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To: OC Management Solutions

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From: Robin Brown

**RE: THE HALLMARK – ACOUSTIC IMPLICATIONS OF ALTERED FLOOR COVERINGS**

The Hallmark is a premium apartment building in South Melbourne that was developed from an existing hotel some 10 years ago. The lower levels of the building are part of the original building, whilst the upper levels were added as part of the redevelopment. We understand that due to wear and tear, there is now an increasing trend for refurbishment of individual apartments by their owners. The renewal and upgrade of floor coverings is a common component of these refurbishments.

Generally, the installation of hard floor surfaces to units above other occupancies has been an increasing cause of complaint in Melbourne's apartment buildings. This is particularly the case in existing apartment buildings where the upgrade of existing flooring involves the replacement of carpet with hard floor coverings, such as timber or tiles. The problem arises when residents below are exposed to very much greater impact noise levels than they are used to (eg. foot fall noise). In such cases it is common for impact noise levels within the apartment below to subjectively increase by a magnitude of 4. Under these circumstances, even when acoustic treatments are installed during the installation of the new hard floor coverings, it is generally not practicable to provide sufficient acoustic treatment to achieve an outcome equivalent to having carpet installed.

Part F5 of the Building Code of Australia (BCA) prescribes a minimum requirement for the level of impact sound insulation across a floor/ceiling construction separating apartments ( $L'nT,w+CI \leq 62$ ). However it is generally accepted that this requirement does not provide an adequate minimum standard. Early in 2008, Renzo Tonin & Associates carried out an impact insulation test program at the Hallmark in response to resident concerns relating to the audibility of impact noise between apartments. Results of this testing suggested that the building complied with the minimum requirement of the BCA, but only by a small margin. The use of 'better' acoustic underlays will not significantly improve these results as the level of



impact sound insulation within the Hallmark is limited by the poor low frequency performance of the thin 115mm thick slabs.

Poor low frequency impact sound insulation can be improved by the installation of double layer plasterboard ceilings suspended a significant depth below the soffit (typically  $\geq 400\text{mm}$ ) on acoustic mounts. Such treatment would also include the installation of ceiling cavity insulation, which is not currently installed in the building. However, at the Hallmark, such works would result in unacceptably low ceilings due to the low soffit heights. Therefore, the recommendations provided herein relate only to works directly associated with the upgrade of existing floor coverings.

Renzo Tonin & Associates has now been engaged by OC Management Solutions to provide advice to the Hallmark Body Corporate in order to assist in the formation of a policy relating to the renewal of apartment floor surfaces.

## 1 A subjective Framework

To assist with the interpretation of the following advice it may be useful to refer to the following table (Hansen, 2003). Whilst the information in this table generally provides a reasonable correlation between subjective impression and objective outcome, it is important to note that this represents 'rule of thumb' and is provided for informative purposes only.

**Table 1 – Subjective Interpretation of Decibels**

Change in Sound Level (dB)	Change in Apparent Loudness
3	Just perceptible
5	Clearly noticeable
10	Half or twice as loud
20	Much quieter or louder

## 2 Current Impact Sound Insulation Performance

The following table provides a summary of the results of impact sound insulation tests carried out by Renzo Tonin & Associates at the Hallmark in 2008. These results show that 'carpet and underlay' installations can be expected to perform 25-29dB better than hard floor coverings. This is an expected result and emphasises the vast performance gap between carpeted and hard floor surfaces. For the Hallmark, it is important to reiterate that existing conditions (slab thickness and limited floor to floor height), mean that it is not likely to be practicable to significantly improve results with hard floor surfaces (ie. a 10dB improvement), let alone obtain performance comparable to that of a carpeted floor.

**Table 2 – Summary of Existing Impact Sound Insulation at the Hallmark**

Apartment Above	Apartment Below	Floor Surface	Result (L'nT,w+CI)
1304	1204	Tiles	56
1304	1204	Engineered timber flooring	55
905	805	Tiles	57
908	808	Engineered timber flooring	59
905	805	Carpet and underlay	30

### 3 Hypothetical Scenarios

To understand likely outcomes associated with renewal of floor coverings, it is helpful to consider the following scenarios:

1. Replacement on a like for like basis
2. Replacement of existing carpet with hard floor surfaces

Under either of these scenarios it is appropriate that there be a set of minimum requirements for best practice installation of new floor coverings. Recommended minimum requirements are provided in the following section. For the purposes of discussion it is assumed that these minimum requirements have been satisfied. In addition, reference to “amenity” means the degree to which an occupant within the apartment below is affected by impact noise from the floor of the apartment above.

#### Scenario 1

During a renewal project, scenario 1 requires that hard floor coverings, such as tiles and timber, are only installed to areas from which hard coverings have been removed (typically kitchens, bathrooms and other wet areas). Carpet and underlay can be installed to any area; however for reasons of practicability, these areas will typically exclude kitchens and wet areas.

Under scenario 1, the subjective outcome for an occupant of the apartment below will be that there has been no significant degradation of amenity. Indeed with the application of best practice installation, it is possible that there may be a minor but noticeable improvement in amenity.

#### Scenario 2

Scenario 2 does not limit the choice of new floor coverings. To this end there is a trend to replacing carpet within apartments with engineered timber flooring, tiles or simply removing the carpet and polishing the slab. Such works may involve the replacement of some, or all carpeted areas with hard flooring.

Consider the case of refitting all carpeted areas within an apartment with hard floor coverings. Whilst there would be no significant change in the high magnitude of the impact noise associated with hard floor surfaces, there would be a significant degradation of amenity

associated with increased occurrence of this high magnitude noise as the extent of hard floor surfaces is greatly increased.

## 4 Recommendations

In considering the history of complaints associated with impact noise at the Hallmark, the Body Corporate may consider that it is appropriate to put policies or rules in place to prevent the degradation of impact noise related amenity. To this end, and considering the constraints of the building, it would be appropriate to limit the renewal of floor coverings to a 'like for like' basis. There may be some argument for minor increases in area of hard floor coverings; however a policy or rule permitting such consideration would require a case by case assessment of proposals. This is a process which is likely to be resource intensive, difficult to define and difficult to monitor.

Recommended minimum requirements for the installation of new hard flooring surfaces are as follows:

### Engineered timber or parquetry floors

At a minimum engineered timber or parquetry floors should be laid on acoustic mat having impact sound insulation performance not less than either:

1. 3mm thick Elastilon Strong <http://www.tfsflooring.com.au/>
2. 2mm thick Damtec Color <http://www.damtec.com.au/>

### Solid timber floors

Battens for solid timber floors shall be laid on 4mm thick acoustic mat equivalent to Damtec Standard. Mechanical fixing through the acoustic matt to the slab shall not be permitted.

### Tiled floors

Tiles shall be laid on acoustic matt having impact sound insulation performance of not less than 2mm thick Damtec Standard.

### Polished Concrete floors

It is recommended that it should not be permitted to remove existing hard floor surfaces and leave the concrete slab bare as the new floor finish.

### Minimum requirements for installation

- All acoustic matting shall be butt jointed, gaps shall not be permitted.
- The perimeter of hard floor coverings shall be no less than 5mm clear of adjoining walls and 2mm clear of other ridged structure/fixtures such as skirting or joints to carpet. These gaps may be filled with a flexible sealant subject to the approval of the flooring manufacturer (refer to the attached example details).

- The Body Corporate may also consider implementing a policy or rule that requires the installation of new hard floor coverings to be comprehensively recorded via a photographic record and inspected and approved by a suitably qualified / trained party.

## DOCUMENT CONTROL

Date	Revision History	Non-Issued Revision	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
17/10/2012	Draft	0		RB		
22/10/2012	Review		1			PT

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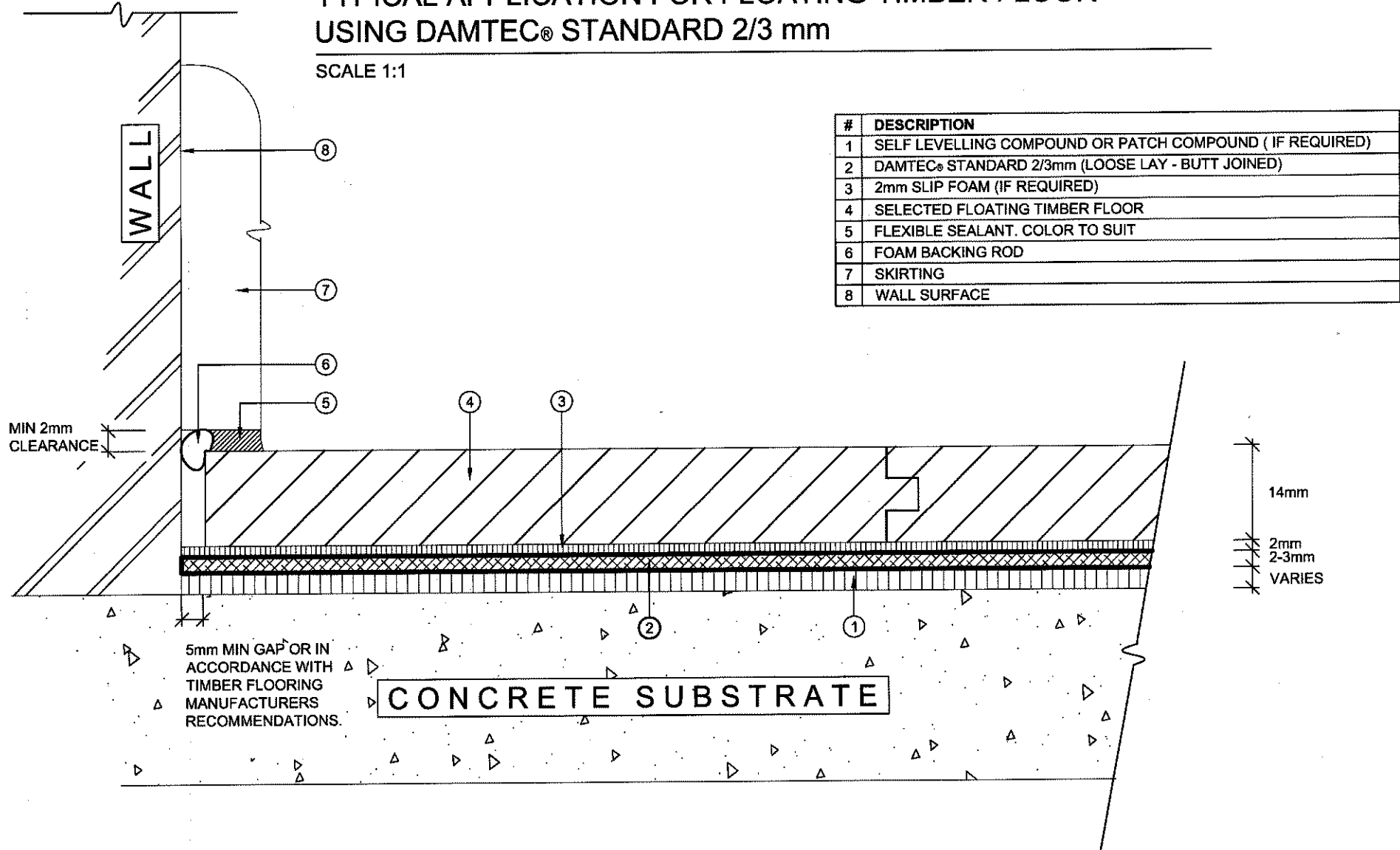
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# TYPICAL APPLICATION FOR FLOATING TIMBER FLOOR USING DAMTEC® STANDARD 2/3 mm

SCALE 1:1



#	DESCRIPTION
1	SELF LEVELLING COMPOUND OR PATCH COMPOUND ( IF REQUIRED)
2	DAMTEC® STANDARD 2/3mm (LOOSE LAY - BUTT JOINED)
3	2mm SLIP FOAM (IF REQUIRED)
4	SELECTED FLOATING TIMBER FLOOR
5	FLEXIBLE SEALANT. COLOR TO SUIT
6	FOAM BACKING ROD
7	SKIRTING
8	WALL SURFACE

MIN 2mm  
CLEARANCE

5mm MIN GAP OR IN  
ACCORDANCE WITH  
TIMBER FLOORING  
MANUFACTURERS  
RECOMMENDATIONS.

CONCRETE SUBSTRATE

14mm  
2mm  
2-3mm  
VARIES

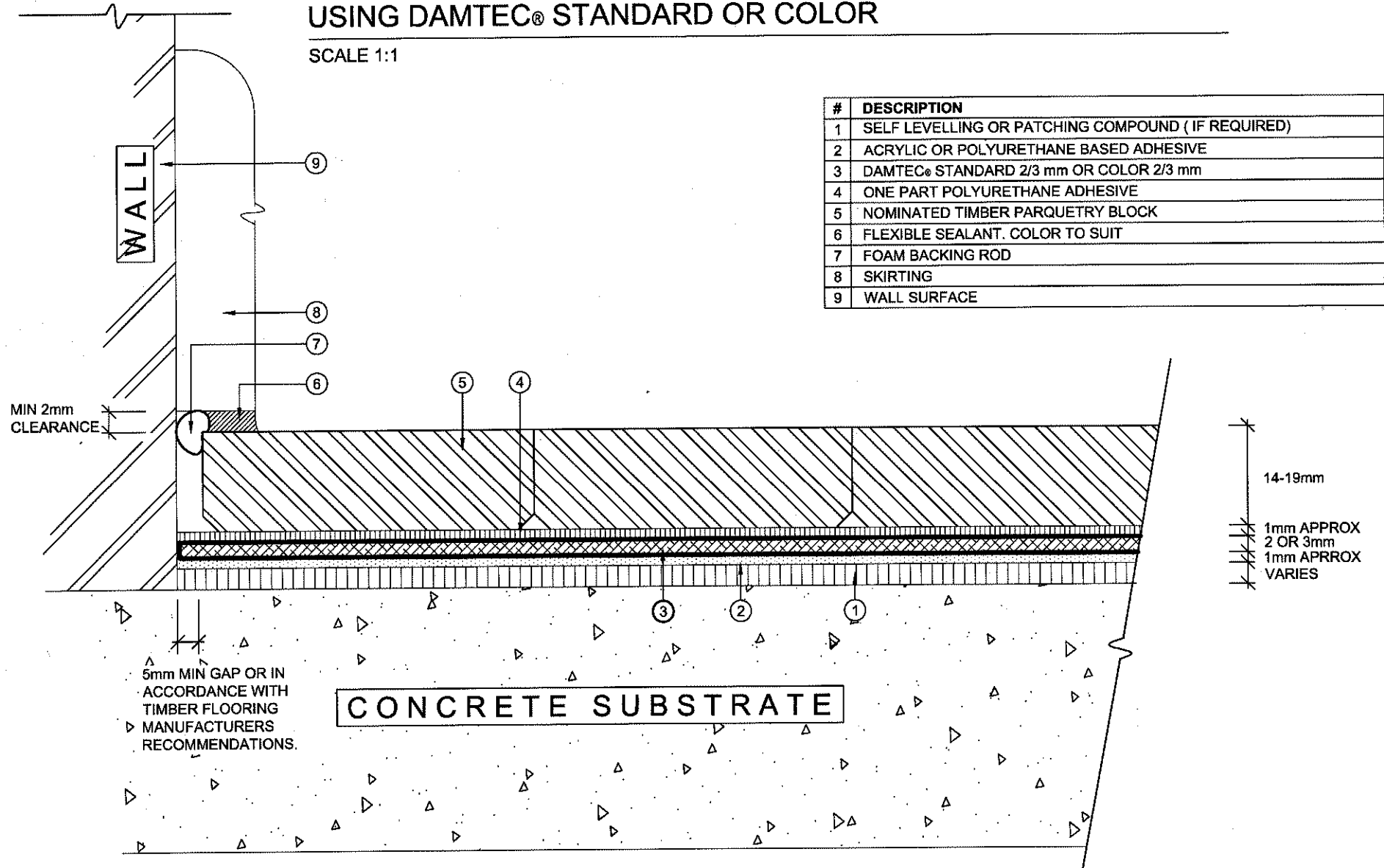
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# TYPICAL APPLICATION FOR PARQUETRY BLOCK (DIRECT-STICK) USING DAMTEC® STANDARD OR COLOR

SCALE 1:1



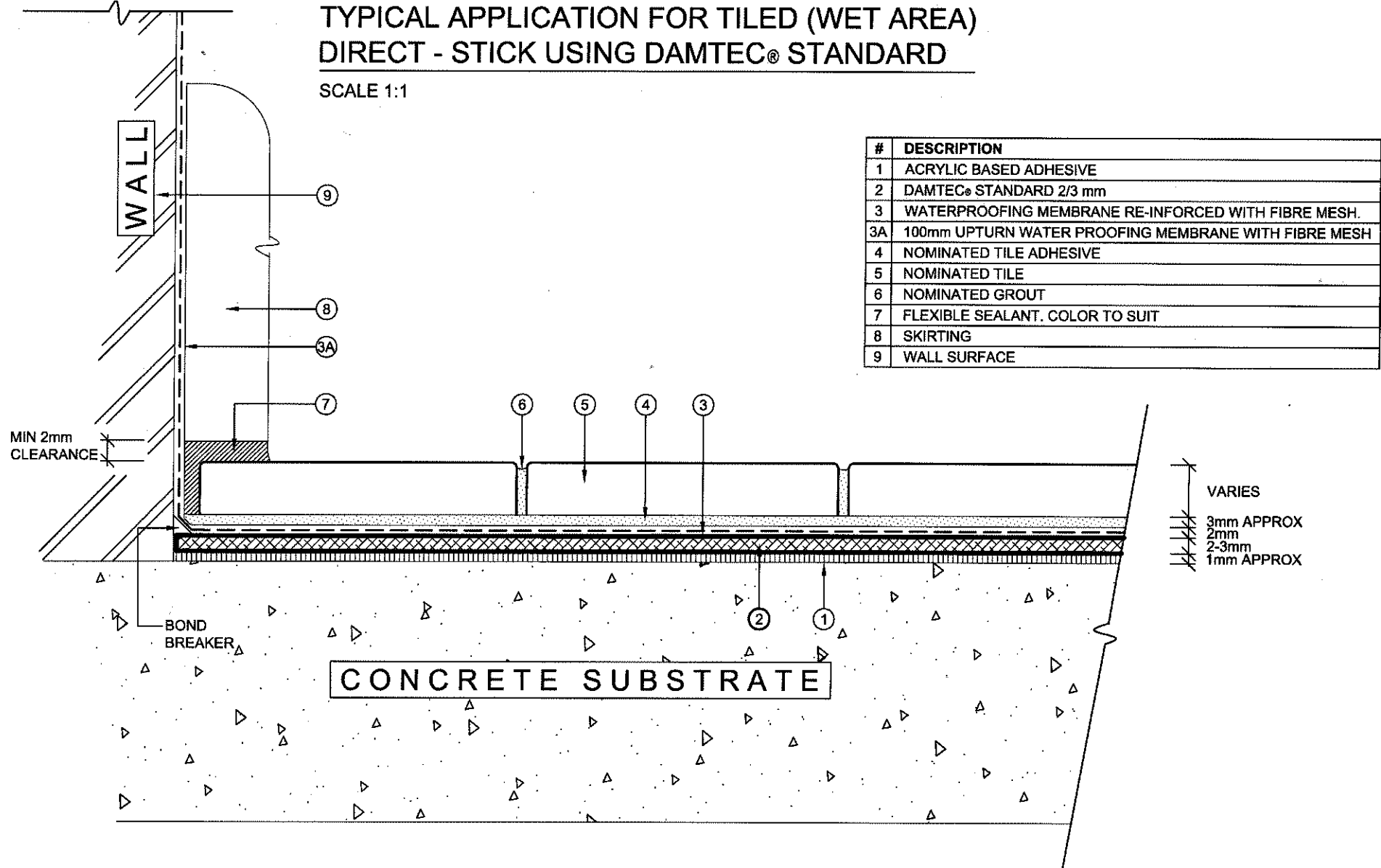
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## TYPICAL APPLICATION FOR TILED (WET AREA) DIRECT - STICK USING DAMTEC® STANDARD

SCALE 1:1



#	DESCRIPTION
1	ACRYLIC BASED ADHESIVE
2	DAMTEC® STANDARD 2/3 mm
3	WATERPROOFING MEMBRANE RE-INFORCED WITH FIBRE MESH.
3A	100mm UPTURN WATER PROOFING MEMBRANE WITH FIBRE MESH
4	NOMINATED TILE ADHESIVE
5	NOMINATED TILE
6	NOMINATED GROUT
7	FLEXIBLE SEALANT. COLOR TO SUIT
8	SKIRTING
9	WALL SURFACE

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