

## TECHNICAL BULLETIN

# CERAMIC TILING—DUNLOP TILE ALL, AND DUNLOP WALL AND FLOOR FLEXIBLE ON PARTICLEBOARD/PLYWOOD SHEET TIMBER FLOORING

### INTRODUCTION & SCOPE

The key to success, when installing DUNLOP 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

This recommendation only:

*Applies to internal timber floors and not to any timber walls*

*Does not apply to ANY external decking or verandah*

*Is for domestic applications and light commercial such as small shops and industrial unit offices, not large commercial or industrial.*

The types of timber that the subfloor is made from must be certified as correct for flooring (strip edged particleboard or structural plywood).

Floors covered with hardboard strip

timber, hardboard underlay (c.f. 'Masonite') or MDF sheet are not acceptable surfaces.

Moisture sensitive and natural stone tiles require special consideration.

This bulletin does not cover the installation of thin (3-4mm thick) large format porcelain sheet tiles onto timber floors.

This bulletin does not cover wet area floors subject to waterproofing requirements in AS3740-2010/12 and the Construction Code of Australia (formerly called the Building Code of Australia BCA).

### 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 leveling prior to fibre cement sheeting, please refer to Dunlop Technical Bulletins DTB015.

### 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 should 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.

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 →	300mm	400mm (~16")	450mm	600mm (~24")
Tile size				
<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

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*Note: Whilst 1/360 of 600mm span is 1.7mm, the maximum shear recommendation is 1.5mm or less.*

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 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 al-

low 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.

### PARTICLEBOARD\ PLYWOOD

#### SUBSTRATE

Installer must ensure the particleboard surfaces are not contaminated with pesticide treatments,

manufacturing resins, coatings, oils or stains. Such contaminated surfaces shall be sanded 100% of areas with a 24 grit paper to CSP1 equivalent and vacuumed. Newly installed particleboards surfaces must be thoroughly cleaned to ensure 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 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 as described below;

Mix 2 parts (by weight) of DUNLOP TILE ALL powder to 1 part of TILE ALL liquid. Add TILE ALL powder to the liquid whilst stirring with a mechanical mixer. Stir until both parts are homogeneously mixed. Apply the mixed slurry with a sponge roller leaving a thick coat of TILE ALL slurry over the timber

### TILE ADHESIVE SYSTEM INFORMATION

Tile Adhesive	Primer	Recommended minimum drying times of primer prior to tiling (minutes)	Minimum Adhesive bed Thickness (mm) dry
DUNLOP WALL & FLOOR TILE ADHESIVE	TILE ALL	40*	2-2.5mm
DUNLOP TILE ALL	TILE ALL	40*	2mm

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

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substrate. Allow the slurry coat to dry fully before tiling over.

### ADHESIVE APPLICATION

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° angle to the horizontal (i.e. nearly vertical) which results in adhesive notch lines about 5-6mm high. 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.

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. Failure to achieve these levels of coverage will result in a bed less able to resist excessive flexing.

<b>TILE ALL as a primer</b>
Prepare timber surface as recommended
Apply bond breaker tape 30-50mm wide to all sheet points
Prime the surface with DUNLOP TILE ALL as recommended using a sponge roller
Adhesive fix tiles 40 minutes after priming with DUNLOP WALL AND FLOOR or TILE ALL
Apply DUNLOP grout mixed with PRIMER & ADDITIVE

### PRIMER COVERAGE

DUNLOP TILE All**	Standard Kit (1.7kg liquid/5kg powder)	8m <sup>2</sup>
	Mini Kit (0.5kg liquid/1.5kg powder)	2.3m <sup>2</sup>

\*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 Type (C)	Additive Ratio Booster : Water	Liquid Requirement per 15kg of Grout Powder
DUNLOP FLEXIBLE COLOURED GROUT	80% DPA / 20% Water	2.5-2.6 litres DPA + 0.5-0.7 litres water
DUNLOP WIDE JOINT	100% DPA	2.7-3 litres DPA

### GROUT APPLICATIONS TO TILE JOINTS

Grouting between the tiles shall be done with a modified C class grout mixed with DUNLOP PRIMER AND ADDITIVE (DPA) to increase flexibility. It also possible to use the R class epoxy grouts.

Where excess flexibility occurs, grout cracking is a significant risk, and can be the precursor to the tiles de-bonding.

### Notes

Always refer to the product data sheets for specific usage details.

The information contained herein 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 the product application.

Users are asked to check that the literature in their possession is the latest issue.

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### GLOSSARY

#### Australian Standards

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.

**Adhesive Contact Coverage**—The actual amount of adhesive which covers the back of the tile and also the surface to be tiled to. This figure is a percentage of the area available for the adhesive to be in contact with. Adhesive contact coverages are specified in AS3958 and also adhesive manufacturer's recommendations.

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**Bond Breaker**—A bond breaker is the layer of separator substance applied in different forms between adjoining solid surfaces. It is used to ensure that there is no adhesive bond between the surfaces.

**C Class Adhesive or Grout**—Tile adhesive or grout based on Portland or speciality hydraulic cements as defined in ISO13007. These are the most common types of tile adhesives and grouts used.

**Ceramic Tile Underlay**—A type of 5.5-6mm thick fibre-cement sheet underlay placed onto timber floors before installation of ceramic tiles.

**CSP**—Concrete surface profile. In this case where we are discussing timber floors, CSP1 is equivalent to a coarsely sanded profile on the timber surface.

**Flooring grade plywood** – This is plywood which is categorised as being suitable to use for flooring purposes by AS/NZS 1170.1-2004.

**Hardboard**—A type of thin floor sheeting around 3-5mm thick that is made from hardwood timber chips bonded together with an adhesive.

The most common tradename for this type of sheeting was Masonite. This material is not an acceptable base for liquid smoothing cements.

**Hard Floor Coverings**—A description for ceramic and stone tiles. Can also loosely be used for floating timber floors.

**MDF**— Medium Density Fibreboard is a resin bonded timber particle underlay material with properties of the same type as hardboard. This material is not an acceptable base for C class ceramic tile adhesives.

**Particleboard flooring**— A type of wood based floor sheeting made from wood chipping and bound together with a resin. The sheets are quite dense and can have waxy coatings, and termite treatments. Thickness ranges from 19-25mm. Includes generic/trade names such as Yellow Tongue, Red Tongue, Blue Tongue and Orange Tongue flooring.

**R Class Adhesive and Grouts**— Resin based tile adhesives or grouts as defined in ISO13007. The majority of R class adhesives and grouts are based on epoxy resins.

**Rubber Modified Adhesive**— Contains small granules of rubber, commonly recycled car tyres, which is added to a C Class adhesive to increase flexibility.

**Tongue & Groove Timber Flooring**— Dunlop uses this term to refer to the old style strip timber floor boards, typically 90-150mm wide. However it is also loosely used to describe plywood and particleboard sheet flooring which have a plastic edge tongue and a rebate. Often shortened to T&G.