TECHNICAL BULLETIN – TB218

CERAMIC TILING FIBRE-CEMENT SHEETED TIMBER FLOORING
(SELECTED ARDEX C TYPE ADHESIVES WITH S1 AND S2 RATINGS)

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INTRODUCTION & SCOPE

A common industry practice has been to cover timber floor substrates with fibre cement sheet underlays prior to adhesive fixing of ceramic tile finishes. The key to success when installing ARDEX tiling adhesive products on a flexible surface like 'timber'; is to achieve a good bond between the substrate and the flooring cover, but also to minimise the vertical movement that occurs between the floor joists.

QUALIFICATIONS

1) **This recommendation only applies to:**
   a. **internal timber floors and not to any external decking or verandah**
   b. **domestic applications for new build houses or extensions**
2) The types of timber that the subfloor is made from must be certified as correct for flooring and can include T&G strip timber, particleboard (Structaflor™) and structural plywood. Timber frame constructions must also comply with the requirements of AS1684 Residential timber-framed construction.
3) Floors covered with hardboard (c.f. 'Masonite'), strip timber or MDF sheet are not acceptable surfaces.
4) Moisture sensitive and natural stone tiles require special consideration and may be subject to Technical Bulletin TB010 recommendations.
5) This bulletin does not cover the installation of thin (3-4mm thick) large format porcelain sheet tiles onto timber floors.
6) This bulletin does not preclude the need for waterproofing on floors that are subject to the requirements in AS3740 and the BCA for Class 1 building wet areas.

STRUCTURAL CONSIDERATIONS

Owners must take responsibility for the long term and short term stability of the flooring system, and tilers need to confirm that the floor is suitably rigid for tiling themselves. The subfloor should be solid and fixed to provide a rigid base and any boards exhibiting movement should be re-nailed.

The floor shall be fibre-cement sheeted with ceramic tile underlay (CTU) sheets *of a type specified to be used in this application by the sheet manufacturers* (min. 5-6mm thick). In other words, substituting wall or façade sheets for the correct underlay sheet is not acceptable. The sheets shall be installed in strict accord with the manufacturer's recommendations.

The maximum vertical deflection in the sheeted subfloor permitted when measured at a position centrally between floor joists (using a straight edge which exceeds the joist span in length) shall not exceed the figures shown in the table on the next page. This does not include any additional deflection of the whole floor that may occur between the bearers of the joists.

There is no standard test for this, but it is recommended that the floor be loaded with an 80kg weight to simulate an 'average' person (figure based on those for 19yrs males in the United States National Health and Nutrition Examination Survey, 1999–2002). This can easily be simulated by placing four 20kg bags of adhesive on the floor next to the straight edge. A set of feelers gauges or steel rule can be used to measure the deflection. Where the measured floor deflection exceeds the values shown in the following table, the floor is deemed to be too flexible for these adhesives and requires other forms of stiffening.

Floor Joist Centres → Tile size ↓	300mm	400mm (~16")	450mm	600mm (~24")
<100mm shortest edge length (small)	No recommendation	No recommendation	No recommendation	No recommendation
100mm-350mm edge length (medium format)	1/360 0.8mm	1/360 1.1mm	1/360 1.3mm	1/360 ≤1.5mm (maximum value)
>350mm edge length (large format)	1/500 0.6mm	1/500 0.8mm	1/500 0.9mm	1/500 1.2mm

Qualitative indications of problems with floor deflections include things such as:

i. creaking and flexing,
ii. rattling of objects such items in cabinets when someone walks past,
iii. cracked existing tiles,
iv. cracked and broken up grout,
v. opening and closing of timber floor joints in the Z axis

The placement of fibre-cement sheeting will reduce the deflection, but will not cure problems with chronically unstable floors, such as ones that have insufficient number or reduced size of joists, loss of joist packing and rot or termite damage. Fibre-cement sheet primarily provides a more suitable type of surface for the cement based adhesive to get a 'bite' to.

JOINTS IN THE TILING SYSTEM

The installation of movement joints in the tile surface must comply with the recommendations in the ceramic tiling standard AS3958.1-2007.

Movement joints in tiled floors are installed to separate the tiled surface from fixtures such as columns and walls (all wall-floor junctions must have perimeter joints installed to isolate the tiled surface from the wall), subdivided large areas of tiled surface into smaller sections to allow for induced strains (the recommended areas are specified in the standard), and to interrupt the tiled surface where subfloor construction and movement joints are positioned.

The fibre-cement sheets shall have bond breaker tape used over each sheet joint to help resist problems with the adhesive and grout over these joints if they move, see 2) in next section.

MOISTURE

Timber floors must have excellent underfloor ventilation to eliminate vapour condensation. Underfloor moisture levels must be stable during the life of the flooring system with effective cross flow ventilation.

Free water sources must not be allowed under timber floors otherwise dimensional stability of the flooring will be compromised. It is not feasible to use a 'moisture barrier' to isolate an installation from moisture coming through a timber subfloor. Installing such a barrier is likely to lead to failure of the subfloor itself due to rot. Dampness also encourages vermin and termites.

Where moisture is found to be a problem this must be corrected by other means before any tile systems can be installed. Typically, this includes increasing ventilation, identification of leaking plumbing, or preventing lateral movement of moisture from other areas.

PRIMARY SURFACE PREPARATION AND ADHESIVE APPLICATION

These instructions apply for the applications of the following cement based adhesives.

Adhesive	Class
Ardex STS8+E90	C1TS1
Ardex X77+E90	$C2FT_TE_ES1$
Ardex Abaflex	C2TS1
Ardex S16+E90	C2FS1
Ardex Optima	C2TS2
Ardex MPP	C1ES2
Ardex X52*	C2S1
Ardex X18*	C2TES1
Ardex X18+E90 or Abalastic*	Not rated
Ardex X56	C1ES2
Ardex 2P Isoflex	C1ES2

**Note 1: X52/X18 require floor deflections not to exceed 1/500 of span. Refer to Technical Bulletin TB231.004 for information about X18 mixed with Ardex E90 or Abalastic.*

Note 2: Ardex X10, Ardex AM01, Forticrete Fortiflex, Forticrete Glue are NOT recommended in this application.

1) All fibre-cement sheeted floors that have been contaminated during installation or other building works (plaster residues, paint and coatings splashes, dust or other adhesive rubbish) must be sanded with 80 grit paper, vacuumed and primed with Ardex Multiprime. Dust suppressed equipment must be used, and in all cases the recommendations of the sheet manufacturers shall be followed. Sheets that are heavily contaminated with old adhesive residues should be replaced.
2) A bond breaker tape should be used over all joints between the fibre cement sheets and the adhesive. This is normally 50mm wide PVC tape.
3) Adhesive application and final tile placement shall be done to ensure a continuous unbroken 2.5mm **minimum** bed of adhesive under each tile. This can be accomplished by applying the adhesive with a 12 to 15 mm notch trowel held at 60^0 angle to the horizontal (i.e. nearly vertical) which results in adhesive notch lines about 6mm high. Then the tile is placed firmly and moved slightly back & forth across the adhesive notch lines to fully bed the adhesive and remove any notch voids.
4) The achieved adhesive contact coverage to both the tile back and substrate are recommended to be >90%, but in all cases must exceed the recommended minimum in AS3958 of >80% coverage for floors in residential situations. Where the correct coverage is not achieved the strength and resilience of the bed is reduced.
5) Application of tiles over tiles on this type of flooring substrate is feasible, however the underlying tiles must be sound and well bonded and the grout intact and not cracked.

GROUT APPLICATIONS TO TILE JOINTS

Grouting between the tiles shall be done with a modified C class grout mixed with Ardex Grout Booster (GB) to increase flexibility.

Where the booster is not used with C class adhesives there is a risk of the grout cracking and falling out.

It also possible to use the R class grouts Ardex WA or Ardex Abapoxy.

Grout Type (C)	Additive Ratio Booster : Water	Liquid Requirement per 20kg of Grout Powder
Ardex FG8	80% GB / 20% Water	3.4-3.5 litres GB + 0.8-0.9 litres water
Ardex WJ50	100% GB	4 litres GB
Ardex FSDD	80% GB / 20% Water	4.8 litres GB + 1.2 litres water

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

Addition of X18 and X18 with additives, some modifications to the text. Deletion of DG5.

DOCUMENT REVIEW REQUIRED

24 months from date of issue.

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