information only and is not intended to be interpreted as a general specification for the application/installation of the products described. Since each project potentially differs in exposure/condition specific recommendations may vary from the information contained herein. For recommendations for specific applications/installations contact your nearest Ardex Australia or Ardex New Zealand Office.

DISCLAIMER

The information presented in this Technical Bulletin is to the best of our knowledge true and accurate. No warranty is implied or given as to its completeness or accuracy in describing the performance or suitability of a product for a particular application. Users are asked to check that the literature in their possession is the latest issue.

REASON FOR REVISION - ISSUER

Complete revision of the last version of TB018 and inclusion of Perlite systems.

DOCUMENT REVIEW REQUIRED

24 months from issue

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