TECHNICAL BULLETIN – TB168

CERAMIC TILING WITH OPTIMA, ISOFLEX AND ARDEX X56 ON PARTICLEBOARD\PLYWOOD SHEET TIMBER FLOORING

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INTRODUCTION & SCOPE

The key to success, when installing ARDEX tiling adhesive products is to achieve a good bond between the sheet timber substrate (i.e. particleboard) and the floor covering. Proper preparation of the surface is the most important factor in achieving this bond.

The surface, therefore, must be sound, clean and free of oil, grease, wax, dirt, old tile, vinyl or carpet adhesives, asphaltic underlayments, dust, finishes, paint or any contaminant which might act as a bond breaker.

QUALIFICATIONS

1) This recommendation only:
    a. *Applies to internal timber floors and not to any timber walls*
    b. *Does not apply to ANY external decking or veranda*
    c. *Is for domestic applications and light commercial such as small shops and industrial unit offices, not large commercial or industrial.*
2) The types of timber that the subfloor is made from must be certified as correct for flooring (strip edged particleboard or structural plywood).
3) Floors covered with hardboard strip timber, hardboard underlay (c.f. 'Masonite') or MDF sheet are not acceptable surfaces; they are not moisture stable.
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 cover wet area floors subject to waterproofing requirements in AS3740 and the NCC/BCA.

See ARDEX Technical Paper TP008 for a discussion on various substrates.

STRIP TIMBER SUBSTRATE (PLANKS)

Whilst direct bond to strip timber is possible in many cases, there is a significant risk associated with tiling directly to a strip timber floor. ARDEX recommends sheeting the strip timber floor area with fibre cement sheet underlay prior to tiling. Where the timber floors require levelling prior to fibre cement sheeting, please refer to ARDEX Technical Bulletins TB110 or TB015/TB016 for more information.

STRUCTURAL CONSIDERATIONS

Owners must take responsibility for the long term and short-term stability of the flooring system and tilers themselves need to confirm that the floor is suitably rigid for tiling.

The subfloor should be structurally sound and fixed to provide a rigid base. Any boards exhibiting movement shall be re-fixed, preferably with screws, and remedial work may involve fitting additional framing to stiffen the floor, or by covering with fibre cement sheeting.

Subfloors such as in mobile homes are likely to undergo large deflections, should be sheeted with fibre cement sheets, before fixing tiles.

Where the floor is to be fibre-cement sheeted, they shall be *ceramic tile underlay* sheets of a type specified to be used in this application by the sheet manufacturers.

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.

Note: Fibre-cement sheeted floors may be subject to ARDEX Technical Bulletin TB218 tiling recommendations instead of these recommendations herein.

AS3958-2007 stipulates a maximum deflection movement of 1 in 360 of the span distance, dependent on the size of the tile to be adhered, however this may be insufficient for large format tiles and a higher degree of stiffness is recommended when using larger tiles.

Floor Joist Centres Spacing → Tile size ↓	**300mm**	**400mm (~16")**	**450mm**	**600mm (~24")**
<350mm edge length (medium format)	1/360 0.8mm	1/360 1.1mm	1/360 1.3mm	1/360 ≤1.5mm
>350mm edge length (large format)	1/500 0.6mm	1/500 0.8mm	1/500 0.9mm	1/500 1.2mm

Note: Whilst 1/360 of 600mm span is 1.7mm, the maximum shear recommendation is 1.5mm or less. It also needs to note that tiles larger than 600mm can require even lower deflections, such as 1/700th.

A give away is where items in the room rattle or move when the floor is walked on, the flooring clearly creaks or even bounces. There is no standard test for testing deflection, 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 feeler gauge or rule can be used to measure the gap under the straight edge. Where the measured floor deflection exceeds the maximum values listed above, the floor is deemed to be too flexible for these adhesives and requires other forms of stiffening.

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.

MOISTURE

Timber floors must have excellent underfloor ventilation to eliminate water 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.

AUSTRALIAN STANDARD

- The relevant standards for framed construction where timber flooring is most likely to be used are:
- AS1684 - 1999, Residential Timber Frame Construction
- AS/NZS 1859 (Particleboard)
- AS3958.1-2007, Guide to installation of Ceramics Tiles.
- *AS1170.1* (2002). Structural Design Actions Part 1 Permanent, Imposed and other Actions

PARTICLEBOARD\ PLYWOOD SUBSTRATE

Installer must ensure the particleboard surfaces are not contaminated with pesticide treatments (LOPS) as this affects the primers. Manufacturing resins, coatings, oils or stains and other contaminated surfaces shall be sanded 100% of areas with a 24-grit paper to CSP1 equivalent and vacuumed. Newly installed particleboard surfaces must be thoroughly cleaned to ensure a dust free surface, but not necessarily sanded.

A 50mm wide PVC bond breaker tape shall be used between the sheet joints and the adhesive bed. The tape is applied to the board surface.

PRIMING

Proper application of the primer is crucial to the integrity of the tile installation in the long run. Applying the primer as recommended helps optimize the adhesion strength to the timber substrate. Method of application and conditioning of the recommended primers are described below;

a) Mix 2 parts (by weight) of ARDEX Optima powder to 1 part of Optima liquid. Add optima powder to the liquid whilst stirring with a mechanical mixer. Stir until both parts are homogeneously mixed. Apply Optima slurry with a sponge roller leaving a thick coat of Optima slurry over the timber substrate. Allow the slurry coat to dry fully before tiling over.

b) ARDEX 82 Ultraprime primer should be applied as recommended with a short nap or sponge roller leaving a thin coat of primer, no heavier than a thin coat of paint to a transparent pink film over the timber substrate. For optimum adhesion, the tile adhesive should be in contact with the primed surface whilst the primer is wet or tacky. To avoid walking on wet primer areas should be done in stages.

c) ARDEX WPM300 primer should be applied as recommended with a short nap roller to produce a coverage coat 300μm wet – 3m^2/litre. Whilst the WPM300 is still wet clean dry sand (ARDEX Primer sand) or an equivalent clay free 0.3-0.5mm grain size sand is broadcast at 700gms/m^2 to achieve >90% coverage. The following day the excess sand is broomed and vacuumed up.

d) ARDEX P9 primer (ABA Abaprime) should be applied as recommended with a short nap roller or by brush at 6m^2/litre with full coverage.

ADHESIVE APPLICATION

1) 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 mm notch trowel held at 60^0 angles to the horizontal (i.e. nearly vertical) which results in adhesive notch lines about 5-6mm high. Tiles larger than 450mm can be back buttered in accord with AS3958 recommendations. Then the tile is placed firmly and moved slightly sideways across the adhesive notch lines to fully bed the adhesive and remove any notch voids.

2) 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 and >85% for light commercial applications.

TILE ADHESIVE SYSTEM INFORMATION

Tile Adhesive	Primer	Recommended minimum drying times of primer prior to tiling (minutes)	Minimum Adhesive bed Thickness (mm)
X56 / 2 Part Isoflex (Aba Floorflex)	Optima Primer	40*	X56 – 2-2.5mm 2P Isoflex – 5mm
	ARDEX P82	0	
	ARDEX WPM300 + broadcast sand	12 hours	
	ARDEX P9	30	
Optima	Optima Primer	40*	2mm
	ARDEX P82	0	

* minimum drying time based on 20°C, 50%RH

** Remove P82 primer from the substrate by mechanical methods, if drying time has exceeded 24 hours after application.

INSTALLATION STEPS FOR SYSTEM

ARDEX P82 or P9 primer	ARDEX WPM300 + Sand primer	ARDEX Optima as primer
Prepare timber surface as recommended	Prepare timber surface as recommended	Prepare timber surface as recommended
Apply bond breaker tape 30-50mm wide to all sheet points	Apply bond breaker tape 30-50mm wide to all sheet points	Apply bond breaker tape 30-50mm wide to all sheet points
Prime surface with ARDEX P82 Ultraprime or ARDEX P9 using brush or roller (sponge or nap)	Prime surface with ARDEX WPM300 applied by nap roller and broadcast sand, Allow to dry	Prime the surface with ARDEX Optima as recommended using a sponge roller
Adhesive fix tiles - *Immediately after priming with ARDEX P82* Allow 30 minutes drying time for ARDEX P9 Fix tiles with ARDEX X56, 2P Isoflex or Optima	Sweep and vacuum floor. Adhesive fix tiles the following day after priming with ARDEX X56, 2P Isoflex or Optima	Adhesive fix tiles 40 minutes after priming with ARDEX X56, 2P Isoflex or Optima
Apply ARDEX grout mixed with Grout Booster	Apply ARDEX grout mixed with Grout Booster	Apply ARDEX grout mixed with Grout Booster

NOTE: Direct tiling can also be performed with ARDEX WA100 epoxy adhesive trowelled directly to the subfloor.

COVERAGE

PRODUCT	PACK SIZE	COVERAGE (M^2)
ARDEX P9	1 litre pail 4 litre pail	6* 24*
ARDEX X56**	15 kg powder	8-10
ARDEX Isoflex (2 part) **	10kg liquid + 2x20 kg powder	19-21
ARDEX Optima**	Mini Kit (1.7kg Liquid/5kg powder) Large Kit (10kg liquid/6x5kg powder)	1.2 7

PRODUCT	PACK SIZE	COVERAGE (M^2)
ARDEX Optima (as primer)	Mini Kit (1.7kg Liquid/5kg powder) Large Kit (10kg liquid/6x5kg powder)	8 48
ARDEX P82 Primer	2 kilo pack (1kg Part A + 1 kg Part B) 8 Kilo Pack (4 kg Part A + 4 kg Part B)	10-20* 40-80*
ARDEX WPM300	4 kilo pack (4kg Part A + 4 kg Part B) 20 Kilo Pack (10 kg Part A + 10 kg Part B) Sand ~20kg	12 60 Sand ~ 20-28m^2

*****Depending on the surface texture of the substrate. ** On floors with 10mm notch trowel from datasheet. With a 12mm notch trowel reduce coverage by ~30% over a 10mm notch trowel.

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.

It also possible to use the R class grouts ARDEX WA or ARDEX EG15.

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 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.

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Australia
Technical Services 1800 224 070. email: technicalservices@ardexaustralia.com
Customer Service and Sales 1300 788 780
Web: www.ardexaustralia.com

New Zealand
Technical/Sales Inquiries 0800 227 339
Web: www.ardex.co.nz

Web Corporate: www.ardex.com