

TECHNICAL BULLETIN

TILING ADHESIVES FOR USE ADJACENT TO FIRE PLACES

INTRODUCTION & SCOPE

The National Construction Code Series (nominally called the Building Code of Australia BCA) in sections G2.3 a) of Volume 1 or 3.7.3.2 of Volume 2 (2015 issues) require that fireplaces are installed in accordance with AS/NZS 2918. This means they have a non-combustible and fire retarded hearth with a minimum width around 300mm from the fire box or grate and 150mm from the sides and back.

This might be a concrete slab, brickwork or Compressed Fibre-Cement sheet which for aesthetic reasons may need to be tiled. For the same reason the fireplace wall surrounds might require tiling onto rendered brick or existing masonry.

A common misconception is that tile adhesives are refractory products and can withstand high temperatures or direct flame contact. Special purpose cements are made for these firebrick type applications and tile adhesives should not be used.

In this bulletin we will look at some of the issues that need to be considered when tiling in this situation.

THERMAL RESISTANCE

The area surrounding a fire becomes quite hot and within a certain distance of the combustion area the temperatures experienced will exceed those that the tile adhesive, or even the tiles themselves can withstand.

The tile adhesives contain polymer materials or in some cases rubber which soften and will degrade when exposed to high temperatures. If the temperature is high enough, the cementitious components can be affected as well. When thermal deg-

radation occurs the adhesive loses its strength and the tiles will debond. For this reason tile adhesive shall not be used in the direct fire contact area.

The Australian Standard for tile adhesives has a thermal ageing test regime that exposes the tiles to 70°C and this is the temperature that DUNLOP tests its adhesives to withstand in service.

EXPANSION & CONTRACTION

The service temperature of hearth areas adjacent to fires can range from ambient room temperature to maybe 70-80°C and this will create expansion and contraction stresses in the tiles and the adhesive. If these stresses exceed the shear strength of adhesive de-bonding can occur. If the tiles are restrained by the adhesive sufficiently that expansion is restricted cracking or de-bonding may also occur.

The substrate areas will also expand and contract with the changes in temperature and the degree of movement is proportional to temperature range experienced. For example, the creaking-tinkling sounds that occur with metal fire boxes are a result of thermal expansion-contraction of the metal.

INSTALLATION CONSIDERATIONS

When considering installation it is necessary to look at a number of things –

- Type of fire, wood, gas, oil or electric. Wood fires generally create a higher thermal output, and also have the added problem of possible impact from logs or pieces of wood dropped onto the tiles.
- Distance of tiling from the actual

fire heating occurs via;

- ⇒ direct radiation from the fire itself
- ⇒ thermal conduction through the substrate (i.e. contact of metal hearth parts, and from areas heated by convection or radiation))
- ⇒ convective heating by air movement (hot air rises so the mantle can be heated this way)

- The types of material used in the construction of the fireplace and surrounds.
- The colour of the tiles (dark heat colours heat up more by radiation) and their heat sensitivity.
- Whether the fire place has a circulation fan which increases the range of convective heating across the floor.

Every installation is different so it is not possible to make 'hard and fast' rules about the service conditions to which the tiling will be exposed. In light of this general recommendations only can be given.

A contact thermometer can be used to check the temperatures reached when the fireplace is in operation.

TILING RECOMMENDATIONS

DUNLOP recommends that the tiles to be used for the installation are confirmed as suitable by supplier or manufacturer. Some tiles are subject to greater thermal movement than others, and agglomerated tiles made from an aggregate and resin, and also marble with resin backing may be susceptible to high temperature degradation and should not be used.

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The following tile adhesives are suggested for hearth installations for a service temperature up to 70°C. These adhesives have high strengths and flexibility to accommodate movements.

Concrete and screeds

DUNLOP TILE ALL

DUNLOP UNIVERSAL TILE ADHESIVE

Compressed fibre-cement sheeting

DUNLOP TILE ALL

DUNLOP UNIVERSAL TILE ADHESIVE

DUNLOP FLOOR & WALL TILE ADHESIVE

DUNLOP RAPIDFLEX

Compressed Fibre-cement sheeted timber floors

DUNLOP FLOOR & WALL TILE ADHESIVE

The flexible adhesives FLOOR & WALL TILE ADHESIVE and RAPIDFLEX contain rubber which at temperatures from around 60-70°C upwards can generate an odour and discolour the grouts. These adhesives have excellent flexibility and will allow for the thermal movements that may occur, but require strict adherence to the maximum recommended temperatures as they have lower heat resistance.

NOTE There is no recommended adhesive in this group for moisture sensitive tiles.

GROUTS

The grouting between tiles must also be flexible and DUNLOP recommends the use of DUNLOP PRIMER AND ADDITIVE with DUNLOP cement based grouts.

The use of this additive is described in the product datasheets.

TILING SITUATIONS THAT ARE NOT RECOMMENDED

- * Direct tiling over timber floors adjacent to hearths. This potentially contravenes recommendations in AS2918 and is not recommended for the adhesives indicated.
- * Direct tiling over metal stove parts or metal fixtures near the fireplace.
- * Tiling inside a fireplace (i.e. tiling onto the back or sides of an inbuilt fire place) or areas subject to direct flame contact. Not only can the adhesive failure, the tiles may also fail catastrophically.
- * Tiling in areas that are subject to temperatures that exceed the recommended service temperature are at the installers risk and not warranted by ArDEX.
- * Premixed or mastic type adhesives shall not be in this application.
- * Tile over tile installations due

possible differential expansions in the tiles.

- * Tiling of pizza ovens.

Problems with heat can be manifested by discolouration of grouts and also any silicone sealant joints. These signs should be seen as a warning that the recommended performance temperature of the adhesive may be being exceeded.

As a general rule, if you can't touch it, it's too hot for the adhesive in the long term.

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.

ARDEX AUSTRALIA PTY LTD,

ABN 82 000 550 005

7/20 Powers Road, Seven Hills, NSW. 2147.