



## TECHNICAL BULLETIN – TB018

### ARDEX LIGHT WEIGHT BULK FILL SYSTEMS

2<sup>nd</sup> October 2024

#### INTRODUCTION & SCOPE

Using a lightweight “Rapid Drying” floor topping with applying floor coverings is a fast-track system that minimises additional weight loading on the subfloor.

ARDEX topping mix designs based on FLC/SL Grade Polystyrene Bead (Exfoliators Australia), Fine Grade Perlite, or Inpro Perlite C500 are easily mixed and installed using similar mixing and placement equipment as for the ARDEX range of self-smoothing cements.

Adding the SL-grade polystyrene Beads, Exfoliators Australia Fine Grade Perlite, or Perlite 500C to selected ARDEX smoothing cements reduces the flow properties, resulting in an irregular surface.

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

#### IMPORTANT NOTES:

- 1) The load-carrying capacity of the lightweight topping is directly related to its compressive strength, which is between 3MPa and 13MPa. The placement of 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 in situ topping, which remains the same.***
- 2) High point loadings such as heavy weights applied over small areas should be avoided.***
- 3) The ARDEX K301 used in this installation is NOT intended as a wear surface for external or internal installations. It is ONLY recommended for usage under sheet membranes such as the Shelterbit products for external installations.***

#### 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 is recommended. It should be done mechanically in accordance with sound building industry practices, as suggested in the “International Concrete Repair Institute Guideline No. 312.R2-2013” (formerly No. 03732-1997): <http://www.icri.org/publications/guidelines.asp>. This will provide a surface profile between CSP3 and CSP7 (CSP concrete surface profile). Further information is supplied in ARDEX Technical Bulletin TB041.

The subfloor should be inspected for moisture under AS 1884-2012 or any other surface conditions that may affect the performance of the underlayment or finished floor covering.

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#### PRIMER FOR STANDARD ABSORBENT CONCRETE SUBFLOOR



Prime with ARDEX P51 Primer mixed: 1 Part ARDEX P51 with 2 parts water. 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 do not apply bulk fill until the primer is dry. Primer coverage is approximately 5 to 10 m<sup>2</sup> 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 completely before proceeding with a second (2nd) application of primer mixed in the ratio 1 part water to 1 part ARDEX 51.

### **MIXING AND INSTALLATION**

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

#### **SL Grade Beads**

1 x 20 kg ARDEX K80, K301, K12, K15, or K275 powder with normal gauge water for the product.

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

or

#### **Exfoliators Australia Fine Grade Perlite**

1 x 20 kg ARDEX K15 powder with normal gauge water for the product

15 litres of Exfoliators Australia Fine Grade Perlite

or 500c Perlite

1 x 20 kg ARDEX K80, K301, K12, K15, or K275 powder with the following gauge water ratios:

K80 or K301 with 4 to 4.5 litres of water

K12, K15, or K275 with 4.5 to 5 litres of water

15-24 litres of 500c grade Perlite



This is the recommended method for batching polystyrene beads. To make a pouring spout, a 75mm PVC pipe has been taped into the mouth of the plastic bag holding the beads.

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



- b. Place the CORRECT AMOUNT of water into a 60 litre (minimum size) mixing bucket. Warning - any additional mixing water will segregate the SL Grade Polystyrene Bead in the matrix. Perlite C500 mixes have a range with a slight degree of nominal over-watering permitted.
- c. c. 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 that this is an exception to ARDEX's normal recommendation to use a paddle-type mixer.) 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.



- a. 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 an even distribution 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.



- b. Slowly add 15 or 20 litres of SL-grade polystyrene Beads, 15-24 litres of C500 Perlite, or 15L of Fine-Grade Perlite 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. The mixing time is 1 – 2 minutes.
- c. Pour the mix onto the prepared and primed floor, pouring the mixed mortar to a wet, even edge, and immediately spread using an ARDEX hand trowel, ARDEX stand-up thickness rake, or straight edge to the required height. DO NOT OVERWORK 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.



- a. The **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 ARDEX A45 mortar can be used to provide a smooth transition to adjacent levels.

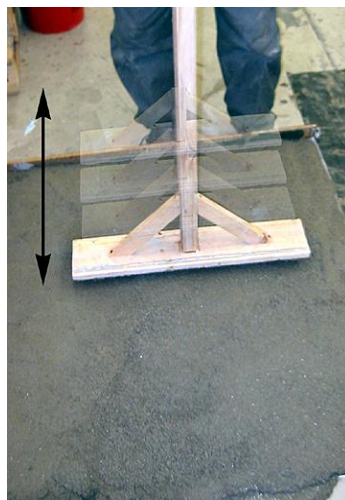


- b. Similar installation techniques, such as those used when installing sand/cement screeds, may be helpful when installing an ARDEX lightweight topping.
- c. C. An ARDEX stand-up smoothing spreader used at 90° to the surface can be used to shave off high points and assist in the smoothing process.

#### 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, 150mm wide, and 19mm thick, fitted with a handle approximately 1200mm long.



- d. Final finishing: Using a tamping pad or hand trowel to pad down the surface will achieve a flat/tight finish.
- e. 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.
- f. The ARDEX lightweight topping should be left for 4 hours before it can be walked on.
- g. The uneven surface finish of the ARDEX lightweight topping can be sanded or lightly ground to remove high points and provide a flat finish.
- h. Vacuum to remove all loose residues of dust grit and SL Grade Polystyrene Bead or 500C Perlite.
- i. Allow the ARDEX lightweight topping to dry for 16 -18 hours at 20°C before priming with ARDEX P51.
- j. Prime with ARDEX P51 Primer mixed 1:2 with water applied 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). The smoothing coat should not be applied until the primer is dry.
- k. Place ARDEX K15, ARDEX K12, ARDEX K275, ARDEX K80 or ARDEX K301 Levelling cements at an average 3 - 4mm thickness to provide a smooth flat finish (5mm for K80).
- l. The underlayment can be walked on in 2 – 3 hours at 20° C
- m. Refer to the relevant ARDEX Levelling Cement for specific drying times before installing 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 obtained using ARDEX K80, ARDEX K15 and ARDEX K301, which have similar general properties to the older ARDEX K500.***





### **Strength properties:**

#### **ARDEX K500\* + SL Grade Polystyrene Bead (13.5kg/m<sup>3</sup> 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 K12. 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 apply to ARDEX K220 as well.

#### **ARDEX K12 + Inpro Perlite C500 Grade (24 litre mix)**

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

**Note: The final properties obtained for a floor will depend on the quality of the beads and the effectiveness of the mixing (distribution of the beads, for example) and tamping down of the applied topping.**

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

#### **ARDEX K15 + Fine Grade Perlite (Exfoliators Australia)**

##### **Compressive Strength**

##### **Flexural Strength**

At 7 days ..... approx. 16.9 MPa                      4.1MPa

At 28 days ..... approx. 21.1 MPa                      6.1MPa

### **Mass Per Unit Volume:**

#### **SL Grade Polystyrene Bead**

**1200kg per cubic metre for ARDEX K80 and**

**1100-1200 for ARDEX K15, K12, K275, or ARDEX K301.**

#### **Exfoliators Australia Fine Grade Perlite**

**1600kg per cubic metre for ARDEX K15.**

#### **Inpro Perlite C500 Grade**

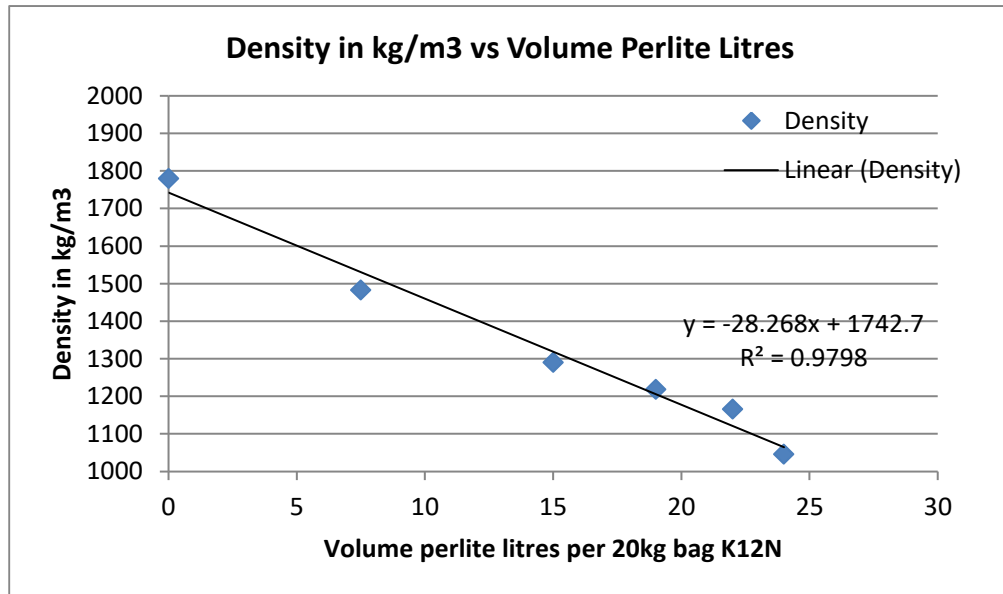
The density can be estimated from this graph.

### **Coverage**

20kg of ARDEX smoothing cement mixed with 15 litres of SL Grade Polystyrene Bead yields approximately 20 litres of mixed mortar or covers 1m<sup>2</sup> at 20mm thickness.

20kg of ARDEX smoothing cement mixed with 24 litres of Perlite 500C yields approximately 23 litres of mixed mortar or covers 1.2m<sup>2</sup> at 20mm thickness.

20kg of ARDEX smoothing cement mixed with 15 litres of Fine-Grade Perlite yields approximately 17 litres of mixed mortar, which covers 1m<sup>2</sup> at 17mm thickness.



#### Further data

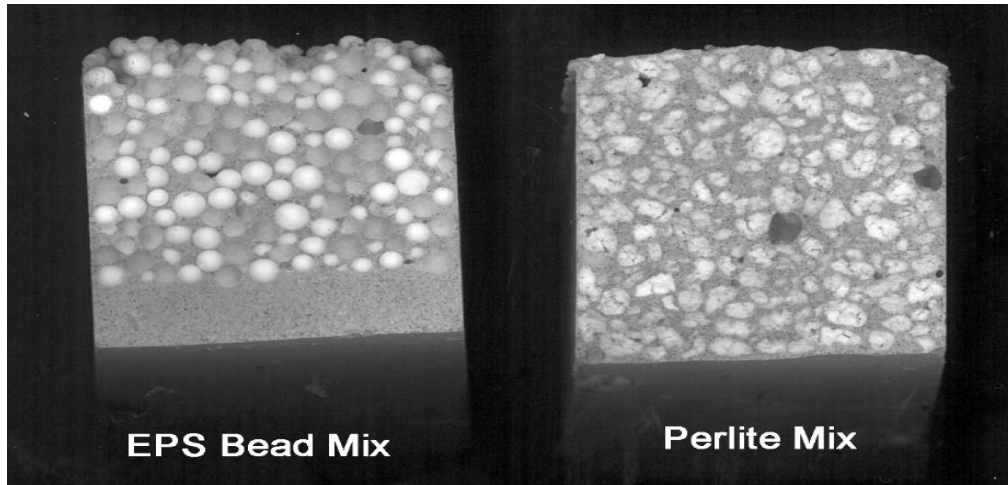
*The use of non-engineering grades of expanded polystyrene foam beads of the same general size and rounded ball shape is possible; however, the final topping properties will likely vary somewhat. The use of 'grist' (ground-up foam of irregular size and shape) is not recommended.*

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

Typical Properties	Product Grades
	<b>C500</b>
<b>Particle Size Distribution</b>	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 <sup>3</sup> )	80 - 110
Ore Used	310 (1.18mm-3.35mm)



ARDEX has not evaluated the longer-term properties of FLC-Perlite mixes for generating 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 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**

Change of slogan and address

**DOCUMENT REVIEW REQUIRED**

36 months or whenever third-party suppliers change their recommendations.

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