TECHNICAL BULLETIN – TB029

ARDEX LEVELLING COMPOUNDS OVER HEATED CONCRETE AND TIMBER OR COMPRESSED FIBRE-CEMENT SUBFLOORS EXISTING IN SLAB, HOT PIPES & WIRE-STRIP HEATING SYSTEMS

Date: 16th February 2024

INTRODUCTION & SCOPE

Subfloor heating is becoming a popular climate control medium offering the client many benefits and creature comforts. Installing flooring over heated subfloors requires all the components to be able to accommodate the thermal variations associated with this flooring concept. The forces and thermal movement associated with heated subfloors can place additional stresses onto components within the heated subfloor and floor coverings.

Floor heating has traditionally been placed using heating elements into sand/cement screeds or the concrete subfloors, requiring long drying times for concrete, lifting floor heights and adding considerable weight where sand/cements screeds are used.

SOLUTIONS

CONCRETE

The ARDEX K15, K12 New, K120, K125, K220 and K275 (mixed with ARDEX E25) and ARDEX K55 Self Smoothing Cements requires only 3-6mm coverage over the electric heating cables when these are installed onto the subfloor, or 3mm of material when used on subfloors with heating systems installed within the slab. Floor coverings can be laid the next day.

NOTE: ARDEX K80 is designed to be laid at a minimum of 6mm and is an industrial topping containing a coarser grade of sand than the other K series products and can be used for heated floors with either cables within the slab, or cables laid onto the subfloor and embedded in the topping.

TIMBER OR COMPRESSED FIBRE-CEMENT

The ARDEX K65 and ARDITEX NA Self-Smoothing Cements require only 3-6mm coverage over the electric heating cables. Floor coverings can be laid after 2 days.

NOTE: ARDEX K65 and ARDITEX NA can also be used over concrete surfaces as well.

TILING

ARDEX supplies a range of tile adhesives suitable for bonding to the underlayment over both concrete and timber floors.

PRECAUTIONS

To provide additional protection when installing floor-levelling cement over pre-existing heated subfloors we recommend the following procedures.

A. Heating element to be disconnected and bring down subfloor temperature to a preferred max. +18°C, but no less than $+10^0$C.

B. Subfloor shall be inspected and corrected for moisture in accordance with AS 1884-2012 or AS2455-2007, or any other conditions that may affect the performance of the underlayment or finished floor covering.

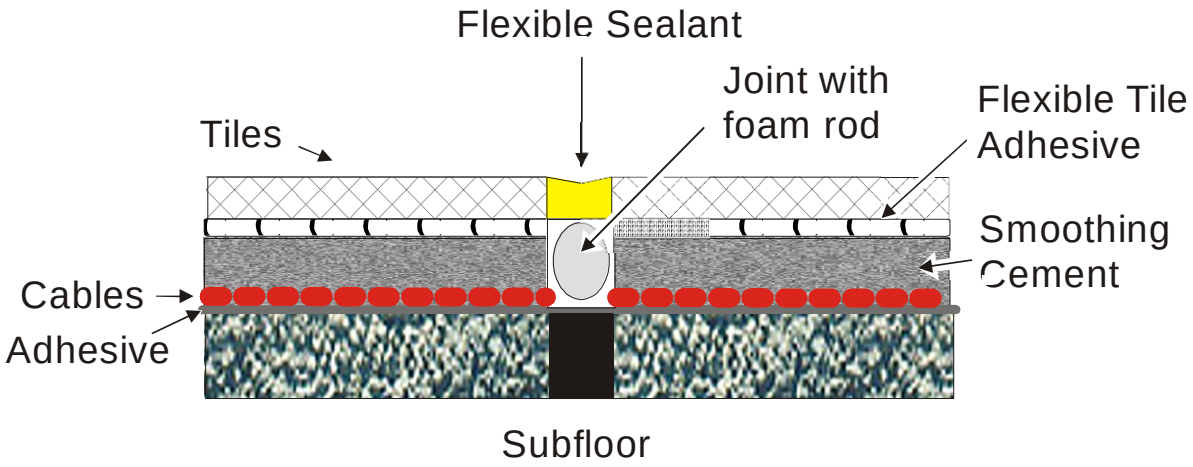
C. Warm water systems where heated water is pumped through pipes sitting directly on the slab should not be embedded in the liquid smoothing cements. The smoothing cements can be applied over concrete with heating pipes embedded, but the depth needs to be 25mm at least.
Where the pipes are held in a plastic framed structure that sits on the concrete subfloor, and allows the smoothing cement penetration around the pipes, the use of K80 can be considered.
Pipes can be direct embedded in an A38-A48 engineered screed.

However, any leaks can result in damage to the levelling compound or possible blistering of the vinyl.

D. Refer to manufacturer's specifications for laying heating cables to confirm that they comply with this procedure.

E. All expansion joints in the tile bed should be transferred through the ARDEX liquid applied smoothing cement topping (see diagram below).

F. The subfloor must be correctly prepared as heated subfloors are high stress applications, and poor surface preparation and contamination can compromise topping bond. The development of show through cracks is possible over the heating elements.



TOPPING INSTALLATION

CONCRETE

1. It is essential that the concrete subfloor provides a mechanical key for the underlayment topping. Diamond shaving/grinding, shotblasting or scarifying the concrete surface to provide a roughened, clean, sound, solid, and porous matrix is required.

2. Primer to be ARDEX P51. Mix ARDEX P51 P1:2 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 underlayment shall not be applied until primer is dry.

   NOTE – Where the smoothing cement is ARDITEX NA, an alternate primer is ARDEX Multiprime, applied undiluted using the same process as the diluted P51.

3. *FOR INSTALLATION ONTO SLABS WITH INTERNAL HEATING* -

   The cement-based self-smoothing underlayment shall be ARDEX K15, ARDEX K55, ARDEX K12N, ARDEX K120, ARDEX K125, ARDEX K220 and ARDEX K275 Self-Smoothing Cements for 3mm thickness, or 6mm+ for ARDEX K80. The following smoothing cements shall be mixed with ARDEX E25 Resilient Emulsion whilst K80 and K55 are used without ARDEX E25.

   MIX RATIO
   1) 20 kg bag of K15 Microtec with
   1.6 litres of ARDEX E25 plus
   4 litres of cool clean water

   2) 20 kg bag of ARDEX K12 New with
   1.6 litres of ARDEX E25 plus
   4 litres of cool clean water

   3) 20 kg bag of ARDEX K120, K175, K220 or K275 with
   1.6 litres of ARDEX E25 plus
   3.5 litres of cool clean water

   Minimum thickness of ARDEX K15, K55, K12N, K120, K125, K220 and K275 to be 3mm

Minimum thickness of ARDEX K80 to be 6mm

4. *FOR INSTALLATIONS USING CABLES OR MATS ON THE SLAB*

   Install heating mat or cable system by adhesive fixing the cable/matting at the edge of the cable/matting* roll at specified centres using ARDEX S28, ARDEX A45, hot melt glue, or liquid nails ensuring that the adhesive used for fixing the cables is used sparingly, avoid soiling of the primed concrete surface.

   Note: Mats must permit approximately 80% contact between floor smoothing cement and subfloor. Do not apply smoothing cement over a full coverage insulating mat.

   The cement-based self-smoothing underlayment shall be ARDEX K15, ARDEX K55, ARDEX K12N, ARDEX K120, WARDEX K125, ARDEX K220 or ARDEX K275 Self-Smoothing Cement, which shall be mixed with ARDEX E25 Resilient Emulsion.

   Neither ARDEX K80 nor ARDEX K55 requires the use of ARDEX E25.

   MIX RATIO
   1) 20 kg bag of ARDEX K15 Microtec with
   1.6 litres of ARDEX E25 plus
   4 litres of cool clean water

   2) 20 kg bag of ARDEX K12 New with
   1.6 litres of ARDEX E25 plus
   4 litres of cool clean water

   3) 20 kg bag of ARDEX K120, K125, K220 or K275 with
   1.6 litres of ARDEX E25 plus
   3.5 litres of cool clean water

   Minimum thickness of ARDEX K15, K55, K12N, K120, K125, K220and K275 above the heating coil is 4mm - 6mm depending on system.

   Minimum thickness of ARDEX K80 above the heating coil is 6mm.

5. For K15, K12N or K80 allow to cure 16-18 hours minimum at 20°C before installing impervious coverings, carpets and floating timber. Tiles can be laid after 4-6 hours.
6. K120, K175, K220 and K275 require 24 hours for carpet and 48 hours for impervious coverings. Tiles can be laid after 4-6 hours.
7. For K55 allow to cure for 60-90 minutes at 20°C before installing impervious coverings, carpets, floating timber or tiles. Direct bonded timber requires around 16-18 hours drying.

TIMBER & COMPRESSED FIBRE-CEMENT

1. The wooden subfloors must be clean and free of oil, grease, wax etc., and should be solid and fixed to provide a rigid base. Any boards exhibiting movement should be re-nailed and open joints should be filled with a suitable fast setting mortar. The examination of the subfloor is a professional evaluation by the contractor and is most important.
2. Sand the wooden subfloor, using a coarse abrasive, to remove all foreign matter and to provide a mechanical surface for the installation of the primer.
3. When using Compressed Fibre Cement Sheet (CFC) it shall be laid as per the manufacturer's instructions. Compressed fibre-cement butt joints must be supported by a batten/joist and firmly fixed in to allow no movement. Sheets are to be adhered with ARDEX RA 88 Plus between panels.

   Compressed fibre-cement to be free from dust, dirt, grease, oil, paint etc. Mechanically prepare (progress, drum, or belt sand) to provide a roughened surface and to remove all adhering foreign matter. Vacuum the surface to remove all dust and dirt.

   Note: Avoid breathing dust and wear approved personal protective equipment and use appropriate dust suppression equipment. Refer to sheet manufacturers advice in this area. ***Do not sand old compressed asbestos cement sheeting***.

4. Prime the wood subfloor with ARDEX P82 ULTRA PRIME in accordance with printed technical data. Prime CFC subfloors with either ARDEX P82 ULTRA PRIME, or alternatively when using ARDEX K65 or ARDITEX NA, the priming can be done with ARDEX P51 diluted 1:1 or ARDEX MULTIPRIME.
5. Install heating cable/mat system and adhesive fix the cable/matting at the edge of the cable/matting roll at specified centres using hot melt glue, or liquid nails ensuring that the adhesive used for fixing the cables is used sparingly, avoid soiling of the primed concrete surface.
6. Install ARDITEX NA as per the printed technical data sheet.
7. Minimum thickness of ARDEX K65 and ARDITEX NA above the heating coil/mat is 3mm - 6mm depending on system.
8. Finish the ARDEX K65 or ARDITEX NA with a spiked roller immediately after application to achieve a smooth flat finish.
9. Allow the ARDEX K65 or ARDITEX NA to dry completely prior to installing flooring.
10. Allow to cure 48 hours minimum at 20°C before installing coverings, unless constrained by the floor covering/flooring adhesive manufacturers' recommendations or relevant standards, whichever is the greater.

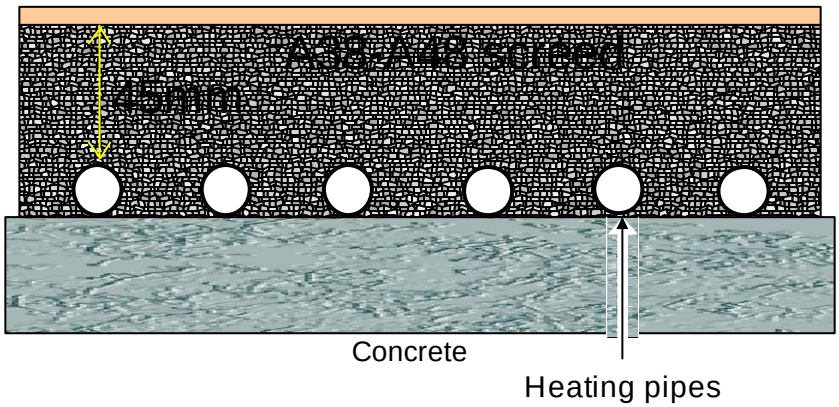
HYDRONIC TYPE HEATED WATER PIPES IN AN A38-A48 SCREED

Water filled heating pipes should not be placed into the liquid smoothing cement materials, as there can be issues with cracking and adhesion. However, this can be done where the pipes are held in a plastic framework on the subfloor, using K80 with 10mm cover over the frame.

A38/A48 SCREED SYSTEM

The water pipes can be embedded into an ARDEX A38 or A48 engineered screed, and then the flooring system placed on top.

The minimum screed thickness over the pipes must be 45mm, and then the surface can have direct application of the flooring system, or a smoothing cement finished applied.



The screed is applied in accordance with the product datasheets, and can be direct bonded onto concrete or floating over surfaces such as compressed fibre-cement sheet or timber floors (the latter types need to be able to support the weight of the screed ~90kg/m^2 for the screed alone).

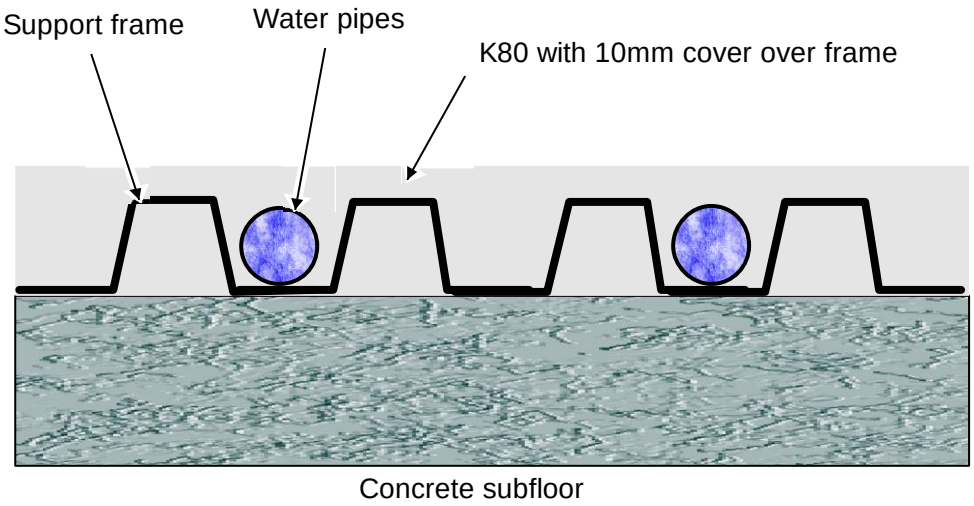
It is not recommended that the plastic sheet be placed over the heating pipes in a floating system since creases in the plastic, and variable thickness can create a crack in the overlying screed.

Where multiple heating circuits are used, each circuit in a screed panel must be separated a sealant filled movement joint, and each panel shall be no more than 40m^2.

Irregular panel shapes are not recommended due to stress concentrations at corners, and sealant joints must be installed around the perimeters.

HEATING PIPES IN A FRAMEWORK

Where the water pipes are placed into a plastic holding framework onto the concrete floor, it is feasible to embed them in ARDEX K80. The framework must have holes in it to allow the smoothing cement



to pass through, and the system MUST also be one that is intended to be used with liquid smoothing cements. A number of these systems are intended to work with screeds and so are not suitable. Where pipes are embedded in the smoothing cement, after the allowed cure time, the floor must be cycled to make sure there are no leaks or other defects which will cause subsequent problems for the floor covering.

FLOOR COVERING

In general the following product applications apply:

ARDEX K15, K12, K55, K120, K125, K220, K275 or K80 suitable for the following coverings:

Vinyl tiles, strips and sheets, carpet, floating timber, tiles and rubber matting.

Note that K80 has coarser sand than K15 or K55 and may not suitable for all vinyls.

ARDEX K65 and ARDITEX NA

Carpet, floating timber or tiles.

Install carpet and vinyl coverings with no further preparation required other than touch up work using ARDEX FEATHER FINISH.

Tiling requires the use of a flexible adhesive and grout that will allow movement. The following products shall be used in accordance with their product data sheets.

For concrete floors use:

ARDEX X7 mixed ARDEX E90,

ARDEX X77 (with or without ARDEX E90),

ARDEX X56,

ARDEX ABAFLEX,

ARDEX S28 mixed with ARDEX E90,

ARDEX X18 (with or without ARDEX E90),

ARDEX WA 100 epoxy

ARDEX X78 (with or without ARDEX E90).

For timber or CFC floors use ARDEX X56.

Grout joints require a flexible grout and choices are ARDEX FG8 GROUT, ARDEX FSDD, ARDEX WJ50 all mixed with ARDEX GROUT BOOSTER.

Install using conventional tiling practices plus allow expansion joints at 4 metre centres and at all vertical abutments, in accordance with Australian Standards AS 3958.1-2007.

For more information about tiling over heated systems refer to ARDEX Technical Bulletin TB176 which covers in detail various adhesive system combinations.

COMMISSIONING THE FLOOR

Standard comments on curing of heated subfloors.

AS1884-2012 states:

4.1.3 Heated subfloors

Where underfloor heating units are installed the heating units shall be—

(a) turned on prior to laying of the floor covering for a minimum of 7 days to ensure that the moisture condition of the heated subfloor will permit successful laying of the coverings; and

(b) turned off 48 h prior to the commencement of installation to allow the subfloor to return to the temperature range recommended by the manufacturer of the floor covering. The heating units shall remain turned off during the laying operations and shall not be turned on again until 48 h after the laying is completed, in order to allow the adhesive to set.

Once the heating unit is turned back on it shall be increased at no more than 2ºC per day until the desired temperature has been achieved and shall not exceed a temperature greater than 28ºC.

It is important to recognise that sufficient drying and cure in the smoothing cement to lay floor coverings, is not the same degree of cure required before the floor heating is turned on.

Where levelling compounds have been used with vinyl or carpet, the heating can be turned on after two (2) to four (4) days depending on the product installed and the weather conditions.

ARDEX K15, K12 New K55, K80 have ARDURAPID drying and cure sufficiently for floor coverings to be laid in 16-18 hrs. However, the minimum cure time before energising of the floor heating is two (2) days, but when the temperature falls below 10^0C this needs to be extended.

In late Autumn, Winter, early Spring or in cold climate areas, ARDEX recommends that the cure time before energising the subfloor is a minimum of three (3) and preferably four (4) days, unless the room is heated to 18^0C or higher in which case two (2) days is sufficient.

ARDITEX NA is a hydration product, and ARDEX K120, K125, K220 and K275 are standard cured materials which initially dry, and then cure more slowly, especially in cold and wet weather (10-15^0C). The recommended curing time for these products is a minimum four (4) days. These products should not be applied below 10^0C.

Do not apply any smoothing cements when the temperature will fall below 5^0C during the drying-cure period as the cure will be severely retarded, or maybe permanently compromised.

Allow tiled installations to cure for a minimum of 7 days before turning on the heating.

WHEN COMMISSIONING THE FLOOR, TURN HEATING UNIT ON BY INCREASING TEMPERATURE APPROXIMATELY 2ºC PER DAY UNTIL THE DESIRED TEMPERATURE IS REACHED.

THE MAXIMUM RECOMMENDED TEMPERATURE IS 28ºC, AND DO NOT HEAT ABOVE 45ºC. THE FLOOR HEATING SHALL BE CONTROLLED WITH AN APPROPRIATE THERMOSTAT SYSTEM.

FAILURE TO OBSERVE THESE RECOMMENDATIONS MAY RESULT IN DE-BONDING OF THE TOPPING due to the development of tensile strains at the topping-floor interface.

ENERGISING THE HEATING BEFORE ADEQUATE CURING IN THE SMOOTHING CEMENT CAN ALSO RESULT IN DEVELOPMENT OF EXCESSIVE TENSILE STRAINS IN THE SMOOTHING CEMENT ITSELF.

PROBLEMS WITH ADHESIVES AND EXCESSIVE MOVEMENT IN TILED FLOORS CAN ALSO RESULT FROM OVER-HEATING THE SUB-FLOOR.

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

Change in usage of K80 over piped systems, where the pipes are placed in a framework.

REVIEW INTERVAL

36 months from issues

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