

FOURTH EDITION

TERRAÇADE TN™ TECHNICAL MANUAL



CONTENTS

PAGE SECTION

05 01. SYSTEM DESCRIPTION

011 02. STRUCTURAL PERFORMANCE - AUS

025 03. STRUCTURAL PERFORMANCE - NZ

035 04. TECHNICAL SPECIFICATIONS

036 Materials Schedule and Properties

038 Fasteners

039 05. COMPONENTS

051 06. SYSTEM DESIGN - COMMON DETAILS

053 Overview

054 Side Detail

055 Horizontal Detail

056 External Corner

057 External Corner - Variations

058 Internal Corner

059 Internal Corner - Variations

060 Base Detail

061 Base Detail - Variations

062 Parapet

063 Parapet - Variations

064 Window Sill

065 Window Sill - Variations

066 Window Head

067 Window Head - Variations

068 Window Jamb

069 Window Jamb - Variations

070 Window Reveal Option

071 Set-Out Tool

072 Rake Detail

074 Top Restraint for Cyclone
and Earthquake Zones

075 Timber - Horizontal Detail

076 Timber - Vertical Detail

077 Timber - Termite Detail (Recessed Slab)

078 Slab Variation

079 Steel - Horizontal Detail

080 Steel - Vertical Detail

081 Concrete - Horizontal Detail

082 Concrete - Vertical Detail

083 Masonry - Horizontal Detail

084 Masonry - Vertical Detail

085 Membrane

088 07. INSTALLATION

089 Safe Working Instructions

090 General Installation Procedures

093 Trim Installation Procedures

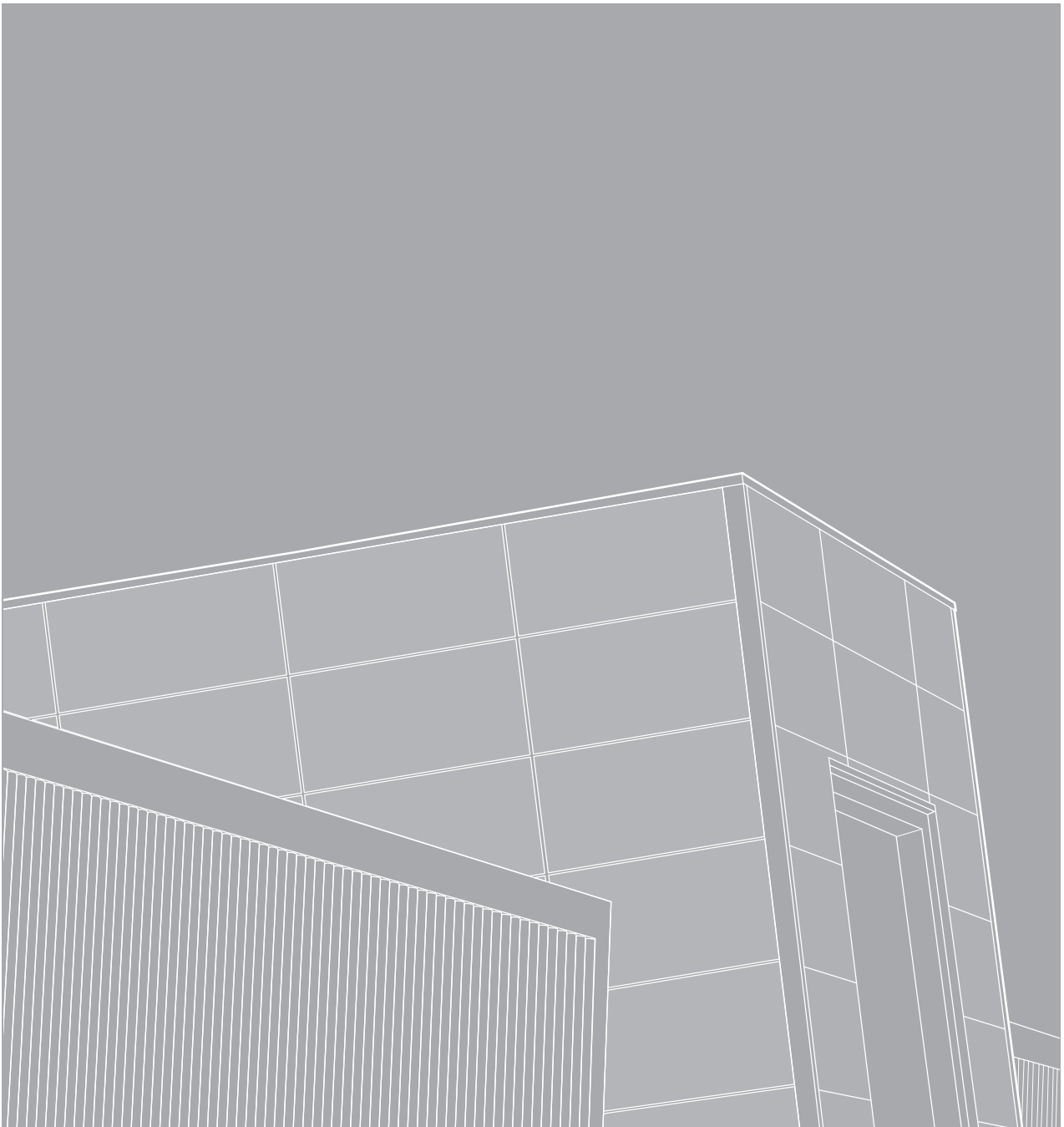
097 Terraçade TN Maintenance Guide

For the most up to date information on
Terraçade products and the latest version
of this manual, please refer to our website.

www.terraçade.com.au

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SYSTEM DESCRIPTION



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SYSTEM DESCRIPTION:

OVERVIEW

TERRAÇADE™ IS AN INNOVATIVE AUSTRALIAN TERRACOTTA FAÇADE SYSTEM DEVELOPED TO PROVIDE THE NATURAL BEAUTY AND AESTHETIC APPEAL OF TERRACOTTA TO YOUR PROJECT.

Terraçade TN has been designed in consultation with Australia's leading engineers to act as a rain screen and ventilated façade system. It is a lightweight system and is simple to install. The combination of the natural, durable properties of terracotta and the system's modern appeal make Terraçade TN an ideal choice for architectural and residential projects no matter what size.

SYSTEM ASSEMBLY

The Terraçade TN system is easily installed as the tiles are attached securely by a purpose designed vertical suspension rail. The versatile hanging system comprises only vertical suspension rails which ensures simple planning and installation. The system can be installed onto a timber framed, steel framed, concrete or masonry structural wall. The combination of lightweight tiles and innovative design allows the system to be installed rapidly.

The Terraçade TN tiles have a smooth modern appearance and are available in a variety of natural clay colours. The Terraçade TN tiles are separated by a jointing strip to accentuate vertical lines.

The Terraçade TN system is comprised of:

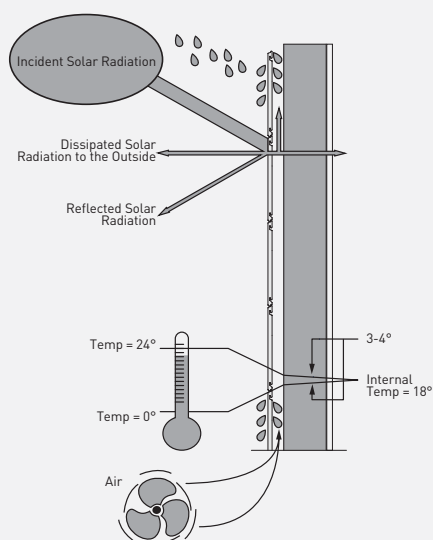
- A galvanised vertical suspension rail incorporating unique tile hangers,
- Lightweight clay tiles designed to fit securely onto the suspension rails,
- An optional vertical jointing strip,
- Fitment sponge,
- A waterproof membrane.

In addition, a full range of trims are available in mill, anodised or powder coated finish to complement or highlight your design, including:

- Internal and external corners,
- A surround that accommodates windows, doors, bases and parapets thereby greatly simplifying quantity surveying and installation.

BENEFITS OF TERRAÇADE TN

Terraçade TN is a rear ventilated façade, which creates an airspace outside the load-bearing wall. This minimises thermal transfer to the building structure improving comfort levels and providing energy savings. The airspace provides natural ventilation with a chimney effect, which facilitates the removal of heat, humidity and condensation away from the building structure.



Terraçade TN tiles are classified exposure grade so they can be used in all environments including severe marine environments and areas subject to heavy industrial pollution. Terracotta tiles are robust and extremely durable and have an extremely long service life. Terraçade TN provides the natural beauty, low maintenance and longevity of real terracotta.

TESTED PERFORMANCE

The terracotta tile acts as part of a rain screen system, where the tile is the first line of defence against water penetration and must be used in conjunction with a waterproofed and drained backup wall. A waterproof membrane is supplied as part of the system's tested performance. The system has demonstrated structural and weather performance, as shown through the extensive wind load and water penetration testing conducted to AS/NZS 4284.

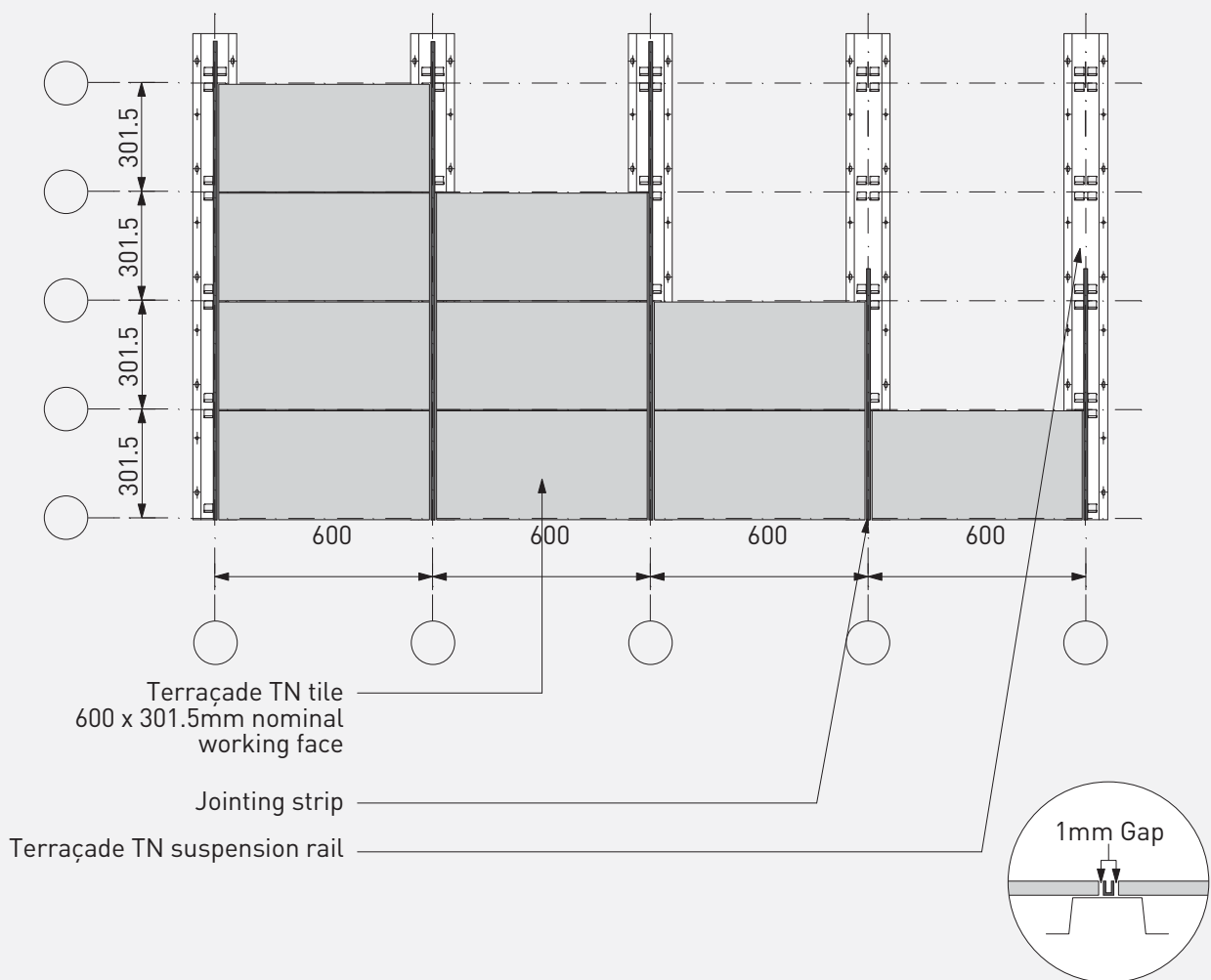
In addition to the standard TN system a coastal version of Terraçade TN is available for severe marine environments. The coastal version incorporates ZAM® pre-coated steel or stainless steel suspension rails to ensure that the Terraçade TN will stand the test of time. The performance of the Terraçade TN tiles has been extensively tested in Austral's NATA accredited laboratory to AS/NZS 4455 and AS/NZS 4456 and in independent NATA accredited laboratories.

In addition to the standard Terraçade TN the natural properties of terracotta ensure that the natural colour of the product will last for its lifetime. The minimal maintenance, lasting properties and thermal benefits of the ventilated façade system make Terraçade TN an environmentally responsible choice.

SYSTEM DESCRIPTION:

TERRAÇADE TN SYSTEM WITH JOINTING STRIP

PREFERRED METHOD



HANDY HINT

- If the timber framed substrate has a ply bracing, then the builder should have the whole wall fixed with the same thickness ply to keep the substrate even to install the rails.
- All walls and substrate structure needs to be true and plumb.

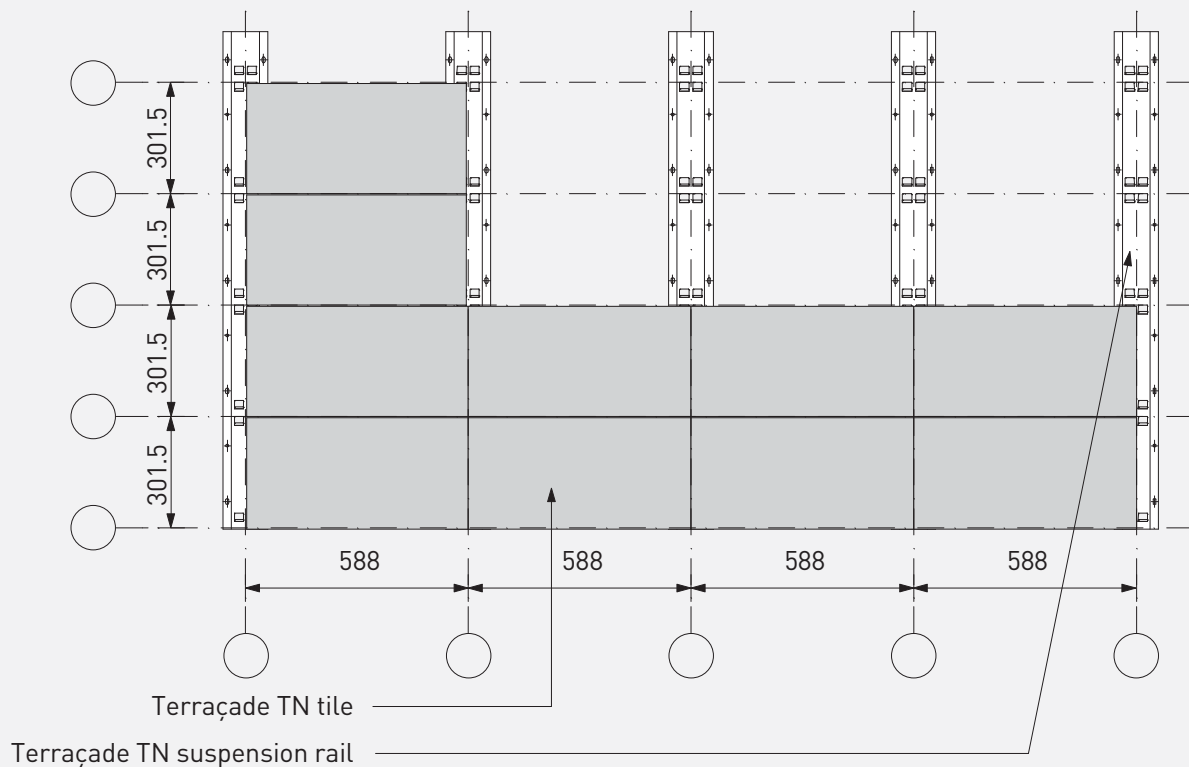
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undertaken after reference and compliance with the relevant component's technical data. The diagram is not to scale. For more tailored solutions to suit individual applications, please contact Brickworks Building Products. Brickworks Building Products reserves the rights to add, alter or delete components without prior notice.

SYSTEM DESCRIPTION:

TERRAÇADE TN SYSTEM WITHOUT JOINTING STRIP



HANDY HINT

- As the tiles have many of the characteristics of terracotta, this method may make it more difficult to align vertical joints if you are abutting the tiles to each other.

HANDY HINT

- If the timber framed substrate has a ply bracing, then the builder should have the whole wall fixed with the same thickness ply to keep the substrate even to install the rails.
- All walls and substrate structure needs to be true and plumb.

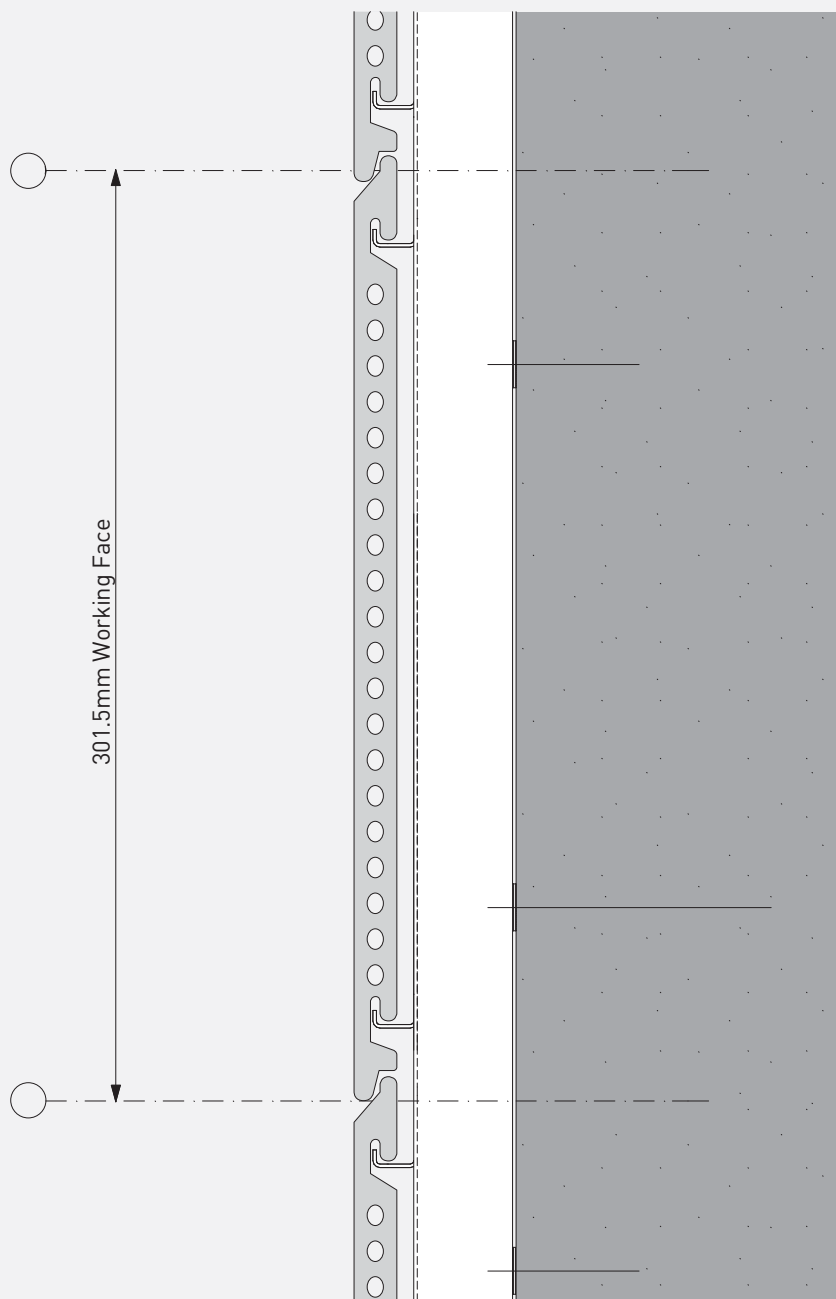
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SYSTEM DESCRIPTION:

TERRAÇADE TN SIDE PROFILE

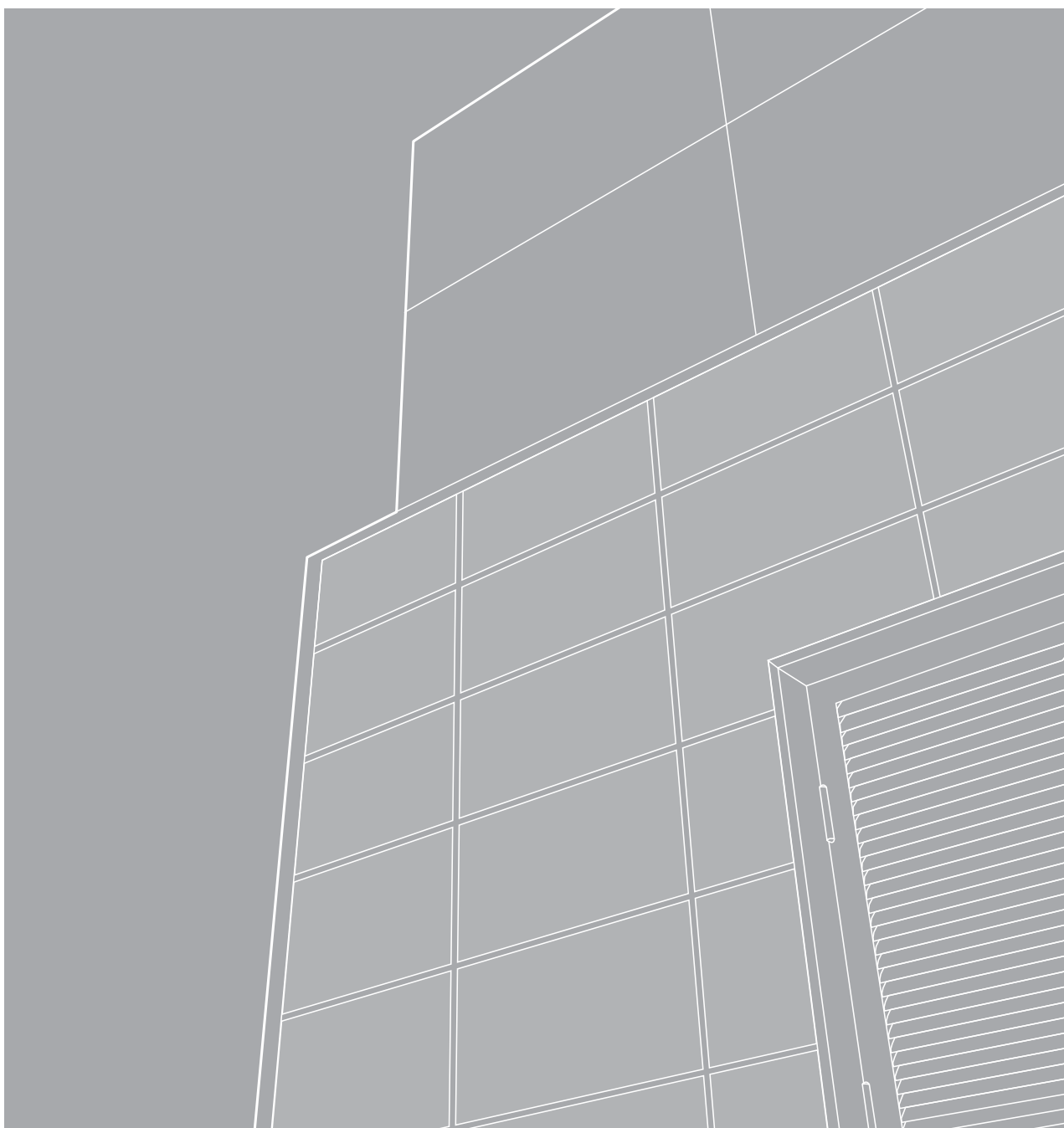


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STRUCTURAL PERFORMANCE - AUSTRALIA



For the most up to date information on
Terraçade products and the latest version
of this manual, please refer to our website.
www.terraçade.com.au
www.terraçade.co.nz

STRUCTURAL PERFORMANCE - AUSTRALIA

PERFORMANCE FOR EARTHQUAKE AND CYCLONES

SUPPLY AND TESTING STATEMENT

The Terraçade TN system has been tested to AS/NZS 4284 (Testing of building façades) for structural performance and has passed the deflection criteria under serviceable limit state. In addition, extensive cyclone testing has been conducted to AS 4040.3 (Methods of testing sheet roof and wall cladding - Resistance to wind pressures for cyclone regions). Terraçade TN has been cyclone rated to 4.4 kPa and has been tested to an ultimate limit state wind pressure of 4.6 kPa. Copies of the test reports are available on the Terraçade website www.terracade.com.au

System and structural advice has been obtained from Core Project Consulting (Australia) Pty. Ltd. and they have also provided engineering guidance on the structural and cyclone testing.

EARTHQUAKE PERFORMANCE

(Statement supplied by Core Project Consulting)

The Terraçade TN system has been checked for compliance with AS 1170: Part 4 Earthquake loads.

From analysis of AS 1170.4 the derived acceleration imparts a load which is approximately equal to the cladding self weight. When such loads are compared to the system's allowable wind pressures it is evident that the wind load is the dominating load case.

As the Terraçade TN system develops small forces from the action of inertia during seismic events, the horizontal directions of movement are accommodated by the inherent strength of the system. No further action is therefore necessary to resist such movements, and the system is acceptable to AS 4100: 1998 Steel Structures.

Movement however in a true vertical direction does require restraint against the tiles lifting directly off the rail system under such an action.

For installation in earthquake prone areas, the Terraçade TN system requires an anti-lift block or trim installed along its top edge to ensure tiles under the action of vertical seismic events, are unable to detach from their supporting rail.

When the anti-lift block or trim is installed the system is suitable for installation against earthquakes in earthquake prone areas. However this precaution does not alleviate the system's requirements for installation against wind load.

CYCLONE PERFORMANCE

The Terraçade TN system has been successfully rated for cyclone performance to 4.4 kPa during testing to AS 4040.3 (Methods of testing sheet roof and wall cladding - Resistance to wind pressures for cyclone regions).

For installation in cyclone regions, the Terraçade TN system requires an anti-lift block or trim installed along its top edge to ensure that the uppermost tiles are unable to detach from their supporting rail. The system was tested at Ian Bennie & Associates with an anti-lift trim in place. The system's requirements for installation against wind load are not alleviated by this precaution.

STRUCTURAL PERFORMANCE - AUSTRALIA

SYSTEM PERFORMANCE FOR WIND LOADS

ULTIMATE WIND PRESSURES

The following charts and tables have been calculated assuming a building consequence of failure importance level of 2 and a design life of 50 years in accordance with AS/NZS 1170.

Contact Brickworks Building Products for further engineering advice for buildings that are outside the above criteria.

The ultimate wind pressures have been calculated for both the standard (galvanised steel) and the coastal (ZAM® pre-coated steel and stainless steel) support rail versions; the pertinent table should be referred to for a particular project. The ultimate wind pressure

tables have been characterised by a particular span configuration. The ultimate wind pressures listed refer to the span configuration directly above it. The standard support rail may be fastened at 600 mm or 1200 mm centres (for 1200 mm tiles), coastal stainless steel support rails may only be fastened at 600 mm centres.

Note: The ultimate wind pressures specified in the span configuration tables below assume a spacing between the support rails of 600 mm. If the support rails are spaced at 1200 mm centres, the maximum allowable ultimate wind pressure on the Terraçade TN cladding can be calculated by multiplying the ratio of 600 mm / 1200 mm = 0.5, by the

"Ultimate Wind Pressure for Supports at 600 mm Centres". This will give the maximum ultimate pressure for the changed support spacing, while maintaining the maximum permissible fastener reactions.

The span configuration tables should be used in accordance with the fastener specifications given in the Technical Specification section. Design documentation should accommodate the ultimate wind pressures and fastener specifications for a particular project.

ULTIMATE WIND PRESSURES FOR THE STANDARD SUSPENSION RAIL (GALVANISED STEEL) & COASTAL SUSPENSION RAIL (ZAM® PRE-COATED STEEL).

SPAN CONFIGURATION							
1	2	3	4	5	6	7	8
ULTIMATE WIND PRESSURE (kPa) FOR SUPPORT RAILS AT 600mm CENTRES:							
0.80	1.00	1.90	2.10	3.75	3.75	3.75	3.75
MAXIMUM REACTIONS (permissible) kN:							
0.71	0.47	1.15	1.12	1.48	1.46	1.52	0.71

ULTIMATE WIND PRESSURES FOR THE COASTAL SUSPENSION RAIL (STAINLESS STEEL)

SPAN CONFIGURATION							
1	2	3	4	5	6	7	8
ULTIMATE WIND PRESSURE (kPa) FOR 600mm CENTRES:							
0.48	0.65	1.15	1.38	2.51	2.51	2.51	2.51
MAXIMUM REACTIONS (permissible) kN:							
0.46	0.31	0.69	0.74	1.02	0.99	1.02	0.48

* Note: The arrows in the allowable pressures tables indicate the fastener locations and the distance noted is the span (mm) between the fasteners.

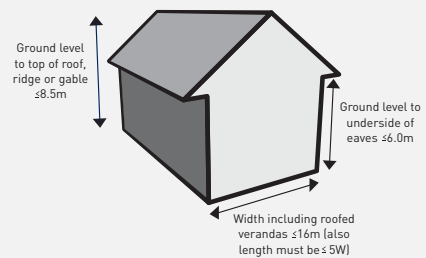
STRUCTURAL PERFORMANCE - AUSTRALIA

SYSTEM PERFORMANCE FOR WIND LOADS

PART A – DETERMINING SPAN CONFIGURATIONS USING THE HOUSING CODE

The following wind load requirements on Terraçade TN only apply to buildings that comply with Australian Standard AS 4055 (Wind loads for housing). In general, AS 4055 applies to houses that are within the dimensions shown in the diagram to the right. However, the applicability of AS 4055 and subsequent compliance of individual projects should be verified.

Leading engineers at Core Project Consulting have considered the wind pressure requirements for Terraçade TN and have derived the following procedure for determining the minimum span configurations required for buildings complying with AS 4055.



STEP A1: WIND PRESSURE REQUIREMENTS

Identify the wind class applicable to the particular project in accordance with AS 4055. The wind pressure requirements applicable to Terraçade TN have been determined by Core Project Consulting and are given in Table A1. Please note that there is an additional installation requirement (refer to Page 12) when Terraçade TN is installed in cyclone regions (wind classes C1-C4).

TABLE A1:

Wind Class	General Pressure (kPa)
N1	0.62
N2	0.86
N3	1.35
N4	2.01
N5	2.96
N6	3.99
C1	1.80
C2	2.68
C3	3.94
C4	5.33

STEP A2: WIND PRESSURES AT BUILDING CORNERS

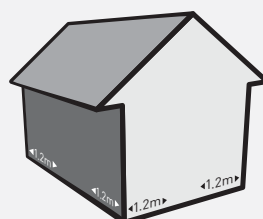
Corners of buildings experience higher wind pressures than the rest of the building. Check whether any Terraçade TN is being installed within 1.2 metres (see below diagram) of the building's corners.

The wind pressure requirements determined for building corners by Core Project Consulting are given in the table below.

TABLE A2:

Wind Class	Corner Pressure (kPa)
N1	0.94
N2	1.30
N3	2.02
N4	3.01
N5	4.44
N6	5.99
C1	2.70
C2	4.02
C3	5.91
C4	7.99

Note: A superseded version of AS 4055 used permissible wind speed categories to indicate required performance. No relation to this version has been included to reduce confusion as only ultimate wind speeds are quoted in the current version. The wind class should be quoted as N1-N6 or C1-C4.



STEP A3: SPAN DETERMINATION

Minimum span configuration requirements (for buildings complying with AS 4055) have been determined for the Terraçade TN system in accordance with the procedure outlined by Core Project Consulting.

The allowable pressure tables (refer to page 13) were used to determine the minimum span configuration requirements for the wind pressure determined. These requirements are summarised in Tables A3 and A4.

The span number given in the tables indicates the lowest span number that the system must be installed at. For example Span 4 indicates that a span configuration of 900 mm – 750 mm – 900 mm is required (refer to span diagram on page 13), any lower numbered spans, such as Span 3 which is 750 mm – 900 mm – 900 mm, cannot be used.

Tables A3 applies to the Standard Version (galvanised rails), whilst Table A4 applies to the Coastal Version stainless steel rails. The tables include both the general installation and the building corner installation requirements.

STRUCTURAL PERFORMANCE - AUSTRALIA

SYSTEM PERFORMANCE FOR WIND LOADS

Example 1:

A typical project has been determined to have a wind class of N1. If the standard version (galvanised rails) is required then using Table A3 the required span is Span 1 for general areas and Span 2 at the corners. It may be worthwhile for the project to specify the higher rated Span 2 for the entire project to simplify installation.

Note: It is important to remember that particular projects that require the coastal version stainless steel rails should use Table A4.

Note: The span configurations determined should be specified along with the fastener requirements (refer to page 39) in all project documentation.

Note: Terraçade TN standard (galvanised)

and coastal (ZAM® pre-coated steel & stainless steel) rails that are cut to lengths of less than 1.8 m should always be installed at 600 mm centres.

Note: If a span configuration is 'N/A' for a particular wind class it may be worthwhile to use the analysis technique in Part B AS 1170.2. The scope of the wind pressure analysis performed in this housing section is limited and more detailed analysis is performed in Part B.

STANDARD VERSION:

TABLE A3: Minimum installation for 600 mm centres (Galvanised and ZAM® Rails) .

Minimum Span Configuration Requirements		
Wind Class	General Installation	Building Corner Installation
N1	Span 1	Span 2
N2	Span 2	Span 3
N3	Span 3	Span 4
N4	Span 4	Span 5-8
N5	Span 5-8	N/A
N6	N/A	N/A
C1	Span 3	Span 5-8
C2	Span 5-8	N/A
C3	N/A	N/A
C4	N/A	N/A

*N/A equals Not Available

COASTAL VERSION:

TABLE A4: Minimum installation for 600 mm centres (Stainless Steel Rails) .

Minimum Span Configuration Requirements		
Wind Class	General Installation	Building Corner Installation
N1	Span 2	Span 3
N2	Span 3	Span 4
N3	Span 4	Span 5-8
N4	Span 5-8	N/A
N5	N/A	N/A
N6	N/A	N/A
C1	Span 5-8	N/A
C2	N/A	N/A
C3	N/A	N/A
C4	N/A	N/A

STRUCTURAL PERFORMANCE - AUSTRALIA

SYSTEM PERFORMANCE FOR WIND LOADS

PART B – DETERMINING SPAN CONFIGURATIONS USING THE STRUCTURAL DESIGN CODE

The following wind load requirements on Terraçade TN only apply to buildings that comply with Australian Standard AS/NZS 1170.2 (Structural design actions, Part 2: Wind actions). The applicability of AS/NZS 1170.2 and subsequent compliance of individual projects should be verified.

AS/NZS 1170.2 identifies four main wind regions pertinent to Australia as shown in the map below.

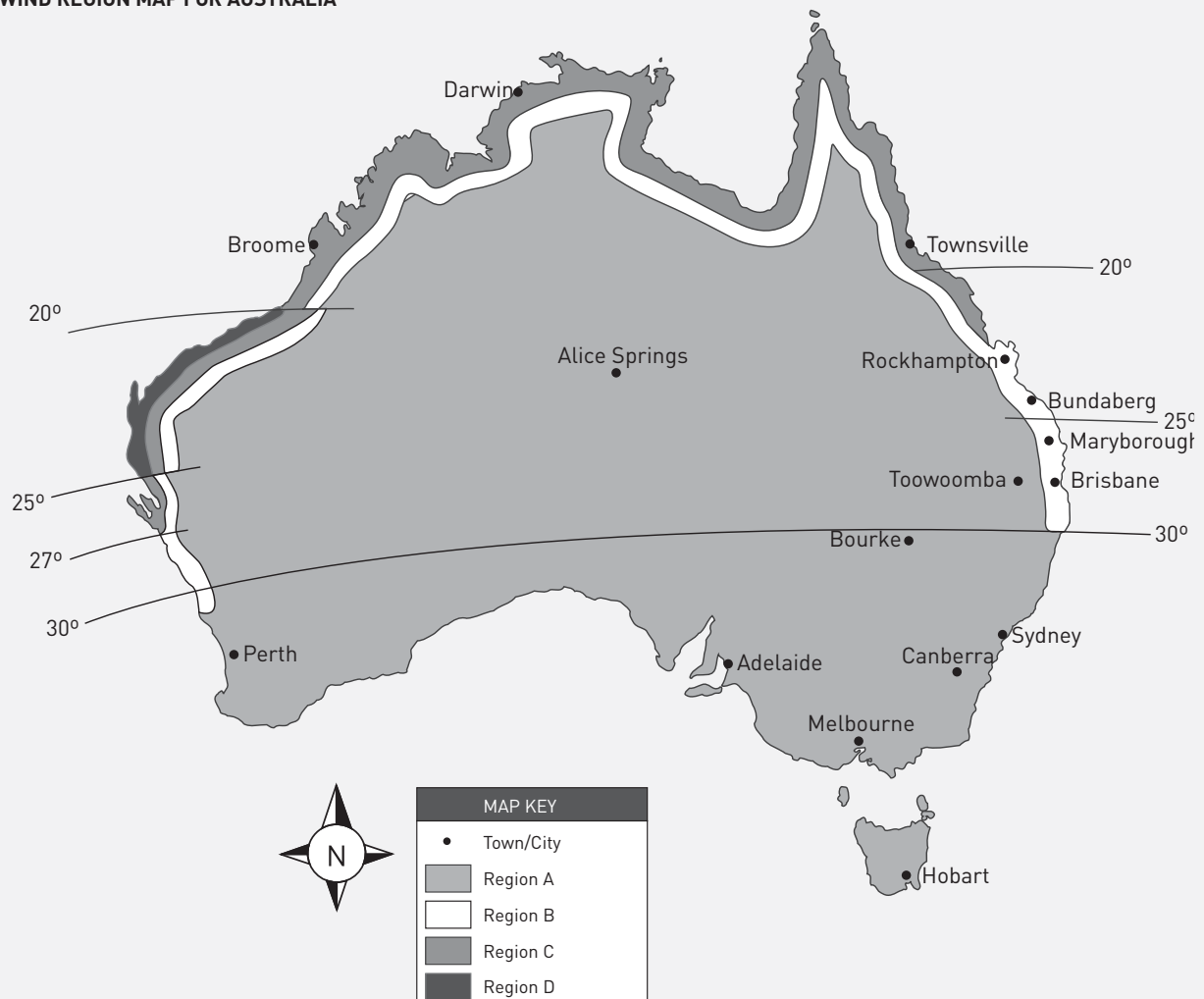
Leading engineers at Core Project Consulting have considered the wind

pressure requirements for Terraçade TN and have derived the following procedure for determining the minimum span configurations required for buildings complying with AS1170.2.

Note: Shielding was not considered in the analysis.

Note: Topography can affect wind pressure if a building is located high on a steep slope or escarpment. Brickworks Building Products should be contacted in such circumstances.

WIND REGION MAP FOR AUSTRALIA



STRUCTURAL PERFORMANCE - AUSTRALIA

SYSTEM PERFORMANCE FOR WIND LOADS

STEP B1: WIND REGION

Identify the wind region that the project is located in. If the wind region has not been specified, it should be determined in accordance with AS/NZS 1170.2. The map on page 16 indicates the wind regions for Australia. It is important to note that regions C and D are affected by cyclones and Terraçade TN installed in these regions has an additional installation requirement (refer to Page 12).

STEP B2: HEIGHT

Determine the height above ground level to which the Terraçade TN will be installed. AS/NZS 1170.2 outlines the method of determining reference heights. The wind pressure requirements have been categorised by specific limiting heights. Always select the limiting height that is larger or equal to the project installation height.

STEP B3: TERRAIN CATEGORY

Identify the terrain category for the project. The terrain will affect the wind flow that a project is subjected to. The four terrain categories defined in AS/NZS 1170.2 are:

- **Category 1:** Very few or no obstructions and an exposed open terrain.
- **Category 1.5:** Open water surfaces subjected to shoaling waves, e.g. near-shore ocean water; large unenclosed bays on seas and oceans; lakes; and enclosed bays extending greater than 10 km in the wind direction.
- **Category 2:** Limited and well-spread obstructions in an open terrain. Typical terrains include grasslands and water surfaces.
- **Category 2.5:** Terrain with a few trees or isolated obstructions, typical of developing outer urban areas with scattered houses, or large acreage developments with fewer than ten buildings per hectare.
- **Category 3:** Numerous low (3-5 m) obstructions that are closely spaced. A typical terrain is a suburban housing estate.

- **Category 4:** High number of large and tall (10-30 m) obstructions that are closely spaced. A typical terrain is a large city centre.

Note: The terrain category should be determined in accordance with AS/NZS 1170.2 and obstructions should have permanence during a wind event.

STEP B4: WIND PRESSURE

A wind pressure table (Table B1 on page 19) has been provided as a reference. The wind pressure for an individual project can be determined from the table using the information determined in the preceding steps.

Example 1:

A typical project in a suburban area of Brisbane (i.e. Terrain Category 3, Region B) installed to a height of 4m. For this case using the limiting height of 5m, the wind pressure for Terraçade TN is 1.63 kPa (using Table B1 on page 19).

STEP B5: CORNER WIND PRESSURE

The corners of tall, slender buildings experience higher wind pressures than the rest of the building. When Terraçade TN is installed in this corner region, a different support rail span configuration may be required.

To determine the span configuration requirement, calculate the aspect ratio (r) of the building by dividing its average roof height (h) by its smallest plan dimension (b or d). If the aspect ratio is less than or equal to 1, no additional requirements are necessary for Terraçade TN being installed on the building corner. (Note: AS/NZS 1170.2-2011 has equalised the worst-case magnitudes of positive and negative wind pressure coefficients and factors for permeable cladding on buildings with an aspect ratio of less than or equal to 1).

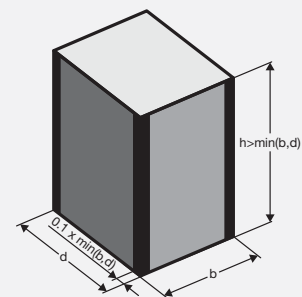
If the aspect ratio is greater than 1, then check whether any Terraçade TN is being installed on the building corners. The length of the corner region (for a tall building) is one-tenth of the shortest plan dimension (refer to below diagram).

Note. Support rails have a maximum spacing of 600 mm in corner areas of tall,

slender buildings.

Example 2:

A six storey building has plan dimensions of 32 metres and 16 metres, and has an average roof height of 20 metres. The aspect ratio found by dividing the height of 20 m by the smallest plan dimension i.e., 16 m, which equals 1.25. Since the aspect ratio is greater than 1, additional fixings for the Terraçade TN support rails are



required at the corners of the building for the increased wind pressure..

The distance from the corners of the building requiring additional fixings for the Terraçade TN support rails is one-tenth of the shortest plan dimension, which in this example is $0.1 \times 16 = 1.6$ metres. This must be rounded up to a multiple of 600 mm (support rail spacing), for this example, the distance from the corners of the building requiring additional support fixings is 1.8 m. **Note:** If 1200 mm Terraçade TN tiles are used near corners, they must be supported on rails at 600 mm centres, however the contractor must take extra care when aligning the support rails during construction.

A wind pressure table (Table B2 on Page 20) has been provided as a reference for the wind pressure at the building corners.

STRUCTURAL PERFORMANCE - AUSTRALIA

SYSTEM PERFORMANCE FOR WIND LOADS

Example 3:

A medium-rise project in the central business district of Brisbane (i.e. Terrain Category 4, Region B) is installed to a height of 20 m, with an aspect ratio of greater than one.

For this case, the wind pressure for general areas of Terraçade TN for a limiting height of 20 m, is 1.33 kPa (using Table B1 on page 19) and the wind pressure on at the corners is 1.90 kPa (using Table B2 on page 20).

If 1200 mm wide Terraçade TN panels are to be supported on rails at 1200 mm, the wind pressure of the general area must be doubled to 2.66 kPa in order to be compared to the maximum ultimate wind pressures on the span chart on page 24. In this example, the support rails for the general areas must be fastened as per span configuration 5 to 8. The corner areas may be fastened as per span configuration 3, however it is recommended to adopt the higher rates span 5 to 8 configuration for the entire project to simplify installation.

The minimum span fastener configuration for general installation a can be read from Table B3 for 600 mm centres (e.g., span configurations 5 to 8, for a height of 30 m in this example) and Table B3 for 1200 mm centres (e.g. not adequate for this site at 30 m).

The minimum span fastener configuration for corner installation a can be read from Table B4 for 600 mm centres (e.g., span configurations 5 to 8, for a height of 30 m in this example).

STEP B6: SPAN DETERMINATION

Minimum span configuration requirements (for buildings complying with AS/NZS 1170.2) have been determined for the Terraçade TN system in accordance with the procedure outlined by Core Project Consulting. The allowable pressure tables (refer to page 13) were used to determine the minimum span configuration requirements for the wind pressure determined. These requirements are summarised in Table B3-B6 on pages 21 and 24.

The span number given in the tables indicates the lowest span number that the system must be installed at. For example Span 4 indicates that a span configuration of 900 mm – 750 mm – 900 mm is required (refer to span diagram below), any lower numbered spans, such as Span 3 which is 750 mm – 900 mm – 900 mm, cannot be used.

Tables B3 and B4 apply to the Standard Version (galvanised rails). Tables B5 and B6 apply to the Coastal Version (ZAM® pre-coated steel or stainless steel rails). The minimum span configuration requirement for general installations of Terraçade TN is given in Table B3 for the Standard Version and Table B5 for the Coastal Version. When Terraçade TN is installed on a building corner (refer to Step B5) refer to Table B4 for the Standard Version and Table B6 for the Coastal Version.

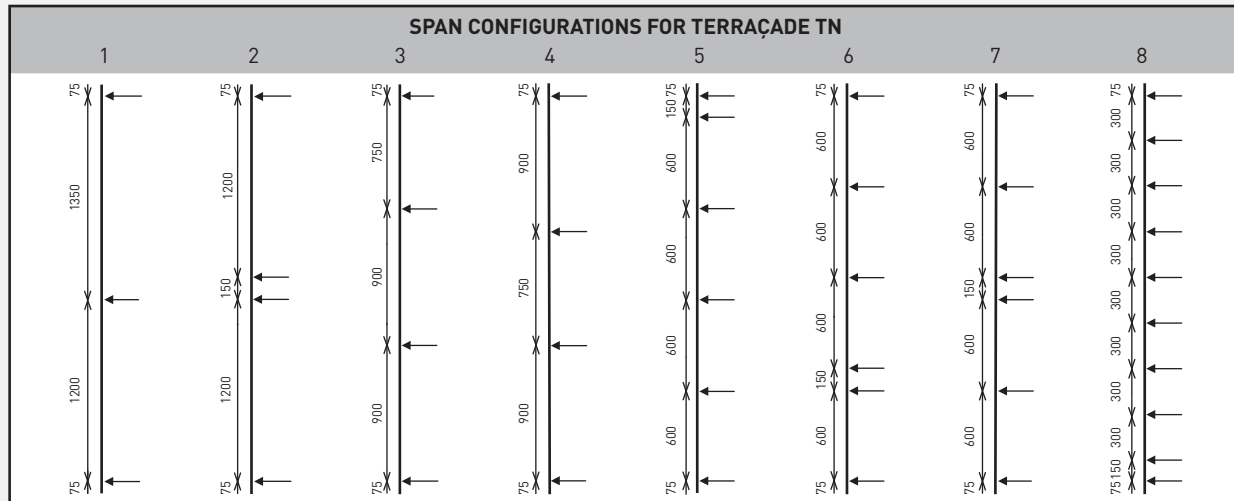
Note: It is important to remember that particular projects that require the coastal version (ZAM® pre-coated steel or stainless steel rails) should use Tables B5 and B6.

Note: The span configurations determined should be specified along with the fastener requirements (refer to the Technical Specifications - Fastener Section) in all project documentation.

Note: Terraçade TN standard (galvanised) and coastal (ZAM® pre-coated steel and stainless steel) rails that are cut to lengths of less than 1.8 m should always be installed at 600 mm centres.

STRUCTURAL PERFORMANCE - AUSTRALIA

SYSTEM PERFORMANCE FOR WIND LOADS



* Note: The arrows in the allowable pressures tables indicate the fastener locations and the distance noted is the span (mm) between the fasteners.

TABLE B1: Wind Pressure

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A	10	1.88	1.69	1.50	1.26	1.03	0.84
	15	2.01	1.83	1.65	1.42	1.19	0.84
	20	2.12	1.93	1.75	1.53	1.32	0.84
	30	2.23	2.05	1.88	1.69	1.50	0.96
	40	2.30	2.16	2.01	1.82	1.62	1.08
B	10	2.97	2.67	2.37	2.00	1.63	1.33
	15	3.19	2.90	2.61	2.24	1.88	1.33
	20	3.35	3.06	2.76	2.43	2.09	1.33
	30	3.53	3.25	2.97	2.67	2.37	1.52
	40	3.64	3.41	3.19	2.87	2.56	1.71
C	10	4.48	4.02	3.57	3.01	2.46	2.01
	15	4.80	4.37	3.93	3.38	2.83	2.01
	20	5.05	4.61	4.16	3.66	3.15	2.01
	30	5.31	4.89	4.48	4.02	3.57	2.28
	40	5.49	5.14	4.80	4.33	3.86	2.58
D	10	7.14	6.41	5.69	4.80	3.92	3.20
	15	7.66	6.96	6.27	5.39	4.51	3.20
	20	8.06	7.35	6.64	5.83	5.03	3.20
	30	8.47	7.80	7.14	6.41	5.69	3.64
	40	8.75	8.20	7.66	6.90	6.15	4.11

STRUCTURAL PERFORMANCE - AUSTRALIA

SYSTEM PERFORMANCE FOR WIND LOADS

TABLE B2: Wind Pressure for Tall Building Corners (Aspect Ratio >1)

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A	10	2.68	2.41	2.14	1.80	1.47	1.20
	15	2.87	2.61	2.35	2.02	1.69	1.20
	20	3.02	2.76	2.49	2.19	1.89	1.20
	30	3.18	2.93	2.68	2.41	2.14	1.37
	40	3.28	3.08	2.87	2.59	2.31	1.54
B	10	4.24	3.81	3.38	2.85	2.33	1.90
	15	4.55	4.14	3.73	3.20	2.68	1.90
	20	4.79	4.36	3.94	3.46	2.99	1.90
	30	5.03	4.64	4.24	3.81	3.38	2.16
	40	5.20	4.87	4.55	4.10	3.66	2.44
C	10	6.39	5.74	5.09	4.30	3.51	2.86
	15	6.85	6.23	5.61	4.82	4.03	2.86
	20	7.21	6.57	5.94	5.22	4.50	2.86
	30	7.58	6.98	6.39	5.74	5.09	3.26
	40	7.83	7.34	6.85	6.18	5.51	3.68
D	10	10.18	9.15	8.12	6.86	5.59	4.57
	15	10.92	9.94	8.95	7.69	6.43	4.57
	20	11.50	10.48	9.47	8.32	7.17	4.57
	30	12.08	11.13	10.18	9.15	8.12	5.20
	40	12.48	11.70	10.92	9.85	8.78	5.87

STRUCTURAL PERFORMANCE - AUSTRALIA

SYSTEM PERFORMANCE FOR WIND LOADS

TABLE B3: General Installation (Galvanised Rails)

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A	10	Span 3	Span 3	Span 3	Span 3	Span 3	Span 2
	15	Span 4	Span 3	Span 3	Span 3	Span 3	Span 2
	20	Span 5-8	Span 4	Span 3	Span 3	Span 3	Span 2
	30	Span 5-8	Span 4	Span 3	Span 3	Span 3	Span 2
	40	Span 5-8	Span 5-8	Span 4	Span 3	Span 3	Span 3
B	10	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3	Span 3
	15	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3	Span 3
	20	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3
	30	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
	40	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
C	10	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 4
	15	N/A	N/A	N/A	Span 5-8	Span 5-8	Span 4
	20	N/A	N/A	N/A	Span 5-8	Span 5-8	Span 4
	30	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
	40	N/A	N/A	N/A	N/A	N/A	Span 5-8
D	10	N/A	N/A	N/A	N/A	N/A	Span 5-8
	15	N/A	N/A	N/A	N/A	N/A	Span 5-8
	20	N/A	N/A	N/A	N/A	N/A	Span 5-8
	30	N/A	N/A	N/A	N/A	N/A	Span 5-8
	40	N/A	N/A	N/A	N/A	N/A	N/A

*N/A equals Not Available

STRUCTURAL PERFORMANCE - AUSTRALIA

SYSTEM PERFORMANCE FOR WIND LOADS

TABLE B4: Corner Installation - Aspect Ratio >1 (Galvanised Rails)

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A	10	Span 5-8	Span 5-8	Span 5-8	Span 3	Span 3	Span 3
	15	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3	Span 3
	20	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3	Span 3
	30	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
	40	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
B	10	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 3
	15	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 3
	20	N/A	N/A	N/A	Span 5-8	Span 5-8	Span 3
	30	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
	40	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
C	10	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
	15	N/A	N/A	N/A	N/A	N/A	Span 5-8
	20	N/A	N/A	N/A	N/A	N/A	Span 5-8
	30	N/A	N/A	N/A	N/A	N/A	Span 5-8
	40	N/A	N/A	N/A	N/A	N/A	Span 5-8
D	10	N/A	N/A	N/A	N/A	N/A	N/A
	15	N/A	N/A	N/A	N/A	N/A	N/A
	20	N/A	N/A	N/A	N/A	N/A	N/A
	30	N/A	N/A	N/A	N/A	N/A	N/A
	40	N/A	N/A	N/A	N/A	N/A	N/A

*N/A equals Not Available

STRUCTURAL PERFORMANCE - AUSTRALIA

SYSTEM PERFORMANCE FOR WIND LOADS

TABLE B5: General Installation (Stainless Steel Rails)

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A	10	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3	Span 3
	15	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3
	20	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3
	30	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
	40	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
B	10	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 4
	15	N/A	N/A	N/A	Span 5-8	Span 5-8	Span 4
	20	N/A	N/A	N/A	Span 5-8	Span 5-8	Span 4
	30	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
	40	N/A	N/A	N/A	N/A	N/A	Span 5-8
C	10	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
	15	N/A	N/A	N/A	N/A	N/A	Span 5-8
	20	N/A	N/A	N/A	N/A	N/A	Span 5-8
	30	N/A	N/A	N/A	N/A	N/A	Span 5-8
	40	N/A	N/A	N/A	N/A	N/A	N/A
D	10	N/A	N/A	N/A	N/A	N/A	N/A
	15	N/A	N/A	N/A	N/A	N/A	N/A
	20	N/A	N/A	N/A	N/A	N/A	N/A
	30	N/A	N/A	N/A	N/A	N/A	N/A
	40	N/A	N/A	N/A	N/A	N/A	N/A

*N/A equals Not Available

STRUCTURAL PERFORMANCE - AUSTRALIA

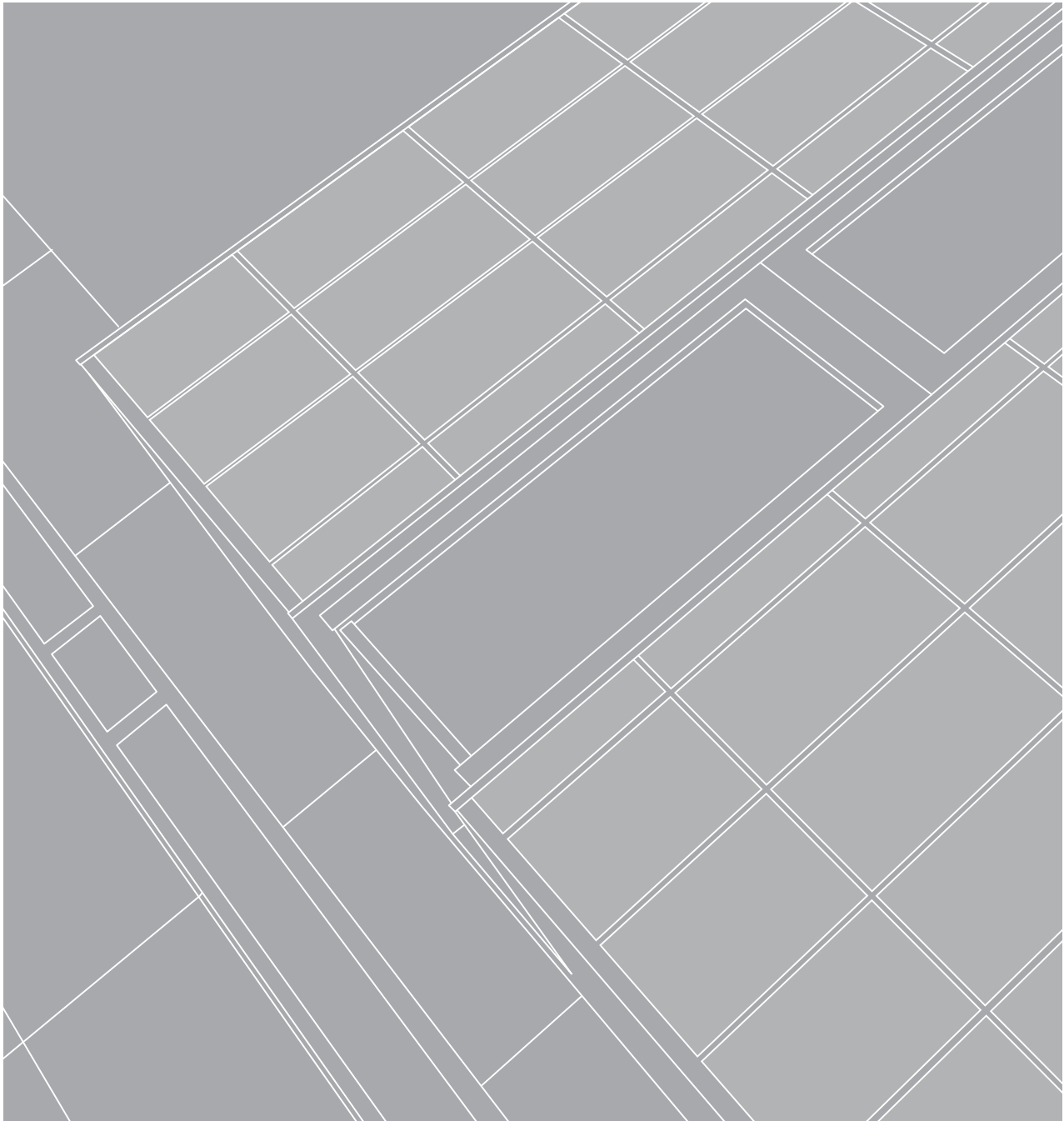
SYSTEM PERFORMANCE FOR WIND LOADS

TABLE B6: Corner installation - Aspect Ratio >1 (Stainless Steel Rails)

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A	10	N/A	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4
	15	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 4
	20	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 4
	30	N/A	N/A	N/A	Span 5-8	Span 5-8	Span 4
	40	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
B	10	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
	15	N/A	N/A	N/A	N/A	N/A	Span 5-8
	20	N/A	N/A	N/A	N/A	N/A	Span 5-8
	30	N/A	N/A	N/A	N/A	N/A	Span 5-8
	40	N/A	N/A	N/A	N/A	N/A	Span 5-8
C	10	N/A	N/A	N/A	N/A	N/A	N/A
	15	N/A	N/A	N/A	N/A	N/A	N/A
	20	N/A	N/A	N/A	N/A	N/A	N/A
	30	N/A	N/A	N/A	N/A	N/A	N/A
	40	N/A	N/A	N/A	N/A	N/A	N/A
D	10	N/A	N/A	N/A	N/A	N/A	N/A
	15	N/A	N/A	N/A	N/A	N/A	N/A
	20	N/A	N/A	N/A	N/A	N/A	N/A
	30	N/A	N/A	N/A	N/A	N/A	N/A
	40	N/A	N/A	N/A	N/A	N/A	N/A

*N/A equals Not Available

STRUCTURAL PERFORMANCE - NEW ZEALAND



For the most up to date information on
Terraçade products and the latest version
of this manual, please refer to our website.
www.terraçade.com.au
www.terraçade.co.nz

STRUCTURAL PERFORMANCE - NEW ZEALAND

PERFORMANCE FOR EARTHQUAKE AND CYCLONES

SUPPLY AND TESTING STATEMENT

The Terraçade TN system has been tested to AS/NZS 4284 (Testing of building façades) for structural performance and has passed the deflection criteria under serviceable limit state. In addition, extensive cyclone testing has been conducted to AS 4040.3 (Methods of testing sheet roof and wall cladding - Resistance to wind pressures for cyclone regions). Terraçade TN has been cyclone rated to 4.4 kPa and has been tested to an ultimate limit state wind pressure of 4.6 kPa. Copies of the test reports are available on the Terraçade website www.terraçade.co.nz.

Brickworks Building Products has received system and structural advice from Core Project Consulting and they have also provided engineering guidance on the structural and cyclone testing.

EARTHQUAKE PERFORMANCE

The Terraçade TN system has been checked for compliance with NZS 1170.5-2004: Structural design actions - Earthquake actions in New Zealand for buildings of importance level 2 and a design life of 50 years in accordance with AS/NZS 1170.0-2002 Structural Design Actions.

From analysis of NZS 1170.5, Terraçade TN tiles may be used for buildings at any site with a hazard factor Z less than or equal to 0.6, for any subsoil class, when supported on suspension rails fixed to the structure in span configurations 3 to 8 inclusive. For span configurations 1 or 2, the maximum site hazard factor Z must be less than a specific limit (refer to span configuration table below).

Contact Brickworks Building Products for further engineering advice for buildings that are outside the above criteria.

The Terraçade TN system develops forces on the support rails from the action of inertia during seismic events which are less than or equal to the maximum ultimate wind pressure for each support rail fastener span configuration stated above. The horizontal directions of movement are accommodated by the inherent strength of the system. No further action is therefore necessary to resist such movements.

Movement in a true vertical direction requires restraint against the tiles lifting directly off the rail system under such an action. For installation in New Zealand, the Terraçade TN system requires an anti-lift block or trim installed along its top edge to ensure tiles are unable to detach from their supporting rail under the action of vertical seismic events.

When the anti-lift block or trim is installed, the system is suitable for installation against earthquakes in New Zealand. This precaution does not alleviate the system's requirements for installation against wind load.

CYCLONE PERFORMANCE

The Terraçade TN system has been successfully rated for cyclone performance to 4.4 kPa during testing to AS 4040.3 (Methods of testing sheet roof and wall cladding - Resistance to wind pressures for cyclone regions).

For installation in cyclone regions, the Terraçade TN system requires an anti-lift block or trim installed along its top edge to ensure that the uppermost tiles are unable to detach from their supporting rail. The system was tested at Ian Bennie & Associates with an anti-lift trim in place. The system's requirements for installation against wind load are not alleviated by this precaution.

HAZARD FACTOR 'Z' LIMIT FOR SUSPENSION RAILS

SPAN CONFIGURATION							
1	2	3	4	5	6	7	8
GALVANISED STEEL & ZAM COASTAL:							
0.38	0.47	0.6	0.6	0.6	0.6	0.6	0.6
STAINLESS STEEL:							
0.23	0.31	0.6	0.6	0.6	0.6	0.6	0.6

* Note: The arrows indicate the fastener locations and the distance noted is the span (mm) between the fasteners.

STRUCTURAL PERFORMANCE - NEW ZEALAND

SYSTEM PERFORMANCE FOR WIND LOADS

ALLOWABLE PRESSURES

The following charts and tables have been calculated assuming a building consequence of failure importance level of 2 and a design life of 50 years in accordance with AS/NZS 1170.

The ultimate wind pressures have been calculated for both the standard (galvanised steel) and the coastal (ZAM® pre-coated steel and stainless steel) support rail versions; the pertinent table should be referred to for a particular project. The ultimate wind pressure tables have been characterised by a particular span configuration. The ultimate wind pressures listed refer to the span configuration directly above it.

Note: The ultimate wind pressures specified in the span configuration tables below assume a spacing between the support rails of 600 mm. The span configuration tables should be used in accordance with the fastener specifications given in the Technical Specification section. Design documentation should accommodate the ultimate wind pressures and fastener specifications for a particular project.

ULTIMATE WIND PRESSURES FOR THE STANDARD VERSION (GALVANISED STEEL & COASTAL ZAM®)

SPAN CONFIGURATION							
1	2	3	4	5	6	7	8
ULTIMATE WIND PRESSURE (kPa):							
0.80	1.00	1.90	2.10	3.75	3.75	3.75	3.75
MAXIMUM REACTIONS (permissible) kN:							
0.71	0.47	1.15	1.12	1.48	1.46	1.52	0.71

ULTIMATE WIND PRESSURES FOR THE COASTAL VERSION (STAINLESS STEEL)

SPAN CONFIGURATION							
1	2	3	4	5	6	7	8
ULTIMATE WIND PRESSURE (kPa):							
0.48	0.65	1.15	1.38	2.51	2.51	2.51	2.51
MAXIMUM REACTIONS (permissible) kN:							
0.46	0.31	0.69	0.74	1.02	0.99	1.02	0.48

* Note: The arrows in the allowable pressures tables indicate the fastener locations and the distance noted is the span (mm) between the fasteners.

STRUCTURAL PERFORMANCE - NEW ZEALAND

PART A – STEP-BY-STEP METHOD

DETERMINING SPAN CONFIGURATION FOR WIND LOAD REQUIREMENTS

The following wind load requirements on Terraçade TN only apply to buildings that comply with New Zealand Standard AS/ NZS 1170.2 (Structural design actions, Part 2: Wind actions). The applicability of AS/NZS 1170.2 and subsequent compliance of individual projects should be verified.

AS/NZS 1170.2 identifies three wind regions pertinent to New Zealand as shown in the map. In addition, some projects will require a multiplying factor to be taken into consideration when located in an area affected by the Lee Multiplier (as shown in the map).

Two methods of determining the span configuration are available, depending on the information available on a particular project. Please apply the following checklist to each project to determine which method to use:

	Yes	No
Is the wind region known?	<input type="radio"/>	<input type="radio"/>
Is the terrain category known?	<input type="radio"/>	<input type="radio"/>
Is the height of the installation known?	<input type="radio"/>	<input type="radio"/>
The project is not affected by a Lee Multiplier?	<input type="radio"/>	<input type="radio"/>

(This information should be determined in accordance with AS/NZS 1170.2)

If **all** of these answers were “Yes” then please use the tables provided on pages 06 and 07 (Specialised Engineering Method) to quickly determine the span configuration. If **any** of these answers were “No” then please use the following Step-By-Step Method. It is especially important that any projects located in an area affected by the Lee Multiplier use the Step-By-Step Method.

Note: Shielding was not considered in the analysis.
Note: Topography can affect wind pressure if a building is located high on a steep slope or escarpment. Brickworks Building Products should be contacted in such circumstances.

STEP-BY-STEP METHOD

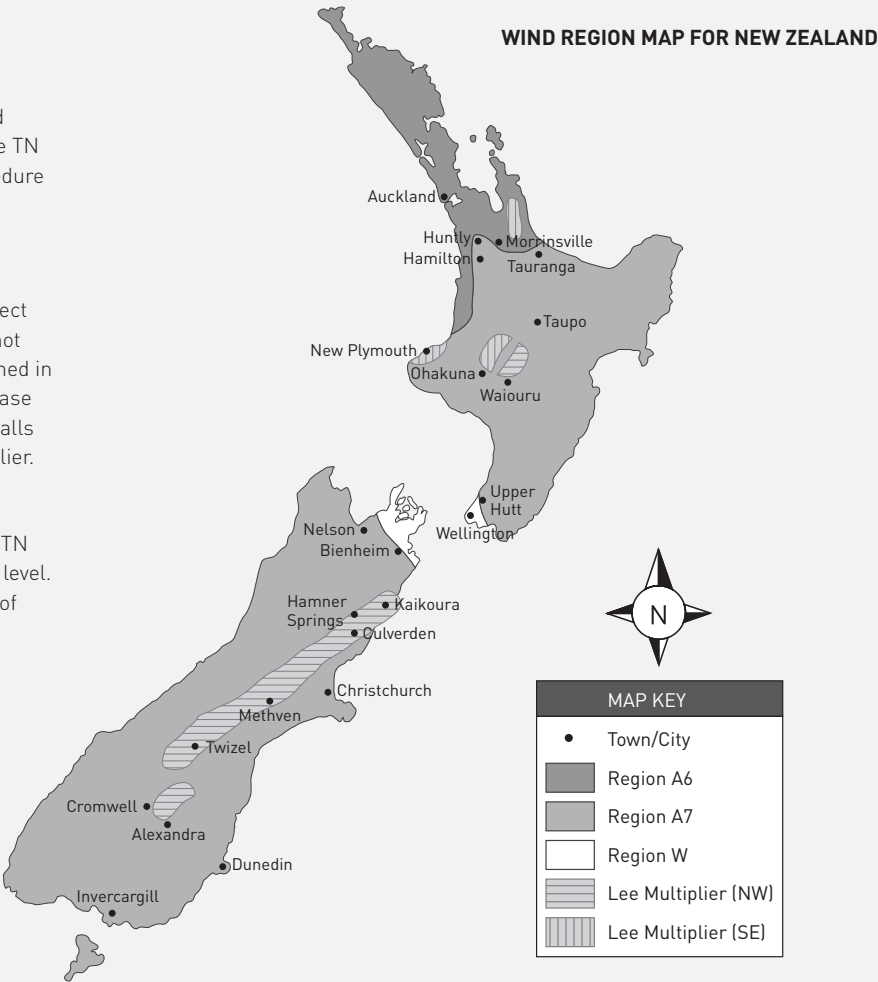
Leading engineers at Core Project Consulting have considered the wind pressure requirements for Terraçade TN and have derived the following procedure for determining the minimum span configurations required.

STEP A1: WIND REGION

Identify the wind region that the project is located in. If the wind region has not been specified, it should be determined in accordance with AS/NZS 1170.2. Please note whether the particular project falls into an area affected by a Lee Multiplier.

STEP A2: HEIGHT

Determine the height the Terraçade TN will be installed to above the ground level. AS/NZS 1170.2 outlines the method of determining reference heights.



STRUCTURAL PERFORMANCE - NEW ZEALAND

SYSTEM PERFORMANCE FOR WIND LOADS

STEP A3: TERRAIN CATEGORY

Identify the terrain category for the project. The terrain affects the wind flows that a project is subjected too. The four terrain categories defined in AS/NZS 1170.2 are:

- **Category 1:** Very few or no obstructions and an exposed open terrain.
- **Category 1.5:** Open water surfaces subjected to shoaling waves, e.g. near-shore ocean water; large unenclosed bays on seas and oceans; lakes; and enclosed bays extending greater than 10 km in the wind direction.
- **Category 2:** Limited and well-spread obstructions in an open terrain. Typical terrains include grasslands and water surfaces.
- **Category 2.5:** Terrain with a few trees or isolated obstructions, typical of developing outer urban areas with scattered houses, or large acreage developments with fewer than ten buildings per hectare.
- **Category 3:** Numerous low (3-5 m) obstructions that are closely spaced. A typical terrain is a suburban housing estate.
- **Category 4:** High number of large and tall (10-30 m) obstructions that are closely spaced. A typical terrain is a large city centre.

Note: The terrain category should be determined in accordance with AS/NZS 1170.2 and obstructions should have permanence during a wind event.

STEP A4: WIND PRESSURE

Use the wind pressure table (refer to Table A1 on page 30) to determine the wind pressure for the individual characteristics determined. Always select the limiting height that is larger or equal to the project installation height.

Example 1:

A typical project in a suburban area (Terrain Category 3) in Wellington is in the W region. If the project is installed to a height of 4 m, the 5 m limiting height column should be used. The ultimate wind pressure for Terraçade TN in this case is 1.33 kPa (using Table A1 on page 30).

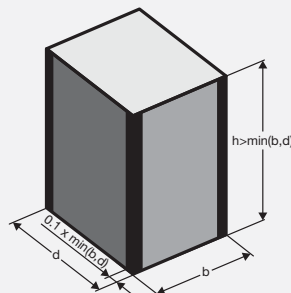
STEP A5: CORNER WIND PRESSURE

The corners of tall, slender buildings experience higher wind pressures than the rest of the building. When Terraçade TN is installed in a corner region of a building, a different support rail span configuration may be required. To determine the span configuration

requirement, calculate the aspect ratio (r) of the building by dividing its average roof height (h) by its smallest plan dimension (b or d).

If the aspect ratio is less than or equal to 1, the span configuration determined in Step A4 is applicable at the building corners. (Note: AS/NZS 1170.2-2011 has equalised the worst-case magnitudes of positive and negative wind pressure coefficients and factors for permeable cladding on buildings with an aspect ratio of less than or equal to 1).

If the aspect ratio is greater than 1, then check whether any Terraçade TN is being installed on the building corners. Refer to Table A2 for the relevant ultimate wind pressure. The length of the corner region requiring additional support is one-tenth of the shortest plan dimension for all corners (refer to below diagram).



Example 2:

A six storey building has plan dimensions of 32 metres and 16 metres, and has an average roof height of 20 metres. The aspect ratio found by dividing the height of 20 m by the smallest plan dimension i.e., 16 m, which equals 1.25. Since the aspect ratio is greater than 1, additional fixings for the Terraçade TN support rails are required at the corners of the building for the increased wind pressure.

The distance from the corners of the building requiring additional fixings for the Terraçade TN support rails is one-tenth of the shortest plan dimension, which in this example is $0.1 \times 16 = 1.6$ metres. This must be rounded up to the nearest multiple of the length of Terraçade TN tile being used (i.e. a multiple of 600 mm or 1200 mm), therefore, for this example, the distance from the corners of the building requiring additional support fixings is 1.8 m for 600 mm wide Terraçade TN panels of 2.4 m for 1200 mm panels. Note: If 1200 mm Terraçade TN tiles are used near corners, they should be supported on rails at 600 mm centres, however

the contractor must take extra care when aligning the support rails during construction.

Example 3:

A typical project in a suburban area (Terrain Category 3) in Wellington is in the W region. If the project is installed to a height of 4 m, the 5 m limiting height column should be used. The ultimate wind pressure for Terraçade TN in general use is 1.08 kPa (using Table A1 on page 30) and the ultimate wind pressure on a corner is 1.40 kPa (using Table A2 on page 30).

STEP A6: LEE MULTIPLIER ADJUSTMENT

If the project is located in a Lee Multiplier area (as identified from the wind region map) an additional factor of 1.35 must be applied to the wind pressure for Terraçade TN (for both the general pressure and the corner pressure).

Example 4:

For a project in a Lee Multiplier region with a ultimate wind pressure of 1.33 kPa in general areas, the adjusted wind pressure is $1.35 \times 1.33 \text{ kPa} = 1.80 \text{ kPa}$. The ultimate wind pressure for building corners of 1.90 kPa, when adjusted is $1.35 \times 1.90 \text{ kPa} = 2.57 \text{ kPa}$.

STEP A7: SPAN DETERMINATION

To determine the span configuration from the wind pressures found in the preceding steps, use the tables in the Ultimate Wind Pressures section. The span configuration tables show the ultimate wind pressure of the Terraçade TN system at different span configurations. Using the wind pressure determined, identify the span configuration that has a greater ultimate wind pressure than the requirement. If Terraçade TN is to be installed at a corner, the span configuration for this situation should also be determined. It is important to remember that particular projects that require the coastal version (ZAM® pre-coated steel rails & stainless steel) should use the Table of Allowable Pressures for the Coastal Version. The span configurations determined should be specified along with the fastener requirements (refer to the Technical Specifications - Fasteners Section) in all project documentation.

Check span configuration for earthquake site hazard factor 'Z' limits (refer table on page 26).

STRUCTURAL PERFORMANCE - NEW ZEALAND

SYSTEM PERFORMANCE FOR WIND LOADS

Example 5:

A typical low-rise project in a suburban area (Terrain Category 3) in New Plymouth is in the A7 region and has

a Lee Multiplier of 1.35. If the project installed at a height of 4 m the ultimate wind pressure for Terraçade TN in this case is $1.33 \text{ kPa} \times 1.35 = 1.80 \text{ kPa}$. The aspect ratio is found to be less than 1, so no change in the span configuration

is required (from Steps A4 and A5). If the coastal version is required then using the ultimate wind pressure for the Coastal Version table the required span configuration is Span 5 (or greater) for all areas of the building.

TABLE A1: Wind Pressure

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A6	10	1.88	1.69	1.50	1.26	1.03	0.84
	15	2.01	1.83	1.65	1.42	1.19	0.84
	20	2.12	1.93	1.75	1.53	1.32	0.84
	30	2.23	2.05	1.88	1.69	1.50	0.96
	40	2.30	2.16	2.01	1.82	1.62	1.08
A7	10	1.88	1.69	1.50	1.26	1.03	0.84
	15	2.01	1.83	1.65	1.42	1.19	0.84
	20	2.12	1.93	1.75	1.53	1.32	0.84
	30	2.23	2.05	1.88	1.69	1.50	0.96
	40	2.30	2.16	2.01	1.82	1.62	1.08
W	10	2.42	2.18	1.93	1.63	1.33	1.09
	15	2.60	2.36	2.13	1.83	1.53	1.09
	20	2.73	2.49	2.25	1.98	1.71	1.09
	30	2.87	2.65	2.42	2.18	1.93	1.24
	40	2.97	2.78	2.60	2.34	2.09	1.39

*N/A equals Not Available

TABLE A2: Wind Pressure at Corners - Aspect Ratio >1

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A6	10	2.68	2.41	2.14	1.80	1.47	1.20
	15	2.87	2.61	2.35	2.02	1.69	1.20
	20	3.02	2.76	2.49	2.19	1.89	1.20
	30	3.18	2.93	2.68	2.41	2.14	1.37
	40	3.28	3.08	2.87	2.59	2.31	1.54
A7	10	2.68	2.41	2.14	1.80	1.47	1.20
	15	2.87	2.61	2.35	2.02	1.69	1.20
	20	3.02	2.76	2.49	2.19	1.89	1.20
	30	3.18	2.93	2.68	2.41	2.14	1.37
	40	3.28	3.08	2.87	2.59	2.31	1.54
W	10	3.45	3.10	2.75	2.33	1.90	1.55
	15	3.71	3.37	3.04	2.61	2.18	1.55
	20	3.90	3.56	3.21	2.82	2.43	1.55
	30	4.10	3.78	3.45	3.10	2.75	1.76
	40	4.23	3.97	3.71	3.34	2.98	1.99

*N/A equals Not Available

STRUCTURAL PERFORMANCE - NEW ZEALAND

PART B – SPECIALISED ENGINEERING METHOD

THIS SECTION ONLY PROVIDES A GENERAL INDICATION OF THE SPAN CONFIGURATION FOR PROJECTS THAT COMPLY WITH AS/NZS 1170.2 AND THAT ARE NOT BUILT IN A LEE MULTIPLIER REGION (REFER TO WIND LOAD MAP)

SPECIALISED ENGINEERING METHOD
 To use this method the following information should be known about the project:
 (This information should be determined in accordance with AS/NZS 1170.2)

Wind region	Yes
Terrain category	○
Height of the installation	○
The project is not affected by a Lee Multiplier	○

Otherwise, each project should follow the procedure outlined in the Step-By-Step Method. This is especially necessary for projects that are located in a Lee Multiplier as the spans stated in these tables will be inadequate for those areas. The span number given in the tables indicates the lowest span number that the system must be installed at.

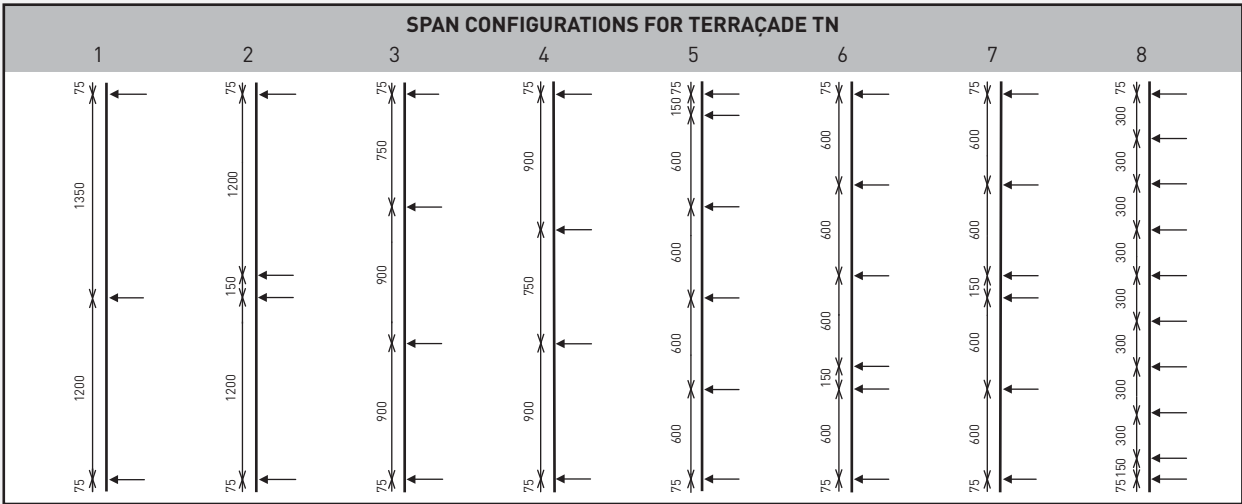
For example Span 4 indicates that a span configuration of 900 mm – 750 mm – 900 mm is required (refer to diagram), any lower numbered spans, such as Span 3 which is 750 mm – 900 mm – 900 mm (refer to diagram), cannot be used. Tables are given for the Standard Version and the Coastal Version of Terraçade TN in this section. Two tables are given for each version; one for general installation and one for installation at building corners. Refer to the definition given earlier for the size of a building corner.

Note: The corners of tall, slender buildings experience higher wind pressures than the rest of the building. If the average roof height is greater than either of the buildings plan dimensions (i.e. aspect ratio greater than 1), a different support rail span configuration will be required at the corners of the building. The distance from the corners is one-tenth of the minimum plan dimension.

Note: It is important to remember that particular projects that require the coastal version (ZAM® pre-coated steel rails and stainless steel rails) should use Tables B3 and B4.

Note: The span configurations determined should be specified along with the fastener requirements (refer to the Technical Specifications Fastener Section) in all project documentation.

Note: Terraçade TN standard and coastal suspension rails that are cut to lengths less than 1.8 m should always be installed at a minimum of 600mm centres.



* Note: The arrows in the allowable pressures tables indicate the fastener locations and the distance noted is the span (mm) between the fasteners.

STRUCTURAL PERFORMANCE - NEW ZEALAND

PART B – SPECIALISED ENGINEERING METHOD

TABLE B1: General Installation (Galvanised Rails)

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A6	10	Span 3	Span 3	Span 3	Span 3	Span 3	Span 2
	15	Span 4	Span 3	Span 3	Span 3	Span 3	Span 2
	20	Span 5-8	Span 4	Span 3	Span 3	Span 3	Span 2
	30	Span 5-8	Span 4	Span 3	Span 3	Span 3	Span 2
	40	Span 5-8	Span 5-8	Span 4	Span 3	Span 3	Span 3
A7	10	Span 3	Span 3	Span 3	Span 3	Span 3	Span 2
	15	Span 4	Span 3	Span 3	Span 3	Span 3	Span 2
	20	Span 5-8	Span 4	Span 3	Span 3	Span 3	Span 2
	30	Span 5-8	Span 4	Span 3	Span 3	Span 3	Span 2
	40	Span 5-8	Span 5-8	Span 4	Span 3	Span 3	Span 3
W	10	Span 5-8	Span 5-8	Span 4	Span 3	Span 3	Span 3
	15	Span 5-8	Span 5-8	Span 5-8	Span 3	Span 3	Span 3
	20	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3	Span 3
	30	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3
	40	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3

*N/A equals Not Available

TABLE B2: Corner Installation for Aspect Ratio >1 (Galvanised Rails)

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A6	10	Span 5-8	Span 5-8	Span 5-8	Span 3	Span 3	Span 3
	15	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3	Span 3
	20	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3	Span 3
	30	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
	40	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
A7	10	Span 5-8	Span 5-8	Span 5-8	Span 3	Span 3	Span 3
	15	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3	Span 3
	20	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3	Span 3
	30	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
	40	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
W	10	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3	Span 3
	15	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
	20	N/A	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
	30	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 3
	40	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 4

*N/A equals Not Available

STRUCTURAL PERFORMANCE - NEW ZEALAND

SYSTEM PERFORMANCE FOR WIND LOAD

COASTAL VERSION:

TABLE B3: General Installation (Stainless Steel Rails)

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A6	10	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3	Span 3
	15	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3
	20	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3
	30	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
	40	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
A7	10	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3	Span 3
	15	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3
	20	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3
	30	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
	40	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
W	10	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4	Span 3
	15	N/A	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
	20	N/A	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 3
	30	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 4
	40	N/A	N/A	N/A	Span 5-8	Span 5-8	Span 5-8

*N/A equals Not Available

TABLE B4: Corner Installation for Aspect Ratio >1 (Stainless Steel Rails)

Wind Region	Limiting Height (m)	Terrain Category 1	Terrain Category 1.5	Terrain Category 2	Terrain Category 2.5	Terrain Category 3	Terrain Category 4
A6	10	N/A	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4
	15	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 4
	20	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 4
	30	N/A	N/A	N/A	Span 5-8	Span 5-8	Span 4
	40	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
A7	10	N/A	Span 5-8	Span 5-8	Span 5-8	Span 5-8	Span 4
	15	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 4
	20	N/A	N/A	Span 5-8	Span 5-8	Span 5-8	Span 4
	30	N/A	N/A	N/A	Span 5-8	Span 5-8	Span 4
	40	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
W	10	N/A	N/A	N/A	Span 5-8	Span 5-8	Span 5-8
	15	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
	20	N/A	N/A	N/A	N/A	Span 5-8	Span 5-8
	30	N/A	N/A	N/A	N/A	N/A	Span 5-8
	40	N/A	N/A	N/A	N/A	N/A	Span 5-8

*N/A equals Not Available

TECHNICAL SPECIFICATIONS



For the most up to date information on
Terraçade products and the latest version
of this manual, please refer to our website.
www.terraçade.com.au
www.terraçade.co.nz

TECHNICAL SPECIFICATIONS:

MATERIALS SCHEDULE AND PROPERTIES

A list of the materials used in the Terraçade TN system is given below.

COMPONENT	MATERIAL
01. Tiles	Fired extruded clay tile
02. Suspension rail	Standard - Colorbond® (cold formed light galvanised sheet), or Coastal - ZAM® pre-coated steel or stainless steel sheet grade 304 or 316
03. Visible trims	Aluminium - All extrusions are aluminium Grade 6063-T5 and are produced to Australian Standard AS 1866 (Aluminium and Aluminium Alloys – Extruded Rod, Bar, Solid and Hollow Shapes). Trims are available in: <ul style="list-style-type: none"> • Mill finish, which is expected to have a design life in excess of twenty-five years for moderate environments (as defined in AS/NZS 2312) • Anodised finish in clear and black, which can have a design life in excess of forty years • Powder coated finish to AS 3715 in various colours, which can come with a guarantee of ten years Folded Metal Trims - These trims are available in Colorbond® or alternative finishes from other suppliers.
04. Waterproof membrane	For framed systems a waterproof membrane is supplied as part of the system's tested performance. The membrane is a spunbonded polypropylene material that allows the egress of vapour from within the frame, but restricts the ingress of rain and moisture.
05. Fitment sponge	EPDM rubber with acrylic adhesive.
06. Set-out tool	Specially designed tool to maintain vertical continuity if multiple lengths of the suspension rail are butted end to end.

TILE PROPERTIES

Extensive testing is carried out in Austral Bricks' NATA accredited laboratory to Australian Standards AS/NZS 4455 and AS/NZS 4456 and in independent NATA accredited laboratories to internationally recognised standards.

(Nominal) Tile Dimensions	308 x 588mm
Mass	~5 kg
Number of Tiles/m ²	5.6
Weight/m ²	27.8kg
Cold Water Absorption	3-7 %
Modulus of Rupture (Longitudinal)	>15 N/mm ²
Modulus of Rupture (Transverse)	>15 N/mm ²
Breaking Strength (Longitudinal)	>2.5 kN
Breaking Strength (Transverse)	>2.5 kN
Coefficient of Expansion	<0.02 %
Coefficient of Thermal Expansion	~7.0 x 10 ⁻⁶ (°C) ⁻¹
Durability Class	Exposure

* Brickworks Building Products reserves the right to change specifications without notice – April 2015. Check the Terraçade website for updated results. Colorbond® is the registered trademark of Bluescope Steel. ZAM® is a registered trade mark of Nisshin Steel

TECHNICAL SPECIFICATIONS:

MATERIALS SCHEDULE AND PROPERTIES

SUSPENSION RAIL AND TRIM PROPERTIES

A table of the standard properties of the suspension rail and trim materials is given below.

	Nominal Length	Coefficient of Thermal Expansion ($10^{-6}/^{\circ}\text{C}$)	I_{yy} (mm ⁴)	E (GPa)
Stainless Steel Suspension Rails	2700mm	15.9 - 17.2	4.75×10^4	190
Colorbond Suspension Rails	2700mm	11.7	4.75×10^4	200
ZAM® pre-coated steel Suspensions Rails	2700mm	10.7	4.75×10^4	210
Aluminium Trim	3600mm	23.4		69

Please ensure to create sufficient gaps between rails and trims to accommodate thermal expansion of the materials. For details on gaps refer page 092 and page 094

SUSPENSION RAIL SELECTION GUIDE

The suspension rail should be determined according to the atmospheric corrosivity of the site.

Distance From Breaking Surf*	Distance from calm salt water body, eg. Bay*	Corrosion Zone According to AS 4312	Recommended Suspension Rail Material
1001m+	101m+	Up to C3	Colourbond®
501m to 1000m	0m to 100m	Up to C4	ZAM®
0m to 500m	0m to 100m	Up to C5	304/316 Stainless Steel

* General guide only. Please refer to AS 4312-2008 for detailed corrosion zones.

FITMENT SPONGE PROPERTIES

The properties of the sponge are given below.

Cell Type	Closed	Thermal Conductivity	0.3
Resistance to Water Penetration	Good	Flame Retardant	Yes
Abrasion/Tear Resistance	Average	Toxicity	Low
Resistance to Weathering (uv/ozone)	Excellent	Compatibility with Plastics	Good
Resistance to Chemicals	Good	Compatibility with Silicones	Good
Resistance to Petrol/Oil	Poor	Force to Compress	Medium
Temperature Resistance (°C)	105	Conformability	Moderate

TERRAÇADE MEMBRANE PROPERTIES

The properties of the Terraçade membrane are given below.

Roll Dimensions	1.5 m x 50 m	
Weight of Complete Roll	~7.5 kg	
Thickness	0.5 mm	
Weight	100 g/m ²	
Resistance to Water Penetration	Pass	
Water Vapour Permeability	1100 g/m ² /d	
Vapour Resistance	0.17 MNs/g	
Burst Strength, Wet Dry	500 N/m ²	
Resistance to Nail Tear	115 N roll direction	126 N cross direction
Resistance to Tear	87 N/mm roll direction	77 N/mm cross direction
56 Days Water Soaked at 20°C	80 N/mm roll direction	81 N/mm cross direction
Tensile Strength	7.5 N/mm roll direction	5.4 N/mm cross direction
56 Days Water Soaked at 20°C	8.2 N/mm roll direction	5.8 N/mm cross direction
100 hours UV aged	6 N/mm roll direction	4 N/mm cross direction

TECHNICAL SPECIFICATIONS:

FASTENERS

The fasteners specified below should be used in accordance with the allowable pressures of the system. Design documentation should accommodate the allowable pressures and fastener specifications for a particular project.

SUBSTRATE	PRIMARY ANCHOR	RECOMMENDED MINIMUM EMBEDMENT	FASTENER DIAGRAMS
TIMBER	2 options		
	01. #12 A4/70 screws Fastener in side grain	45mm into supporting timber	
	02. A4/70 Tek Screw Type M		
STEEL	2 options		
	01. M6 A4/70 bolts	Min. thickness of base plate 1mm	
	02. #14 A4/70 Tek screws		
PRECAST OR REINFORCED CONCRETE WALLS	3 Options		
	01. M8 A4/70 chemical bolts	Min. 60mm embedment depth	
	02. M6 A4/70 mechanical anchors.	Min. 55mm embedment depth	
	03. Load rated 60 mm long plastic plug anchors, with #12 A4/70 screws*	Min. 60mm embedment depth	
MASONRY			
	Solid/Pressed brick	Load rated plastic plug anchors minimum 60 mm long with #12 A4/70 screws*	
	Concrete filled hollow block.	3 Options	
	01. M8 A4/70 chemical bolts	Min. 65mm embedment depth	
	02. M8 A4/70 mechanical bolts.	Min. 35mm embedment depth	
	03. Load rated plastic plug anchors minimum 60 mm long with #12 A4/70 screws*	Min. 60mm embedment depth	
Extruded hollow brick	M8 Chemical injection resin with mesh sleeves and 12 mm A4/70 threaded rods.	Min. 65mm embedment depth	

The above table is a guide to anchorage selection and does not alleviate the installers' responsibility to ensure the anchorage chosen is fit for purpose. Specifiers should review the maximum reaction section of the load span tables and review the design accordingly. If in doubt advice should be sought by the product design engineers.

All screws and bolts are to be manufactured to AS 1111 and AS 3566.

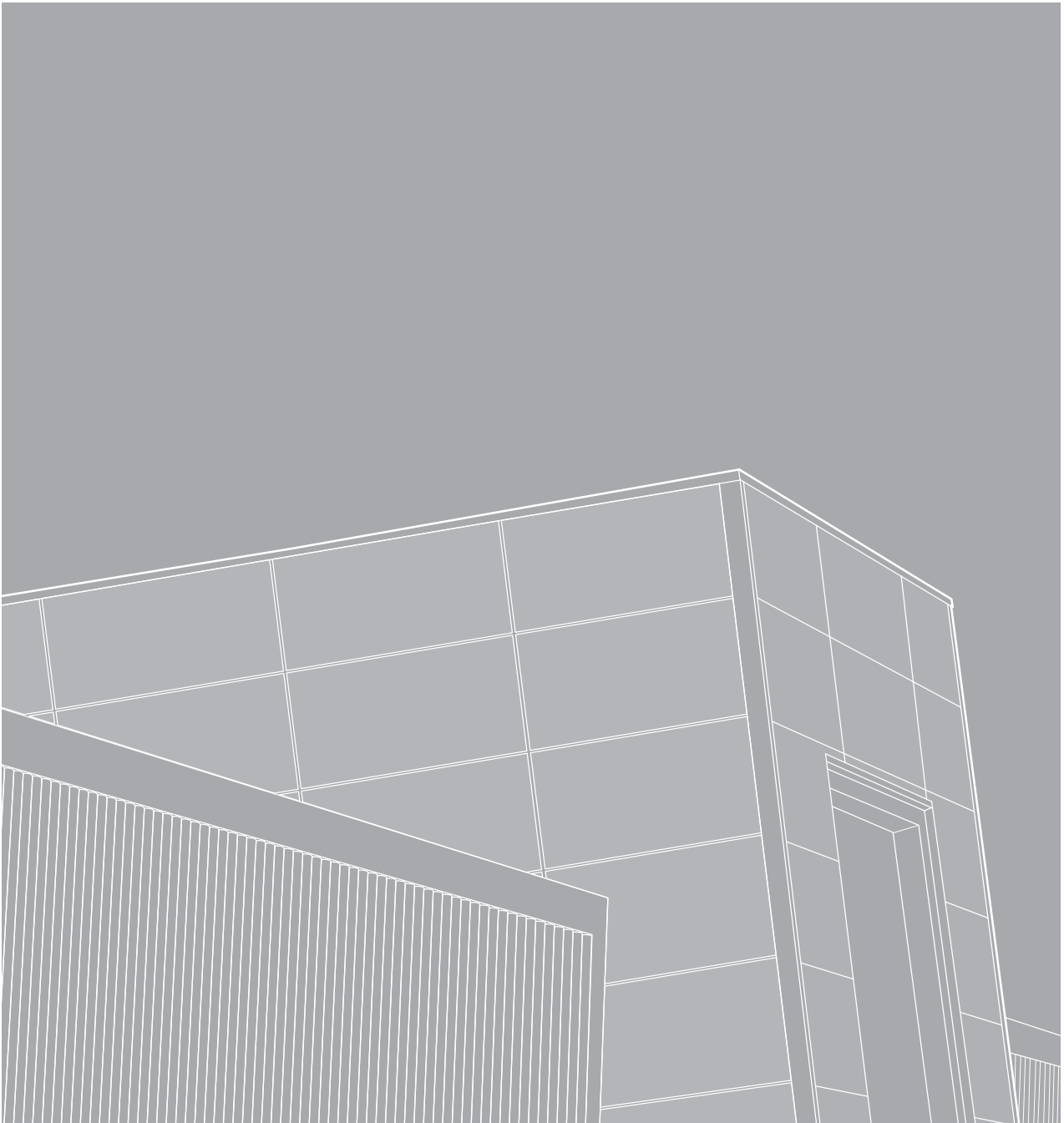
* Note: Refer to the load span table (allowable pressures) for reaction output.

A4/70 indicates that the material required is cold worked, austenitic stainless steel.

M6, M8, #12 and #14 indicate the gauge or fastener diameter required.

These descriptions should be confirmed with the fastener manufacturer.

COMPONENTS



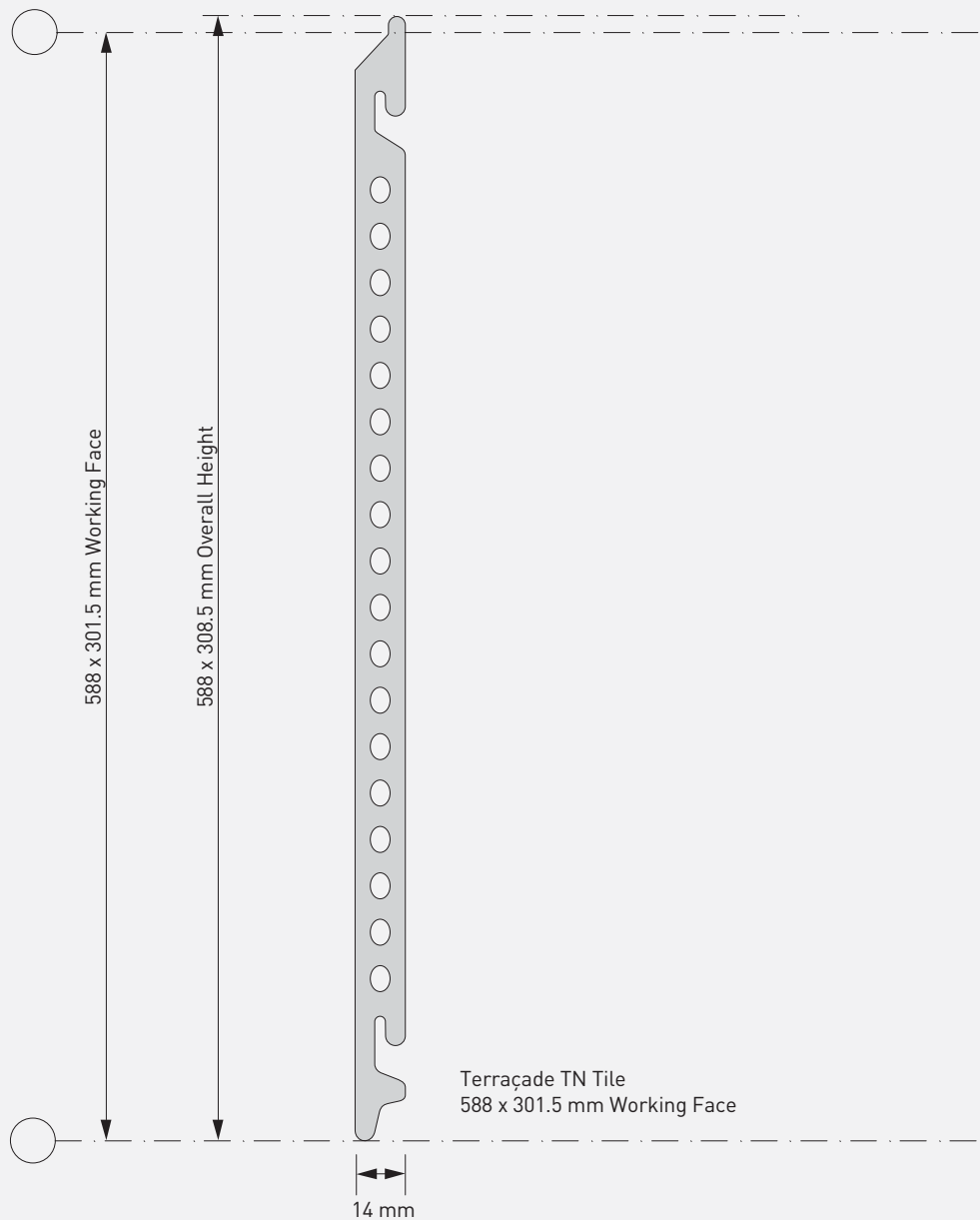
For the most up to date information on
Terraçade products and the latest version
of this manual, please refer to our website.
www.terraçade.com.au
www.terraçade.co.nz

COMPONENTS:

Component Description	Page Number	Available from Terraçade	Available from Other suppliers
Terraçade™ TN Tile	39	Yes	-
TN.01 Vertical Suspension Rail	40 & 41	Yes	-
Surround Trim Options			
TN.02 Aluminium Surround Profile	42	Yes	-
A.05 Aluminum door/surround profiles (for use with battons)	41	Yes	-
A.06 Modified aluminium door/surround profile	41	Yes	-
A.07 Aluminium Base Surround Profile (for use with battons)	42	Yes	-
A.08 Modified Aluminium Base Surround Profile	42	Yes	-
Corner Trim Options			
TN.04 Aluminium external corner	45	Yes	-
TN.05 Aluminium internal corner	45	Yes	-
50x50mm Aluminium angle	45	-	Yes
TN Mitre Corner	46	-	Yes
Jointing Strip Options			
TN.03 Aluminium jointing Strip	45	Yes	-
Other Components			
Corner angle fixing for TN.02	47	-	Yes
Corner spigot fixing for TN.02	47	-	Yes
Rail Setting Tool	47	Yes	-
TN.E2 Fitment sponge	47	Yes	-
TN.E3 Breathable membrane	47	Yes	-
Horizontal Supports	47	-	Yes

COMPONENTS:

TERRAÇADE TN TILE PROFILE



GENERAL TOLERANCES FOR TILES: +/- 1% ON ALL DIMENSIONS

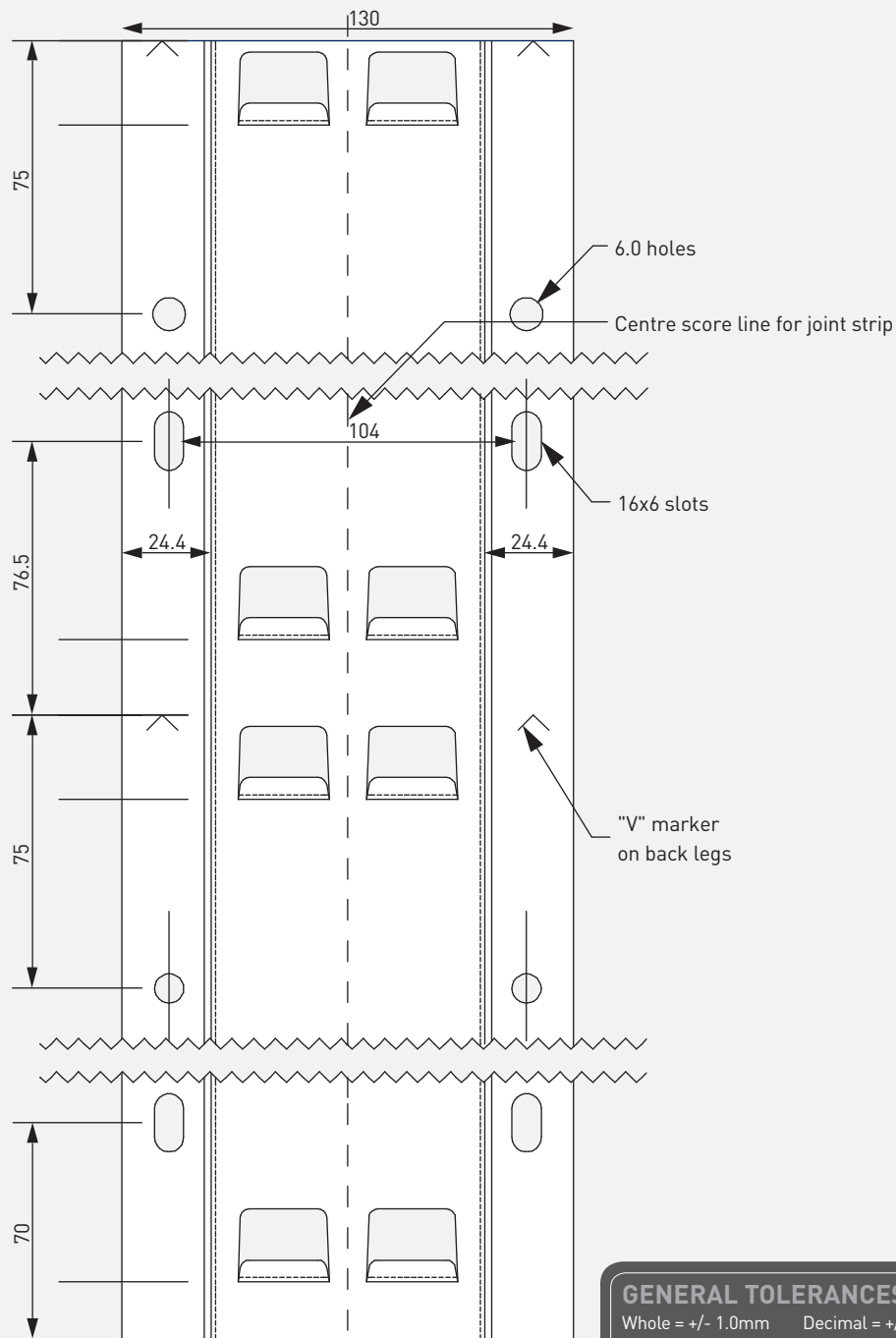
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undertaken after reference and compliance with the relevant component's technical data. The diagram is not to scale. For more tailored solutions to suit individual applications, please contact Brickworks Building Products. Brickworks Building Products reserves the rights to add, alter or delete components without prior notice.

COMPONENTS:

TERRAÇADE TN SUSPENSION RAIL - ELEVATION



TN.01 suspension rail, elevation

GENERAL TOLERANCES

Whole = +/- 1.0mm Decimal = +/- 0.3mm Angular = +/- 2 deg

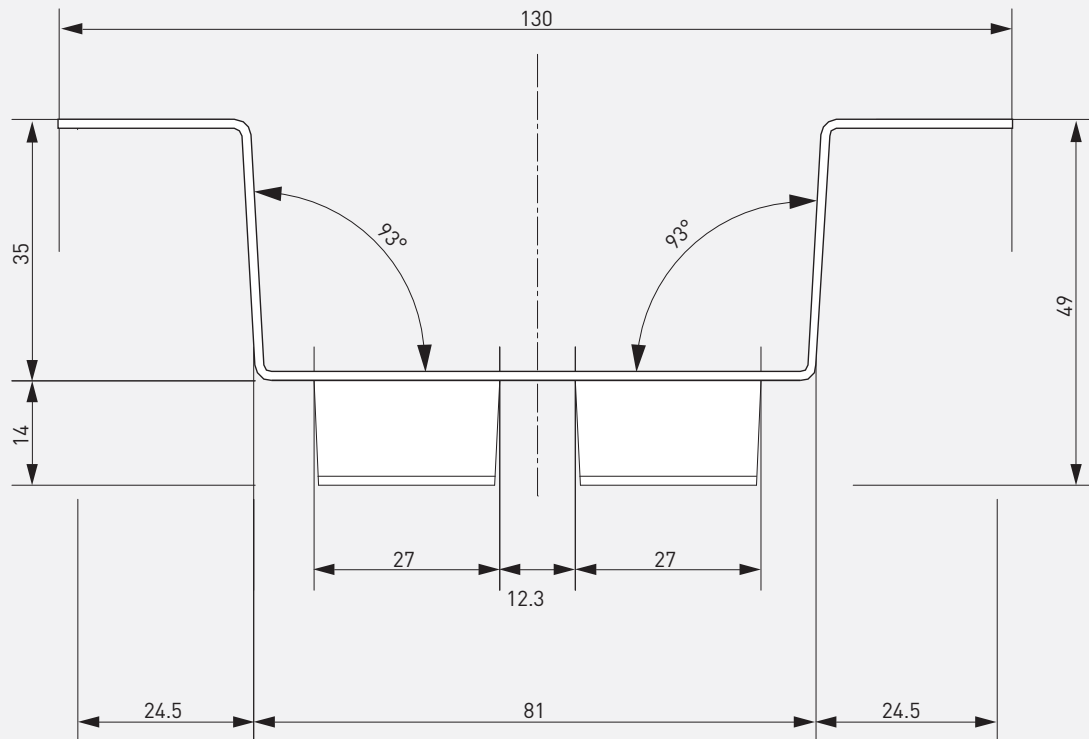
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COMPONENTS:

TERRAÇADE TN SUSPENSION RAIL - PLAN



TN.01 suspension rail, plan

HANDY HINT

- Spray or brush the central section of the coastal version suspension rail face (between the hanging tabs) matt black to reduce reflection through any gaps

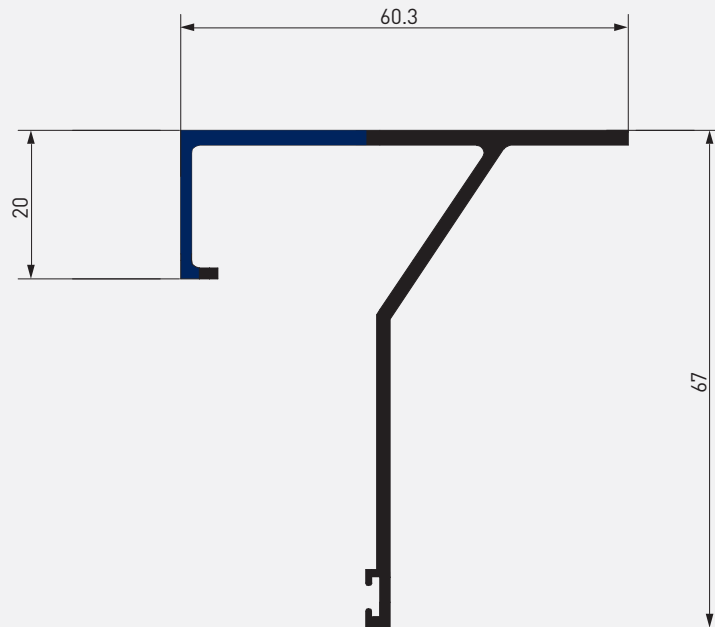
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COMPONENTS:

SURROUND TRIM OPTIONS



TN.02 aluminium surround profile

HANDY HINT

- Colorbond® or similar metal trims can be folded to suit your individual project by other suppliers

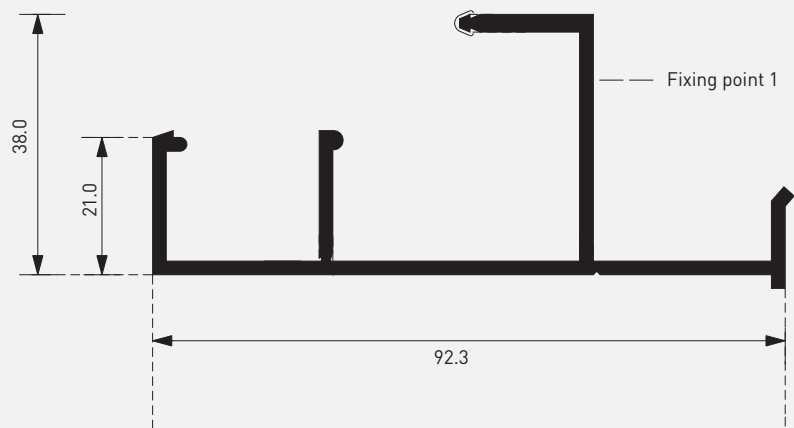
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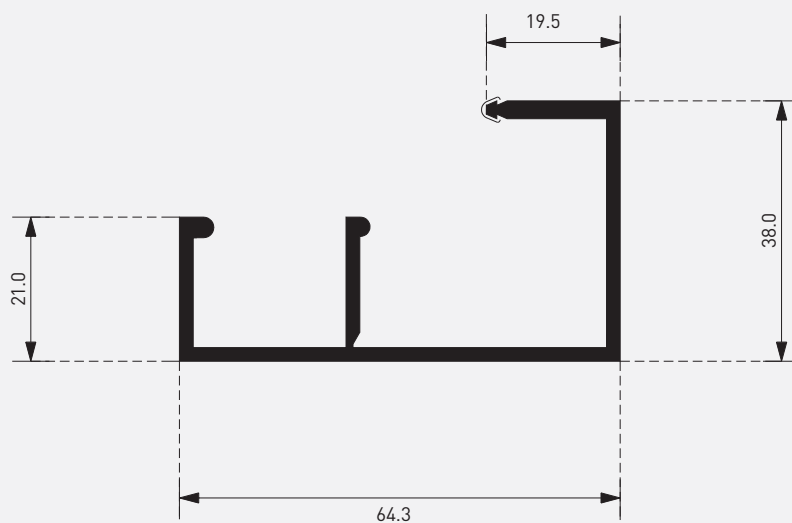
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COMPONENTS:

SURROUND TRIM OPTIONS



A.05 aluminium door/window surround profile



A.06 modified aluminium door/window surround profile

HANDY HINT

- Use the A.05 shape when battens are required to be used on the main structural wall

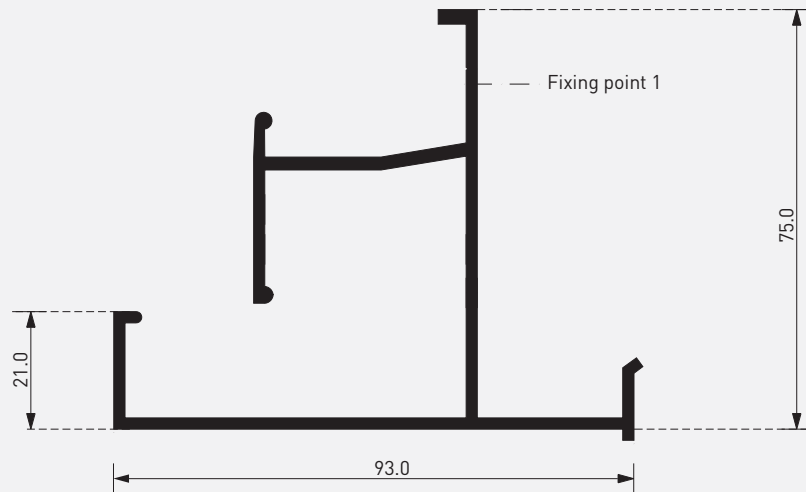
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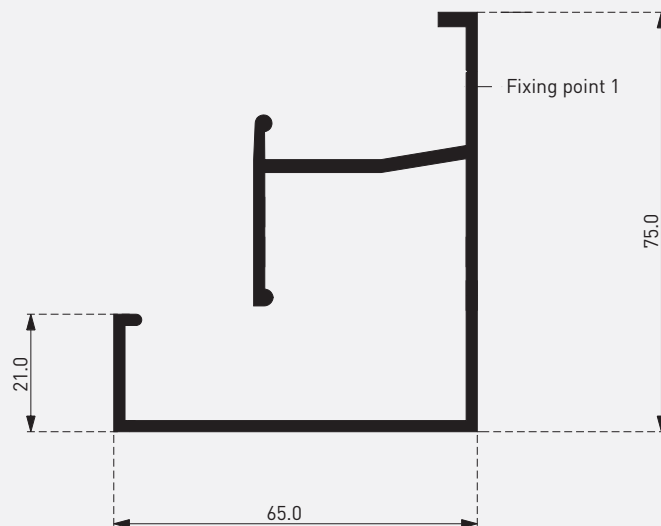
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COMPONENTS:

SURROUND TRIM OPTIONS



A.07 aluminium base surround profile



A.08 modified aluminium base surround profile

HANDY HINT

- Use the A.07 shape when battens are required to be used on the main structural wall

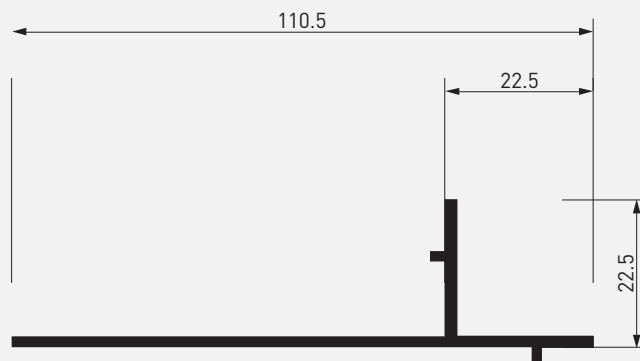
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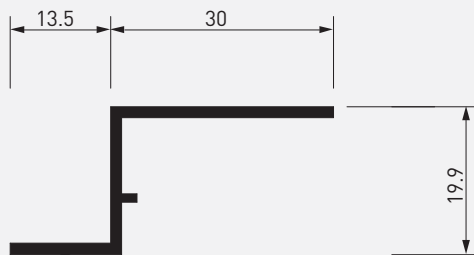
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COMPONENTS:

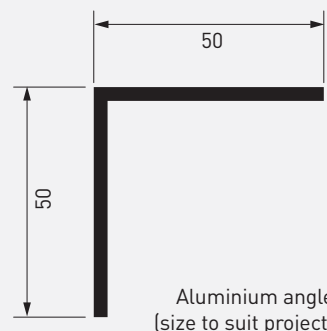
CORNER TRIM OPTIONS



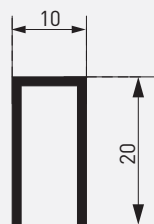
TN.04 aluminium external corner



TN.05 aluminium internal corner



Aluminium angle
(size to suit project)



TN.03 aluminium jointing strip

HANDY HINT

- Colorbond® or similar metal trims can be folded to suit your individual project by other suppliers

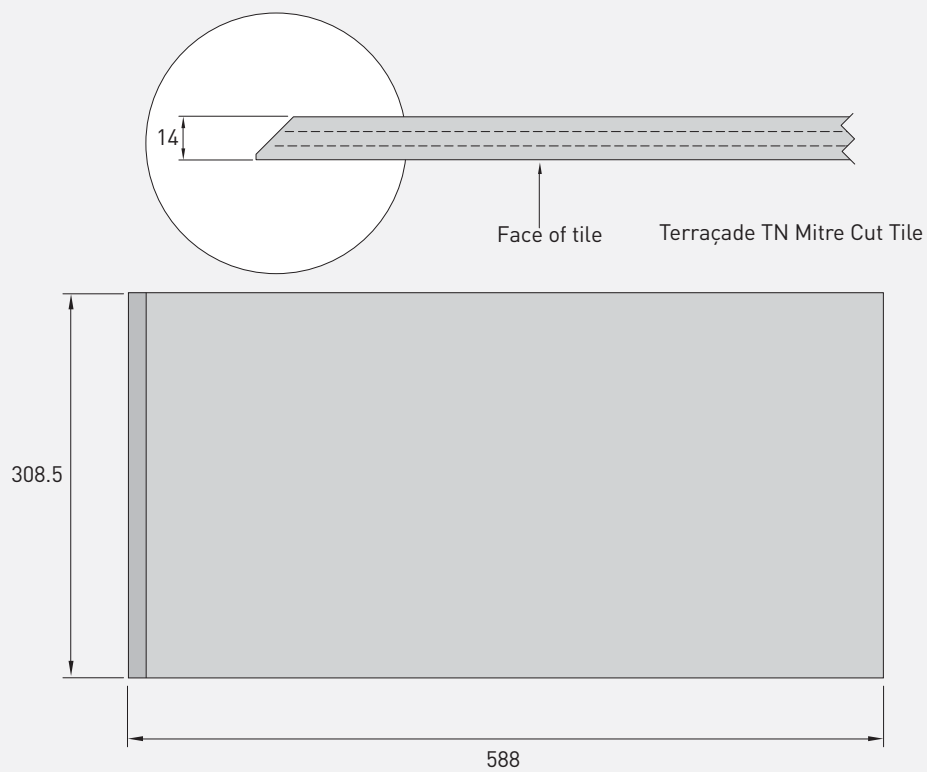
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COMPONENTS:

CORNER TRIM OPTIONS



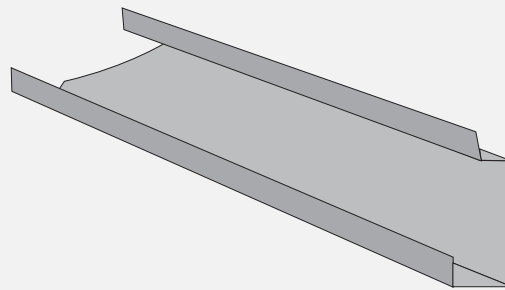
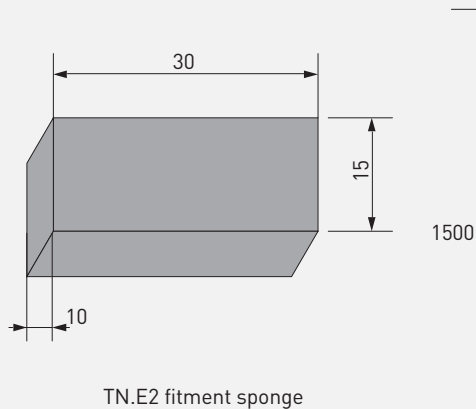
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COMPONENTS:

OTHER COMPONENTS

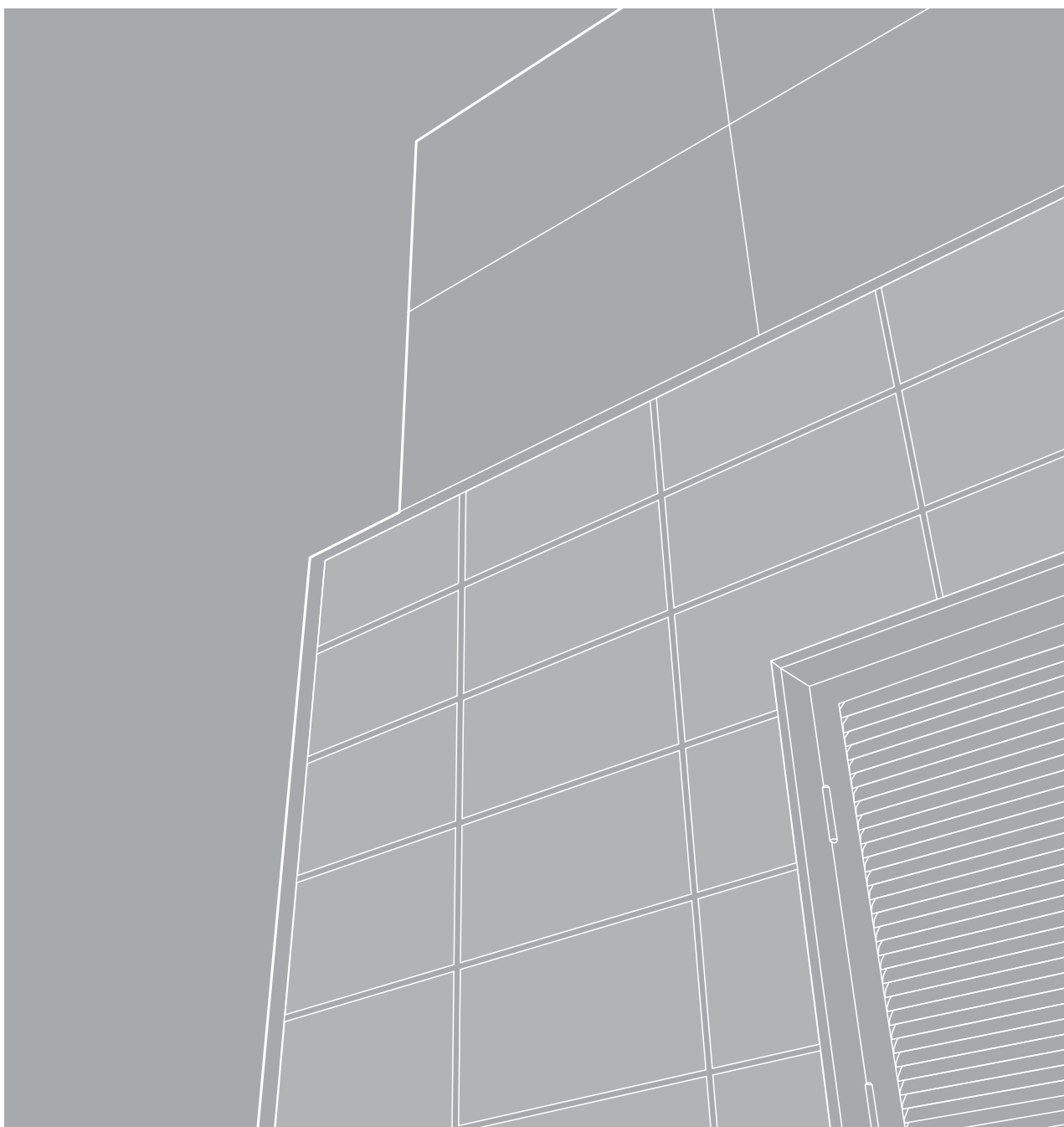


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SYSTEM DESIGN



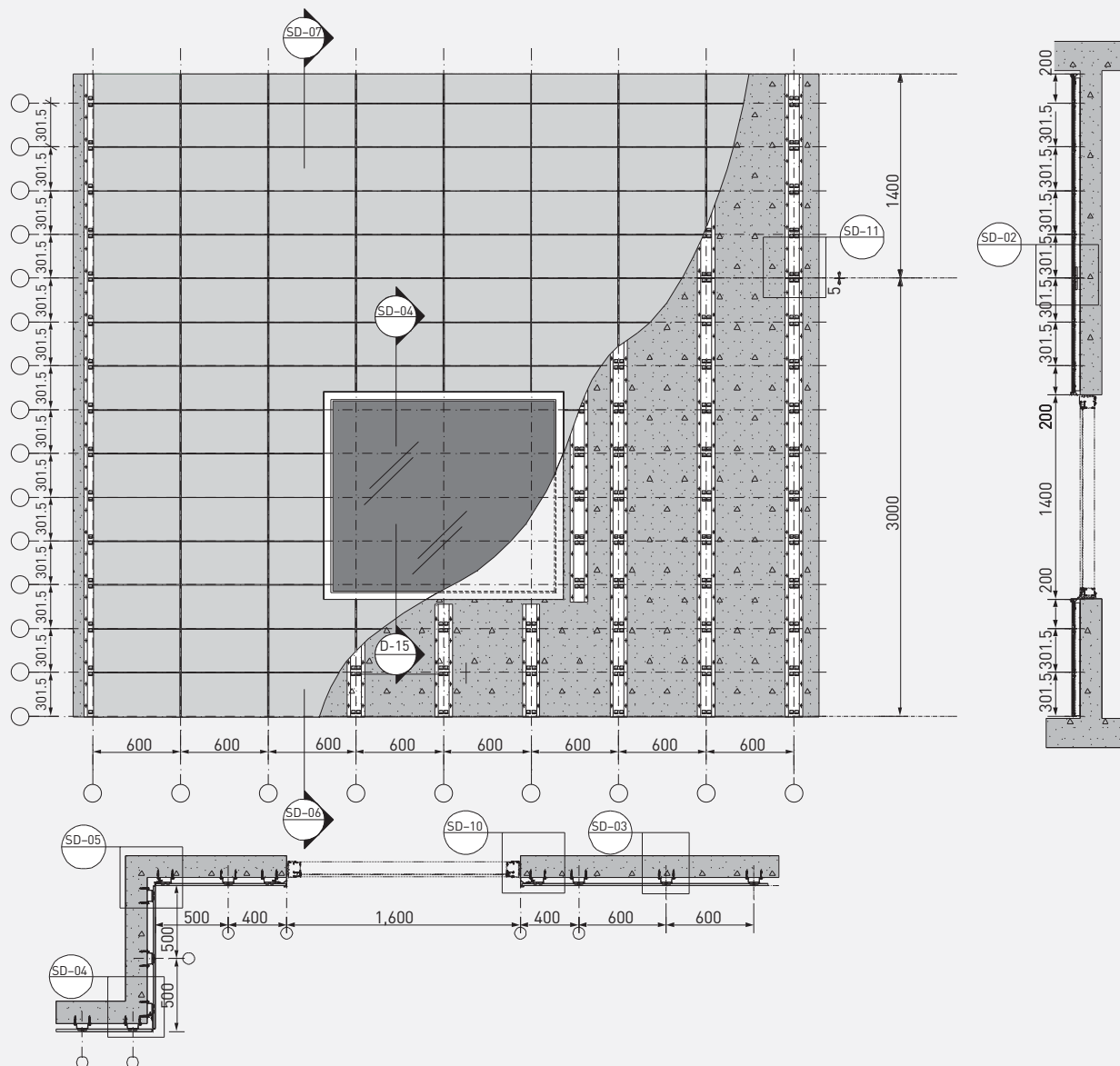
For the most up to date information on
Terraçade products and the latest version
of this manual, please refer to our website.
www.terraçade.com.au
www.terraçade.co.nz

SYSTEM DESIGN

Common Details	Page Number
SD-01 Overview	53
SD-02 Side Detail	54
SD-03 Horizontal Detail	55
SD-04 External Corner Variations	56 57
SD-05 Internal Corner Variations	58 59
SD-06 Base Detail Variations	60 61
SD-07 Parapet Variations	62 63
SD-08 Window Sill Variations	64 65
SD-09 Window Head Variations	66 67
SD-10 Window Jamb Variations Window Reveal Option	68 69 70
SD-11 Set-Out Tool	71
SD-12 Rake Detail	72
SD-13 Top Restraint for Cyclone and Earthquake Zones	74
Typical Details for Common Structural Walls	Page Number
D-01 Timber – Horizontal Detail	75
D-02 Timber – Vertical Detail	76
D-03 Timber – Termite Detail (Recessed Slab) Slab Variation	77 78
D-04 Steel – Horizontal Detail	79
D-05 Steel – Vertical Detail	80
D-06 Concrete – Horizontal Detail	81
D-07 Concrete – Vertical Detail	82
D-08 Masonry – Horizontal Detail	83
D-09 Masonry – Vertical Detail	84
Membrane	85

SYSTEM DESIGN:

OVERVIEW – SD 01



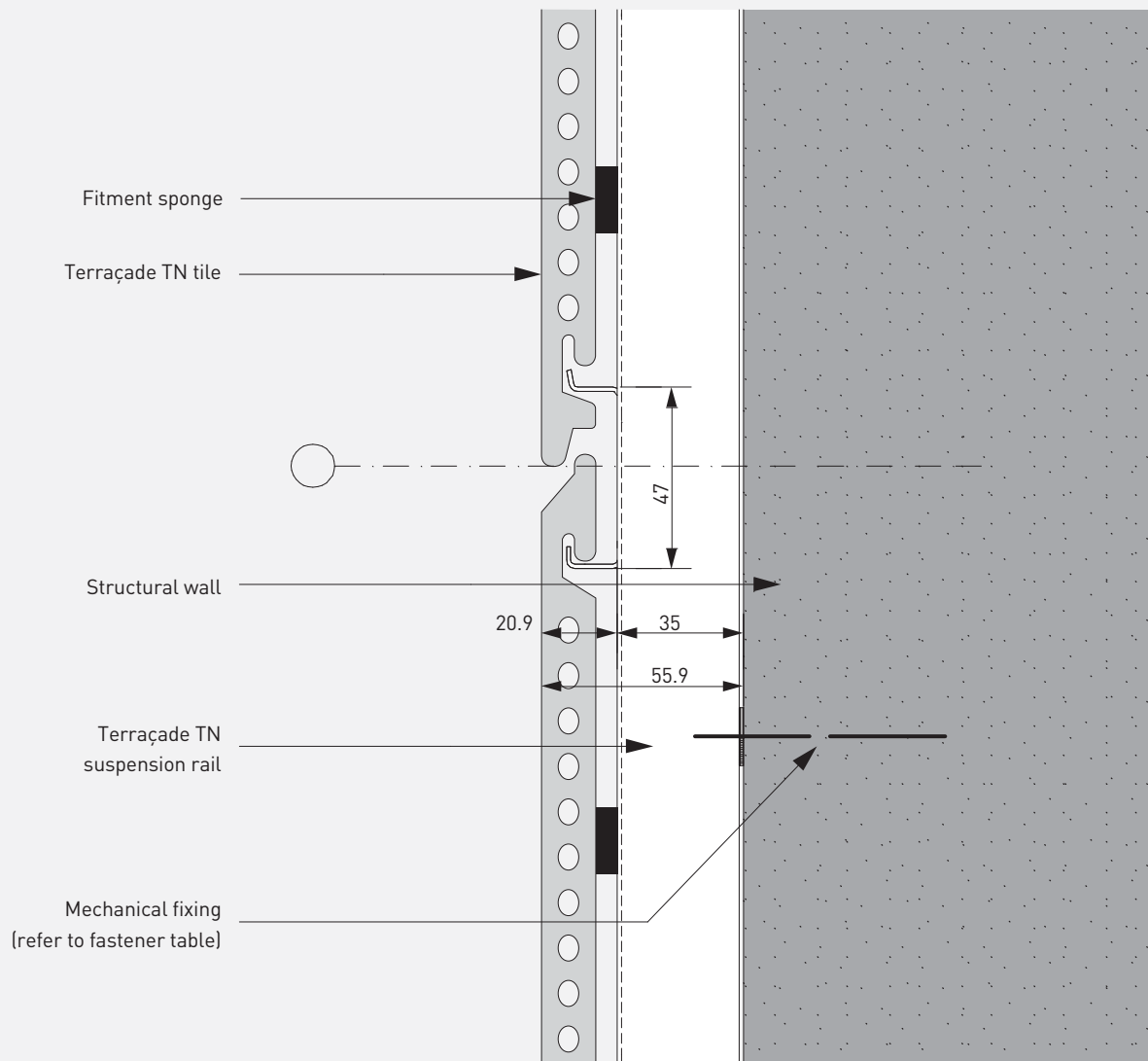
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SYSTEM DESIGN:

SIDE DETAIL – SD 02



HANDY HINT

- Fitment sponges should be fitted immediately prior to installation of tiles

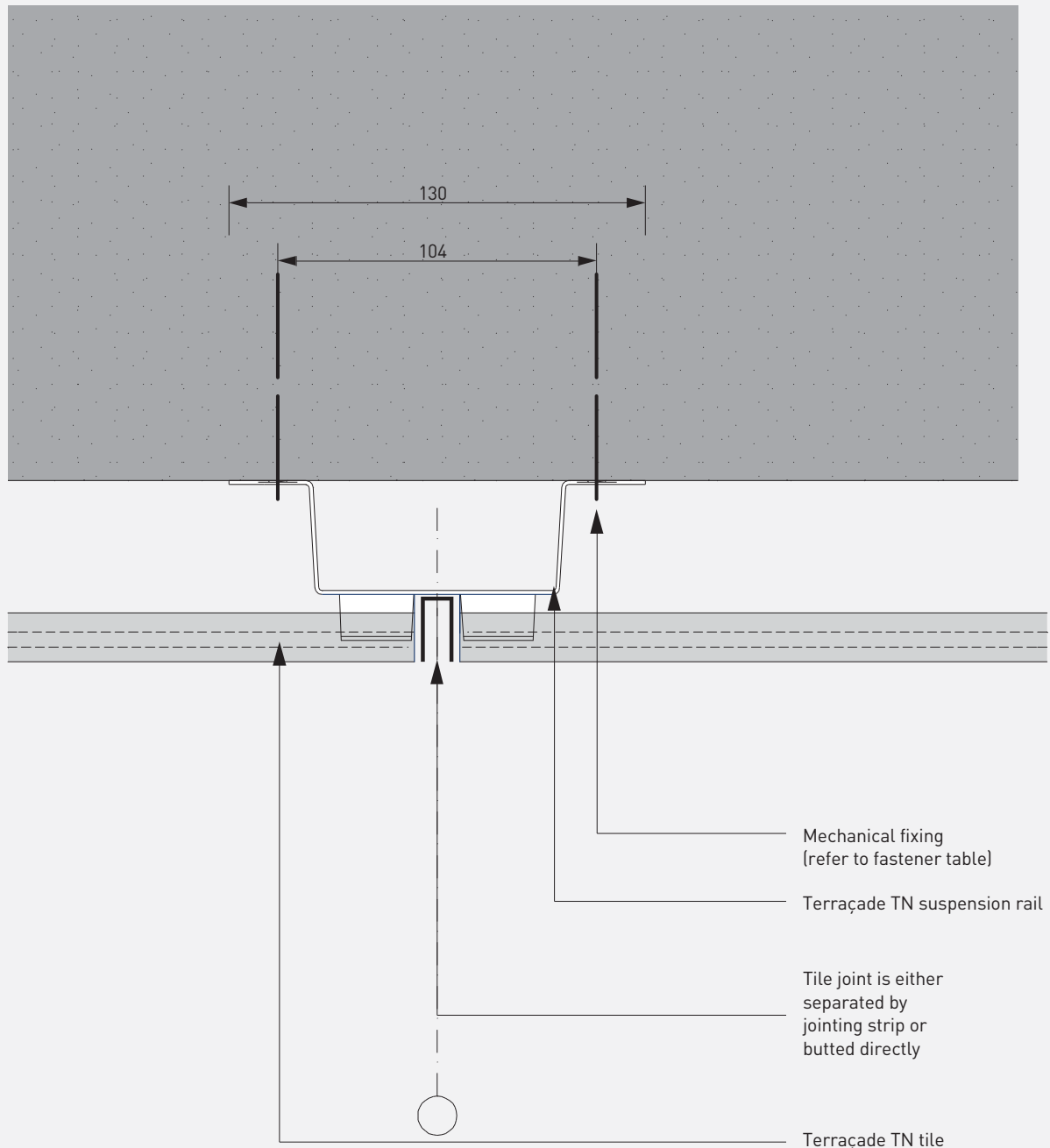
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SYSTEM DESIGN:

HORIZONTAL DETAIL – SD 03



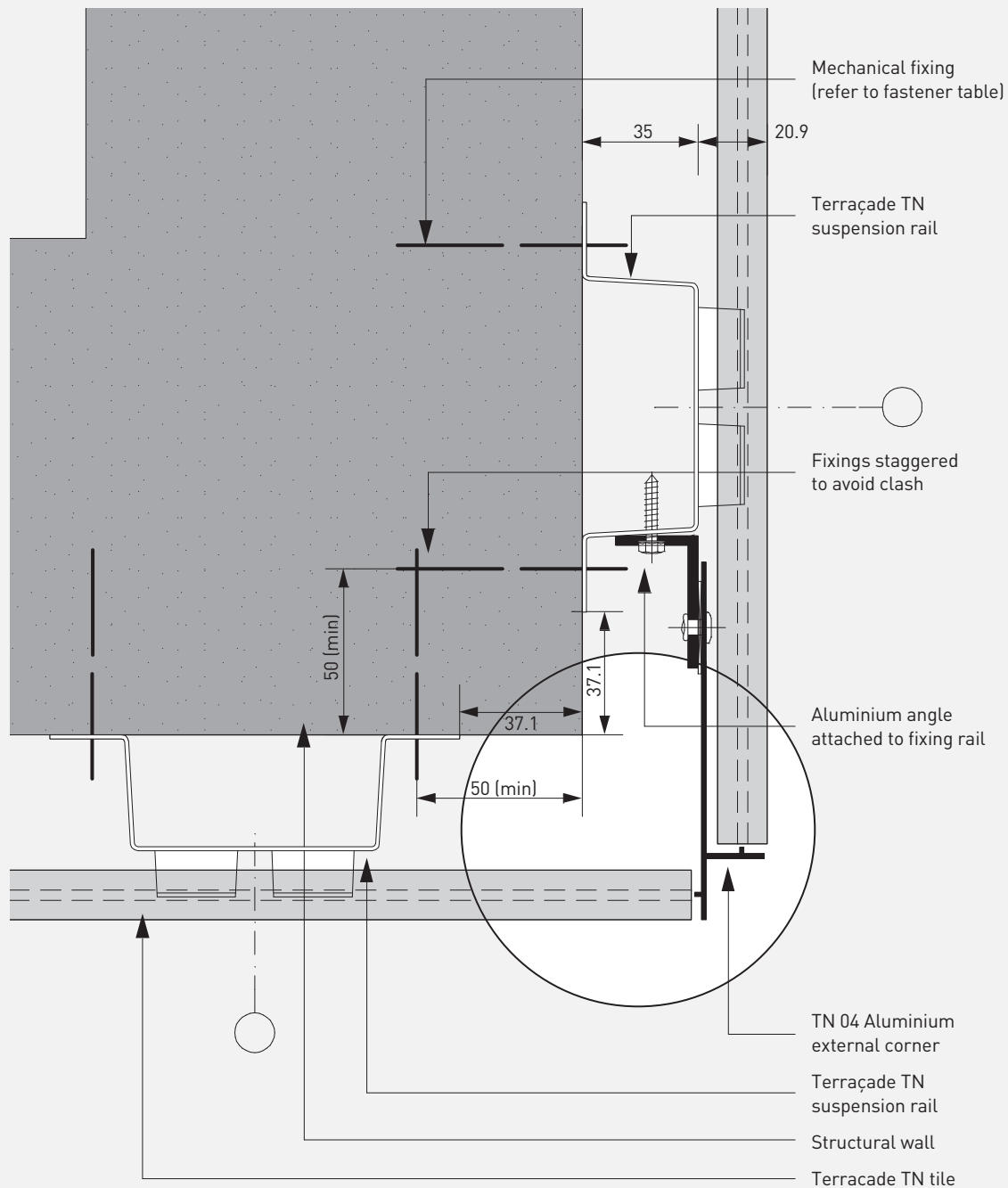
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SYSTEM DESIGN:

EXTERNAL CORNER – SD 04



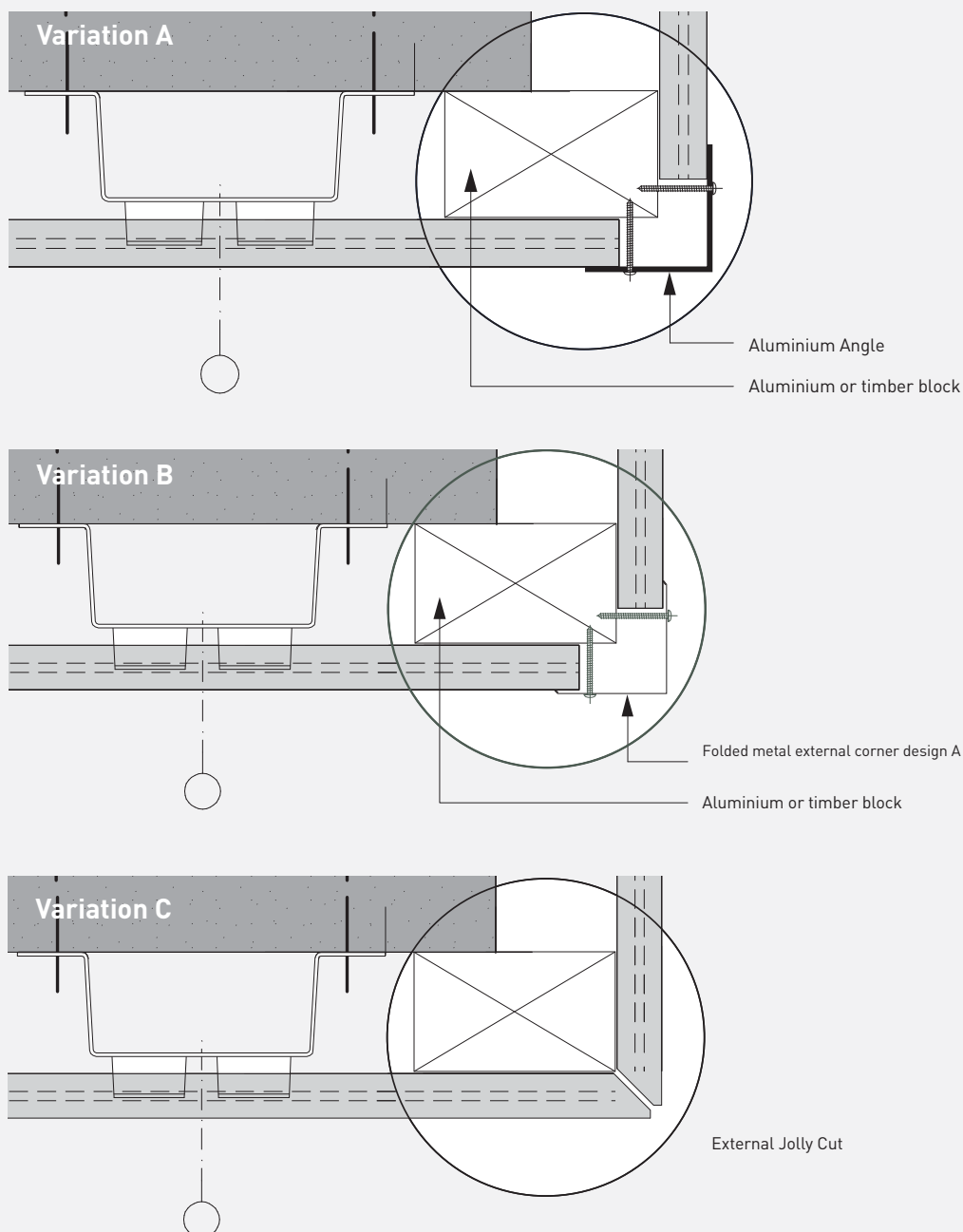
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SYSTEM DESIGN:

EXTERNAL CORNER – SD 04 (VARIATIONS)



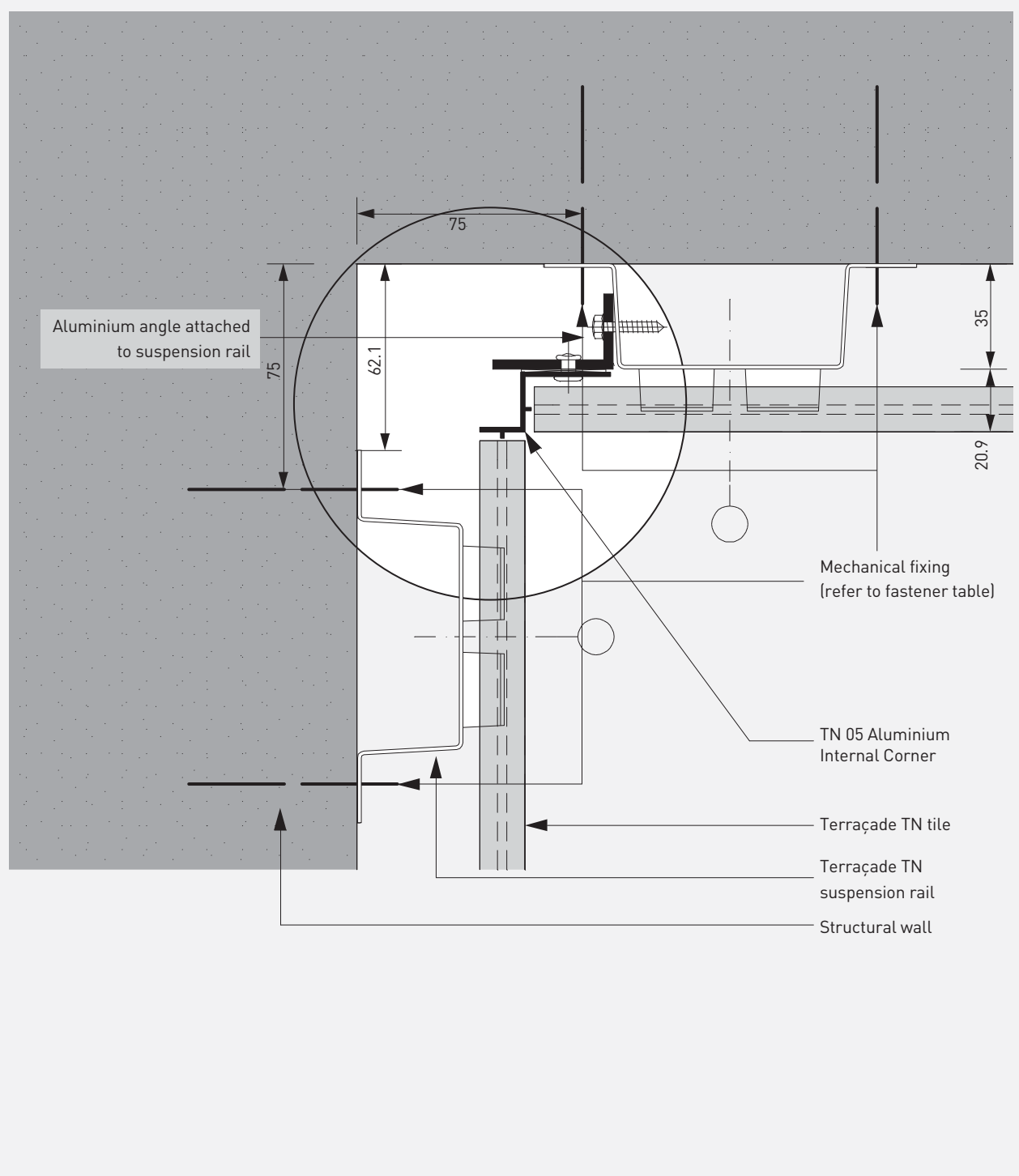
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SYSTEM DESIGN:

INTERNAL CORNER – SD 05



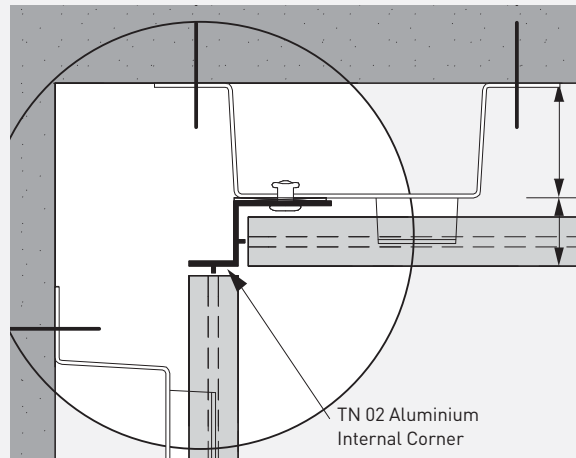
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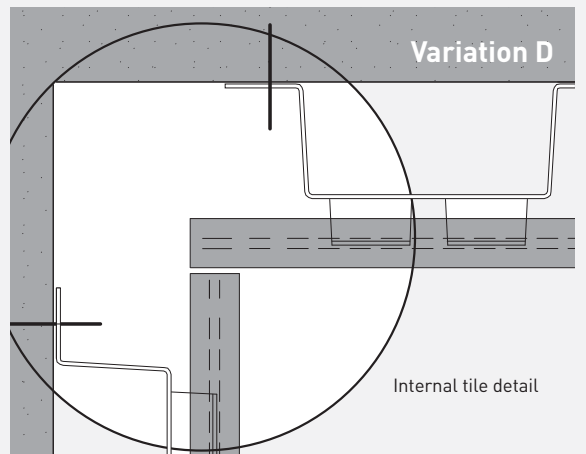
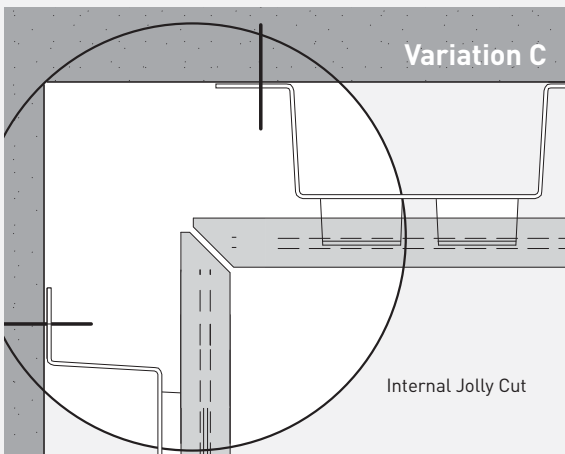
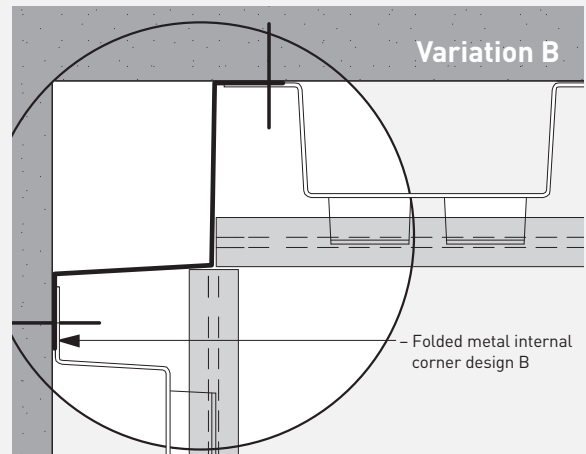
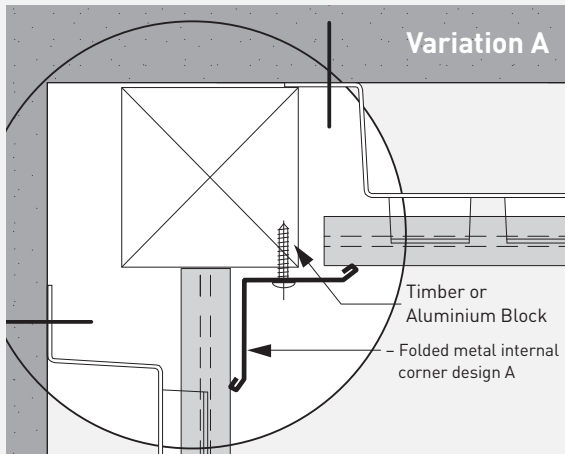
SYSTEM DESIGN:

INTERNAL CORNER – SD 05 (VARIATIONS)



HANDY HINT

Variation A: Push in Hanging Tab first.



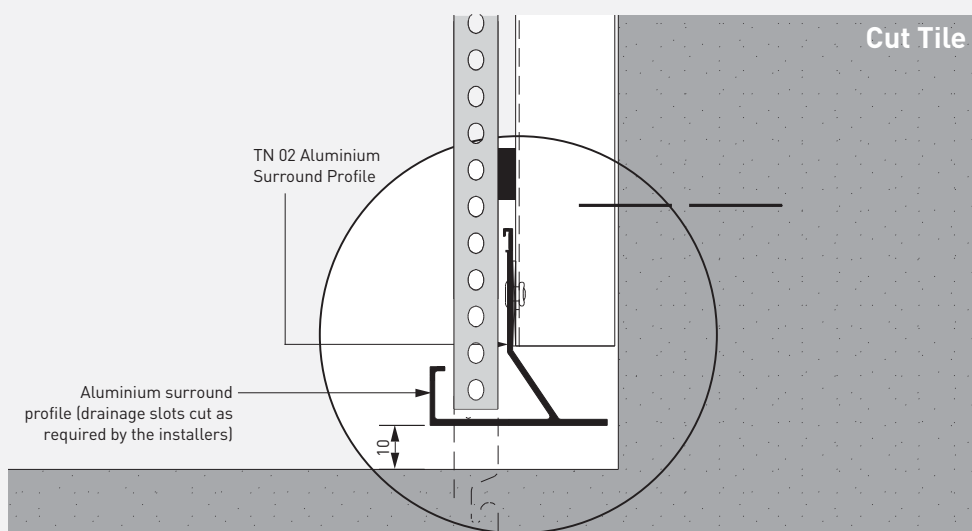
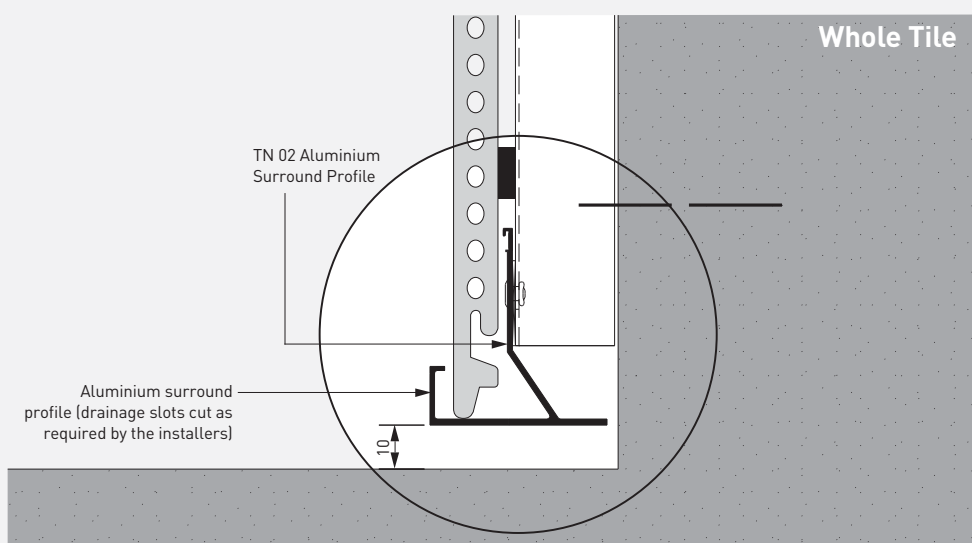
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SYSTEM DESIGN:

BASE DETAIL – SD 06



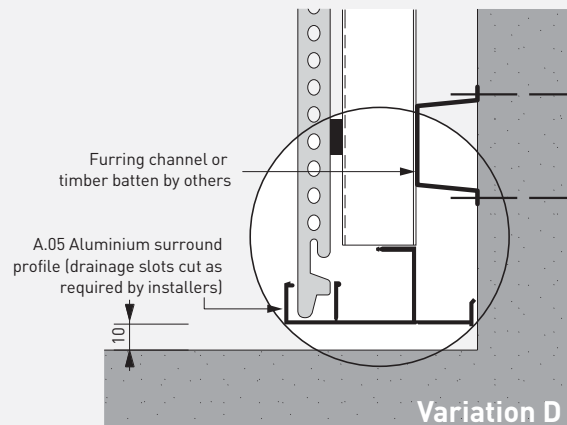
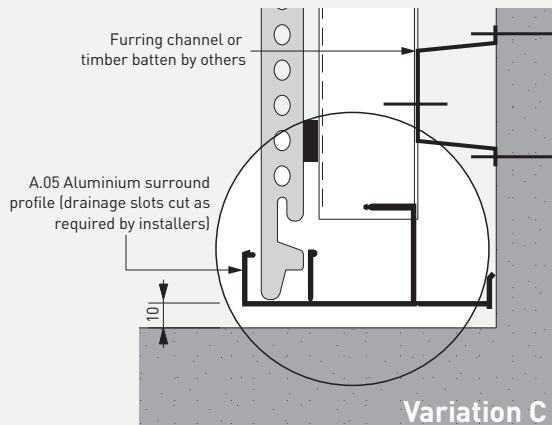
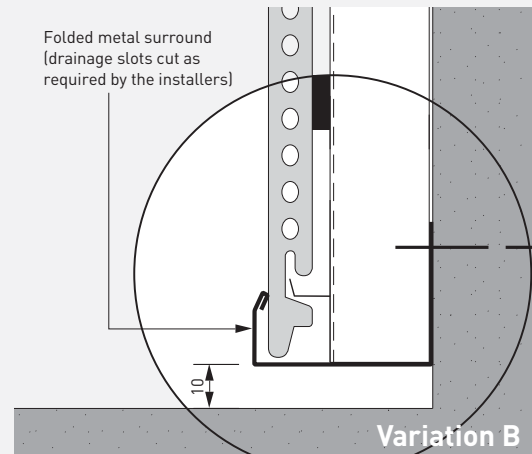
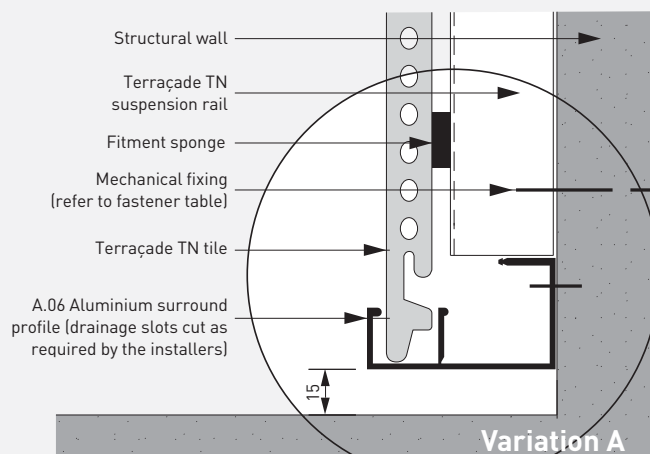
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SYSTEM DESIGN:

BASE DETAIL – SD 06 (VARIATIONS)



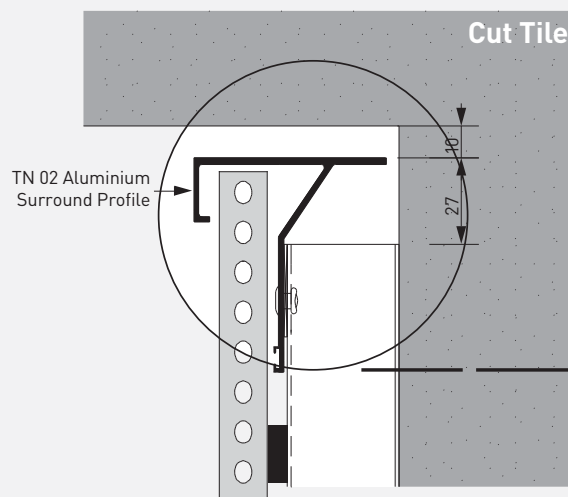
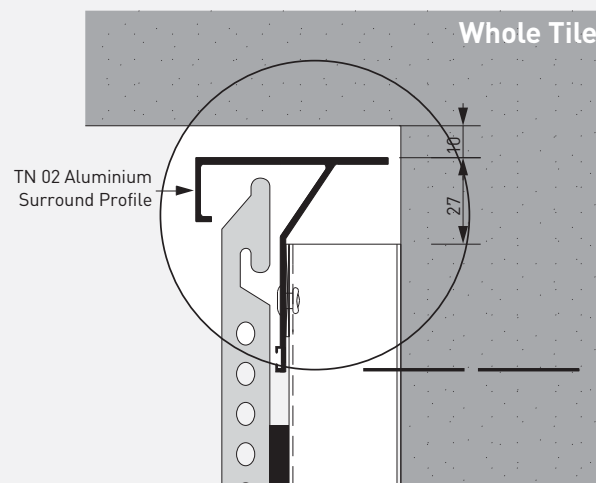
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SYSTEM DESIGN:

PARAPET DETAIL – SD 07



HANDY HINT

- If fixing to structural wall and the suspension rail allow a 10mm gap

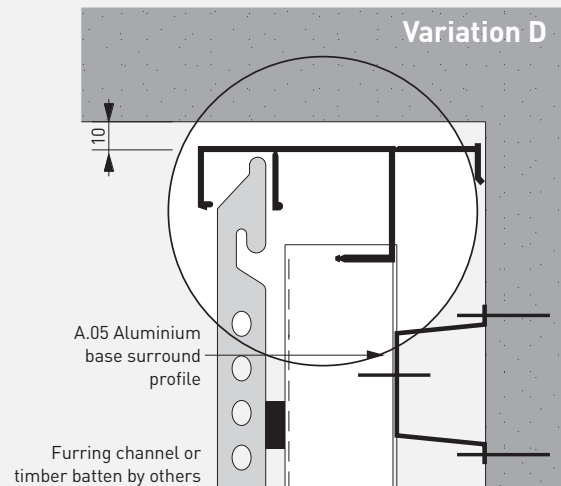
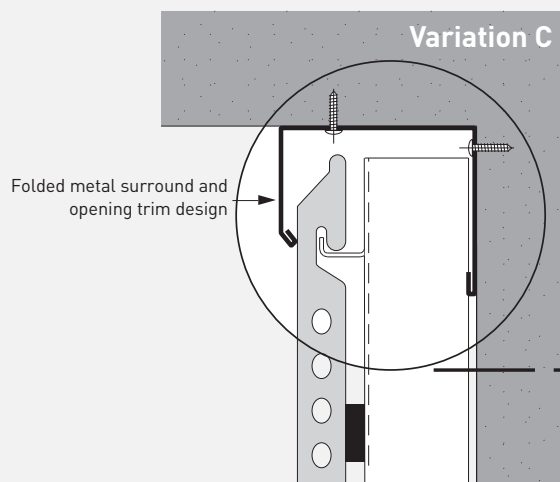
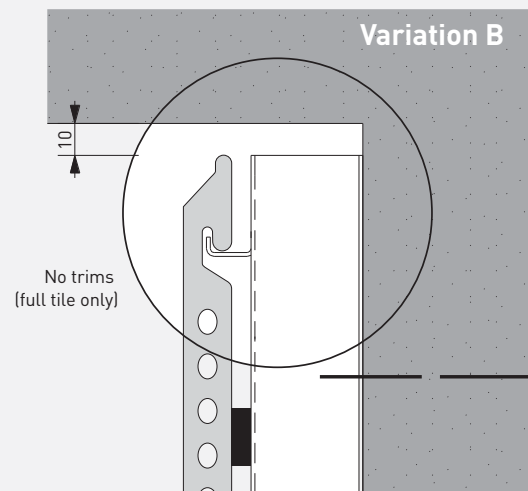
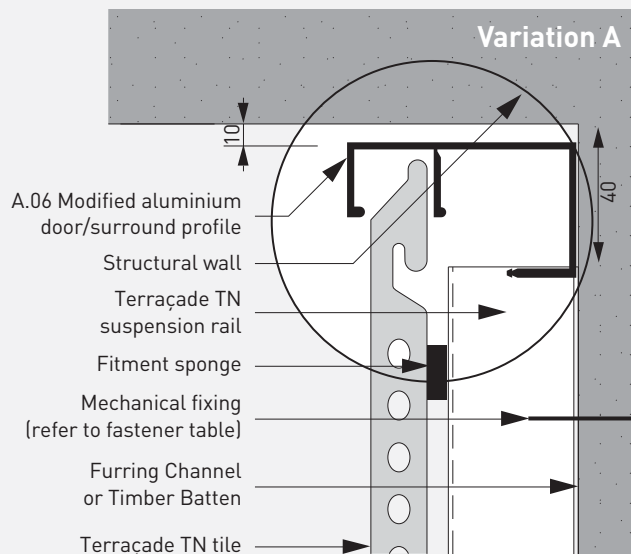
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SYSTEM DESIGN:

PARAPET DETAIL – SD 07 (VARIATIONS)

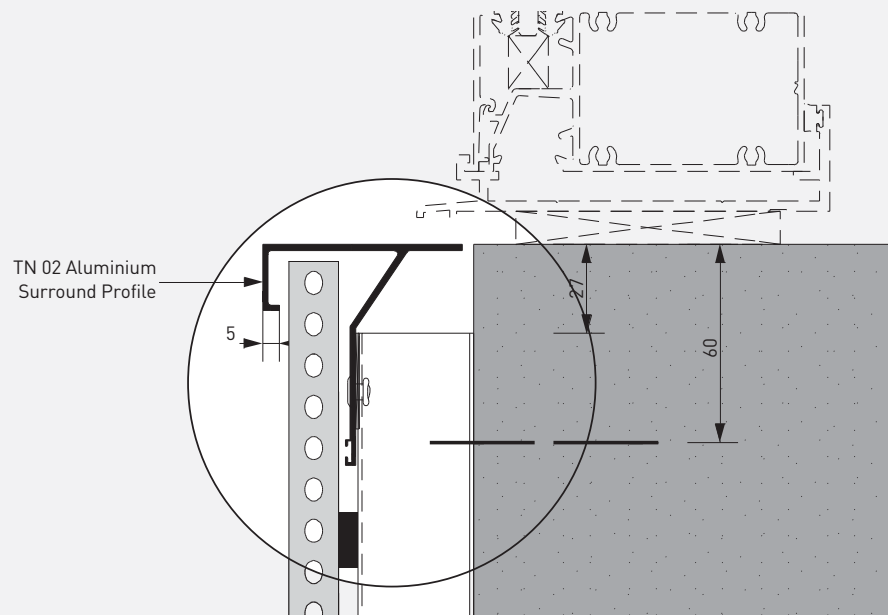
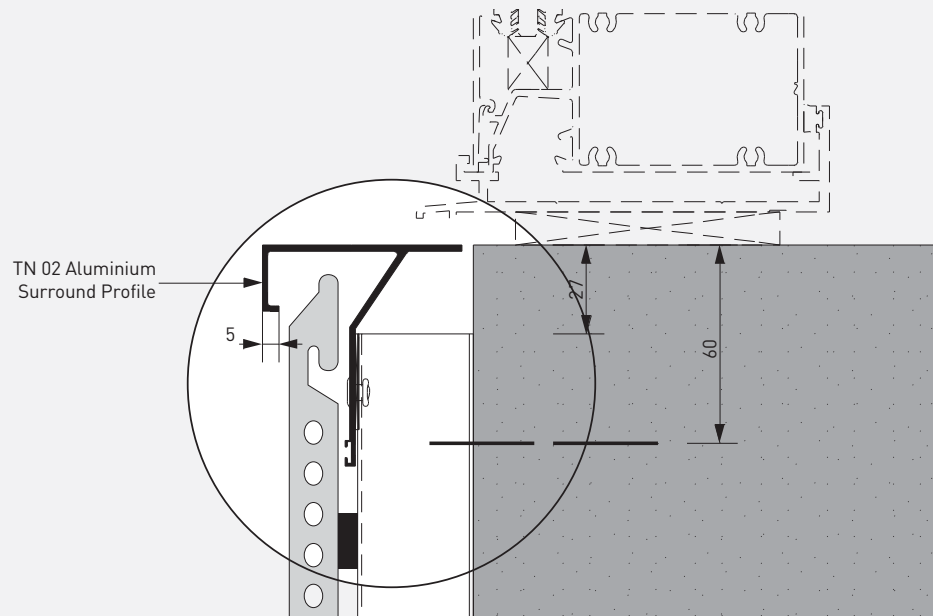


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SYSTEM DESIGN:

WINDOW SILL – SD 08



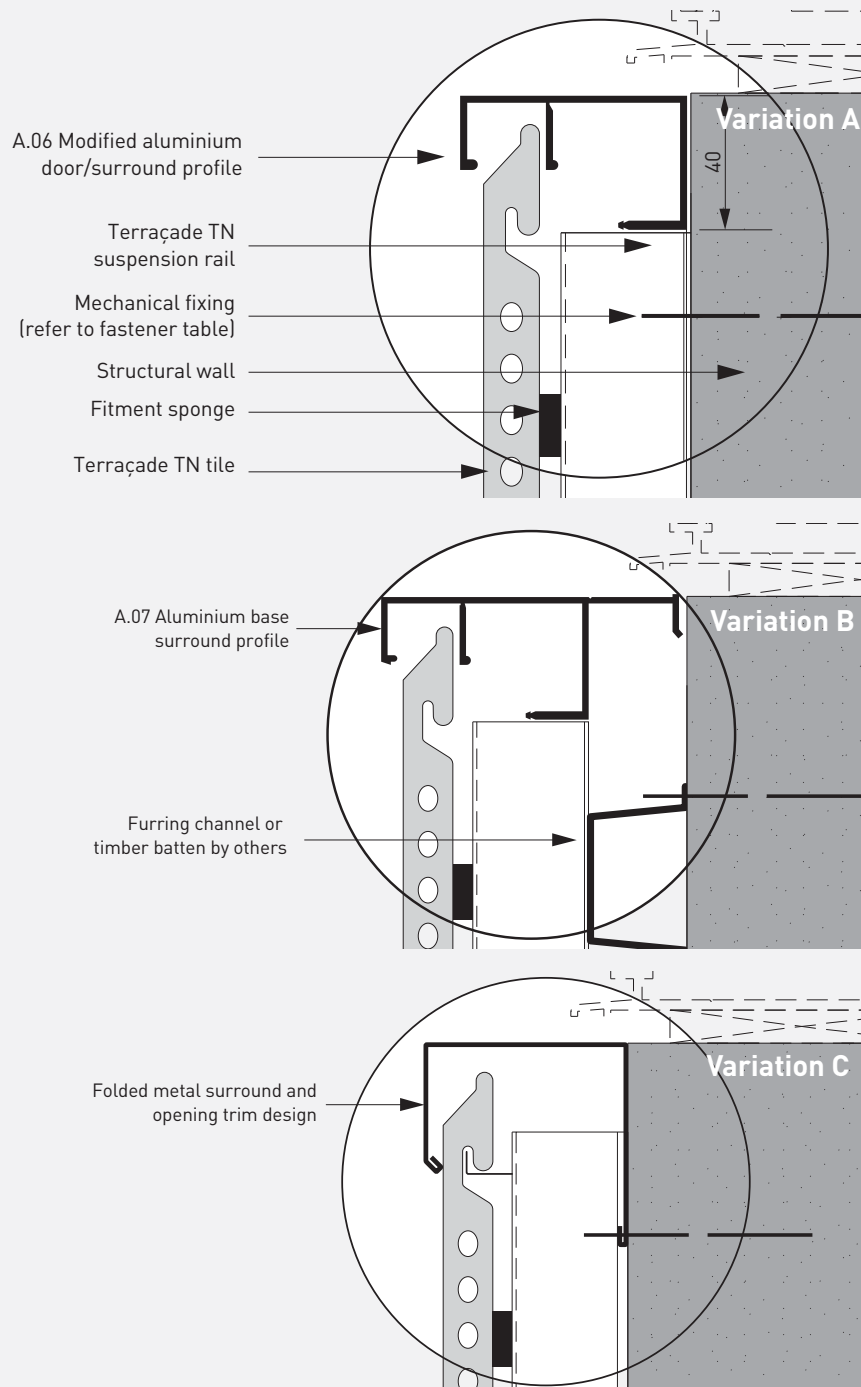
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SYSTEM DESIGN:

WINDOW SILL – SD 08 (VARIATIONS)



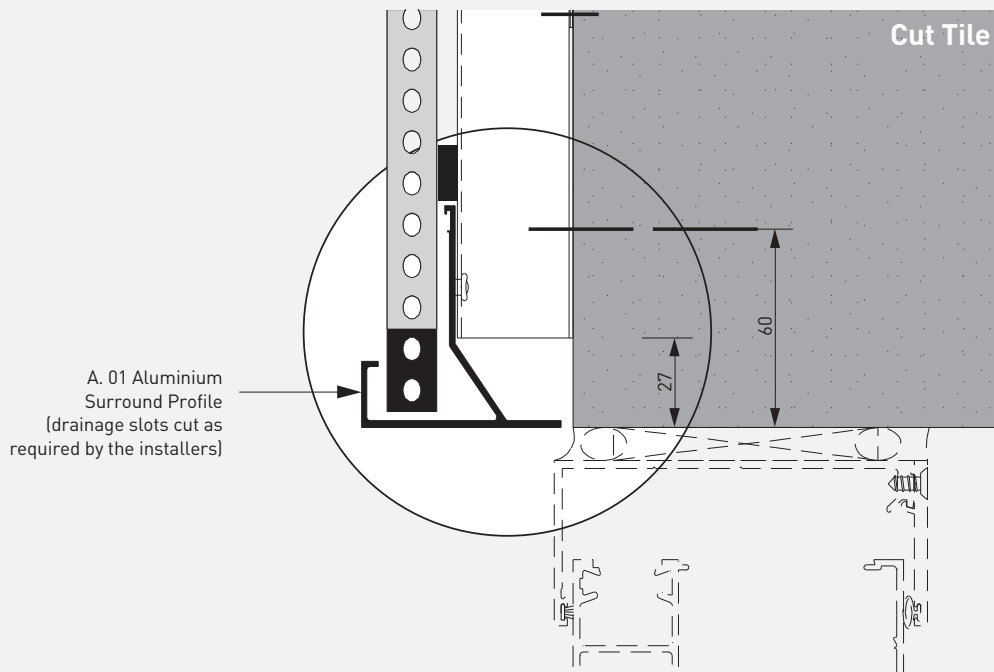
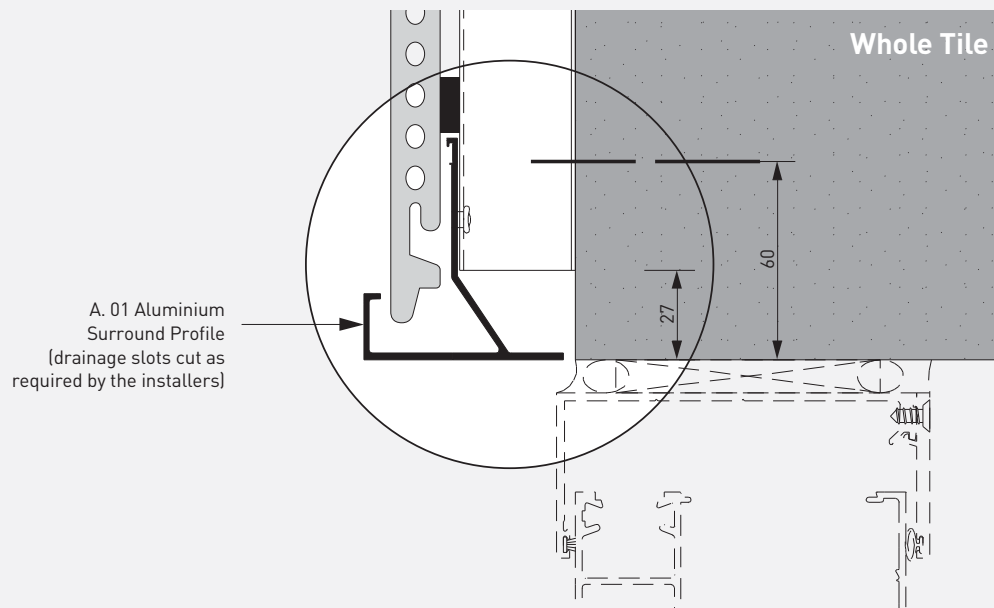
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SYSTEM DESIGN:

WINDOW HEAD – SD 09



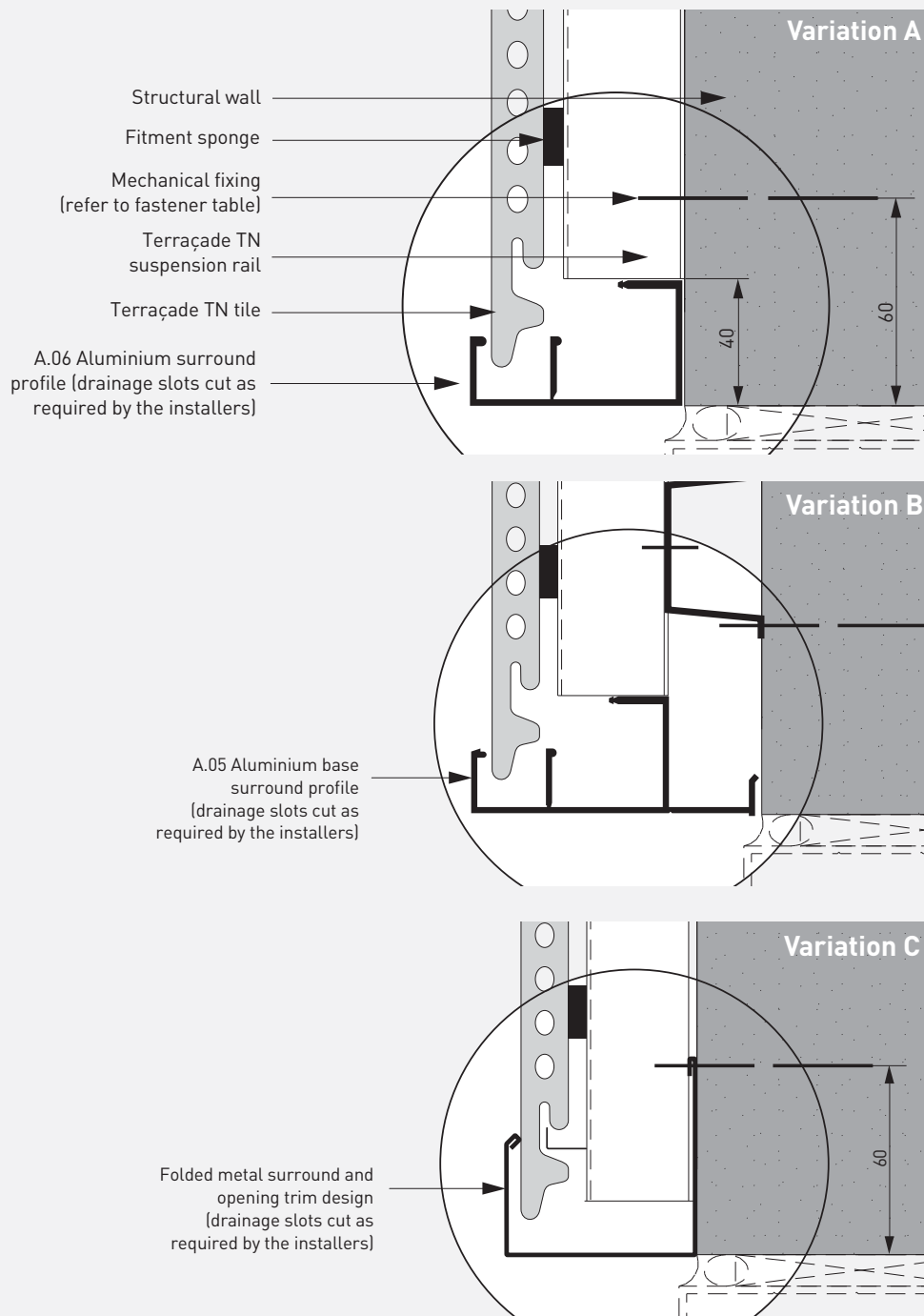
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SYSTEM DESIGN:

WINDOW HEAD – SD 09 (VARIATIONS)



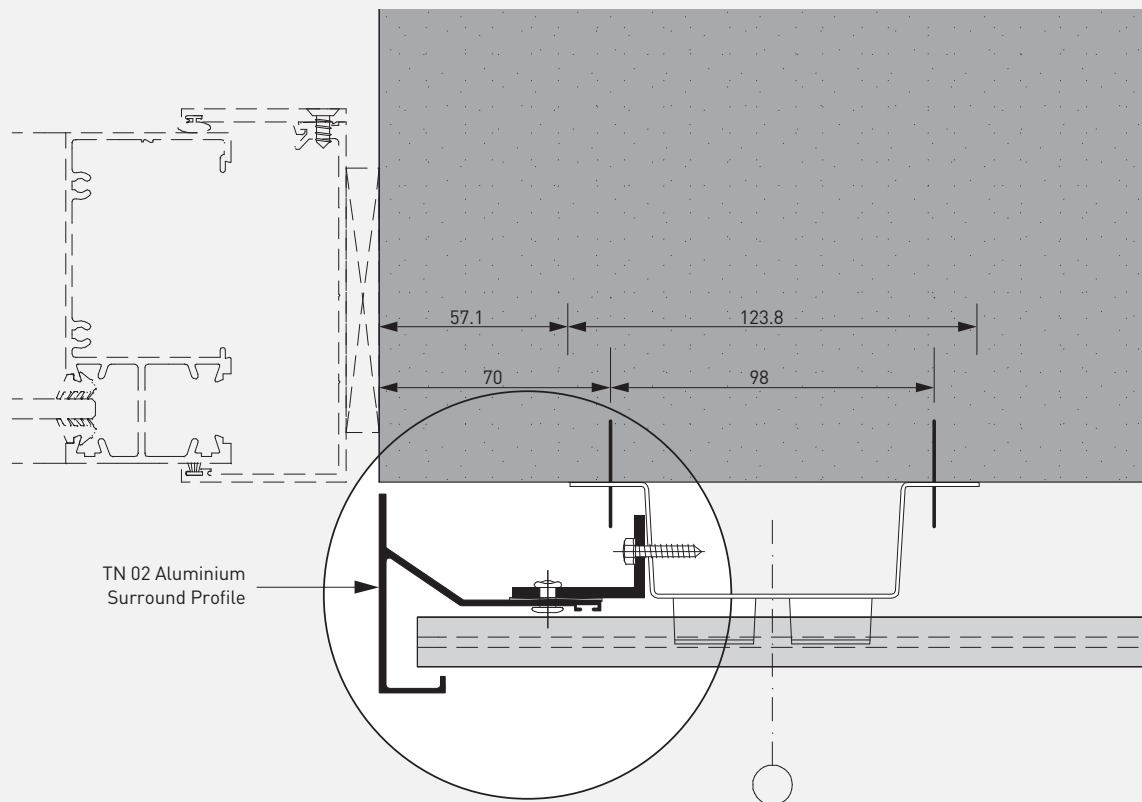
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SYSTEM DESIGN:

WINDOW JAMB – SD 10



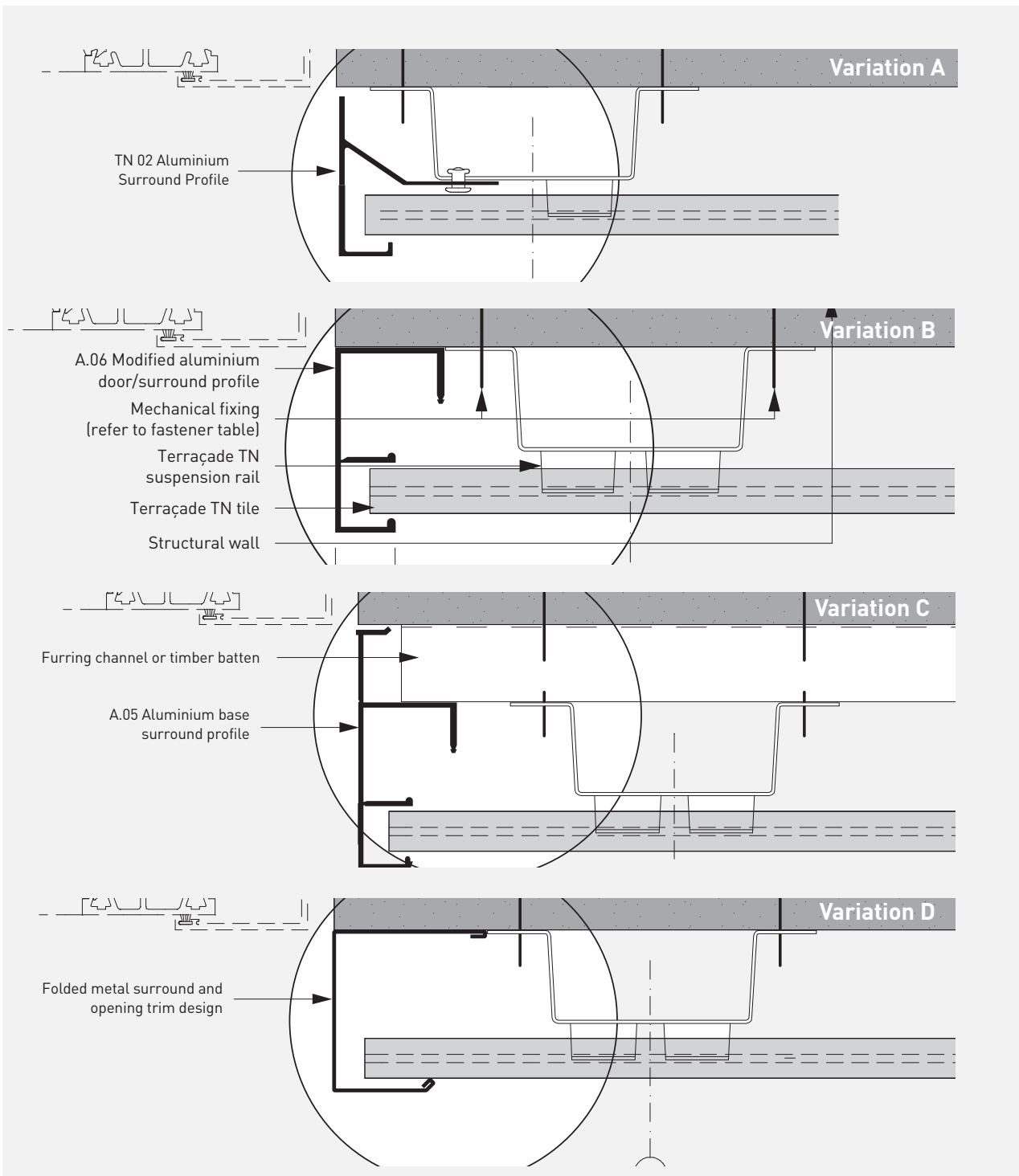
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SYSTEM DESIGN:

WINDOW JAMB – SD 10 (VARIATIONS)



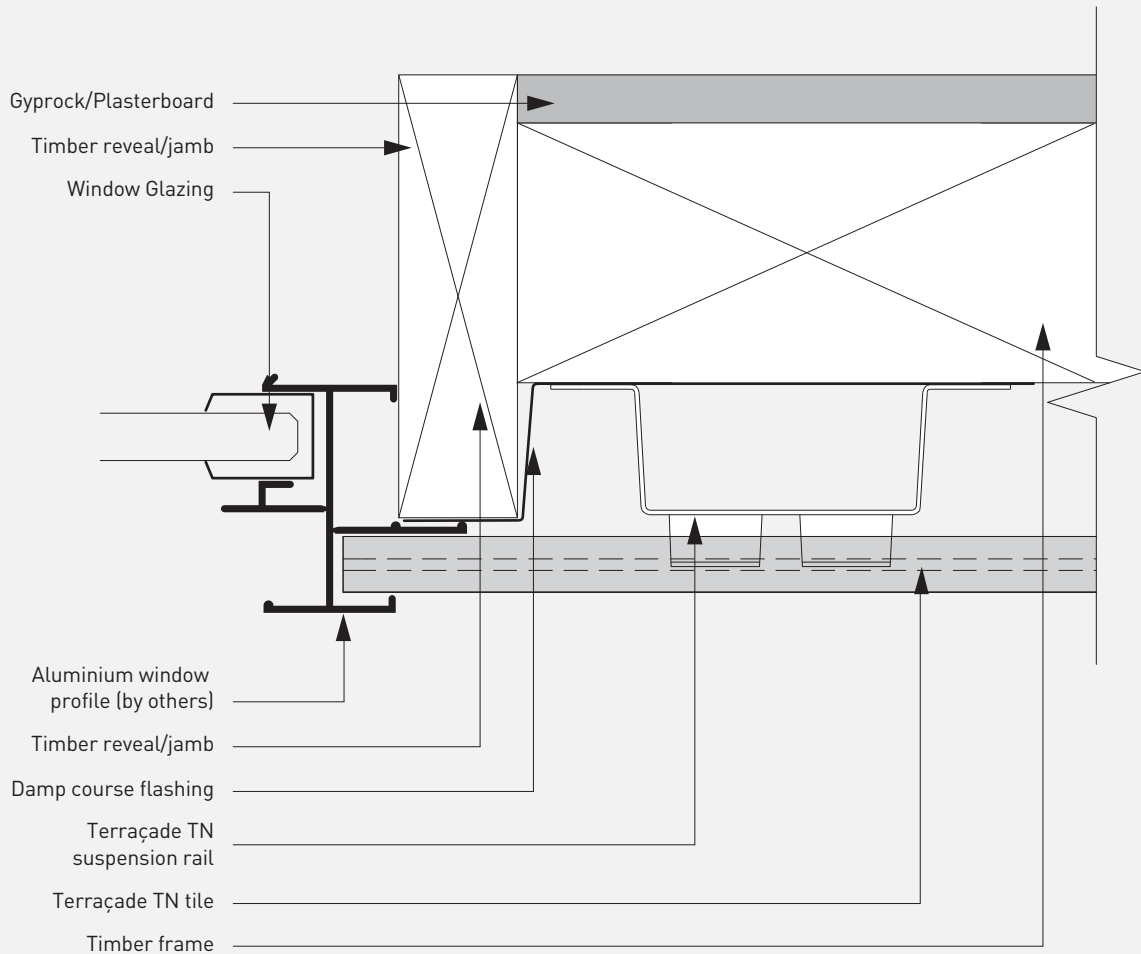
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SYSTEM DESIGN:

WINDOW JAMB – SD 10 WINDOW REVEAL OPTION



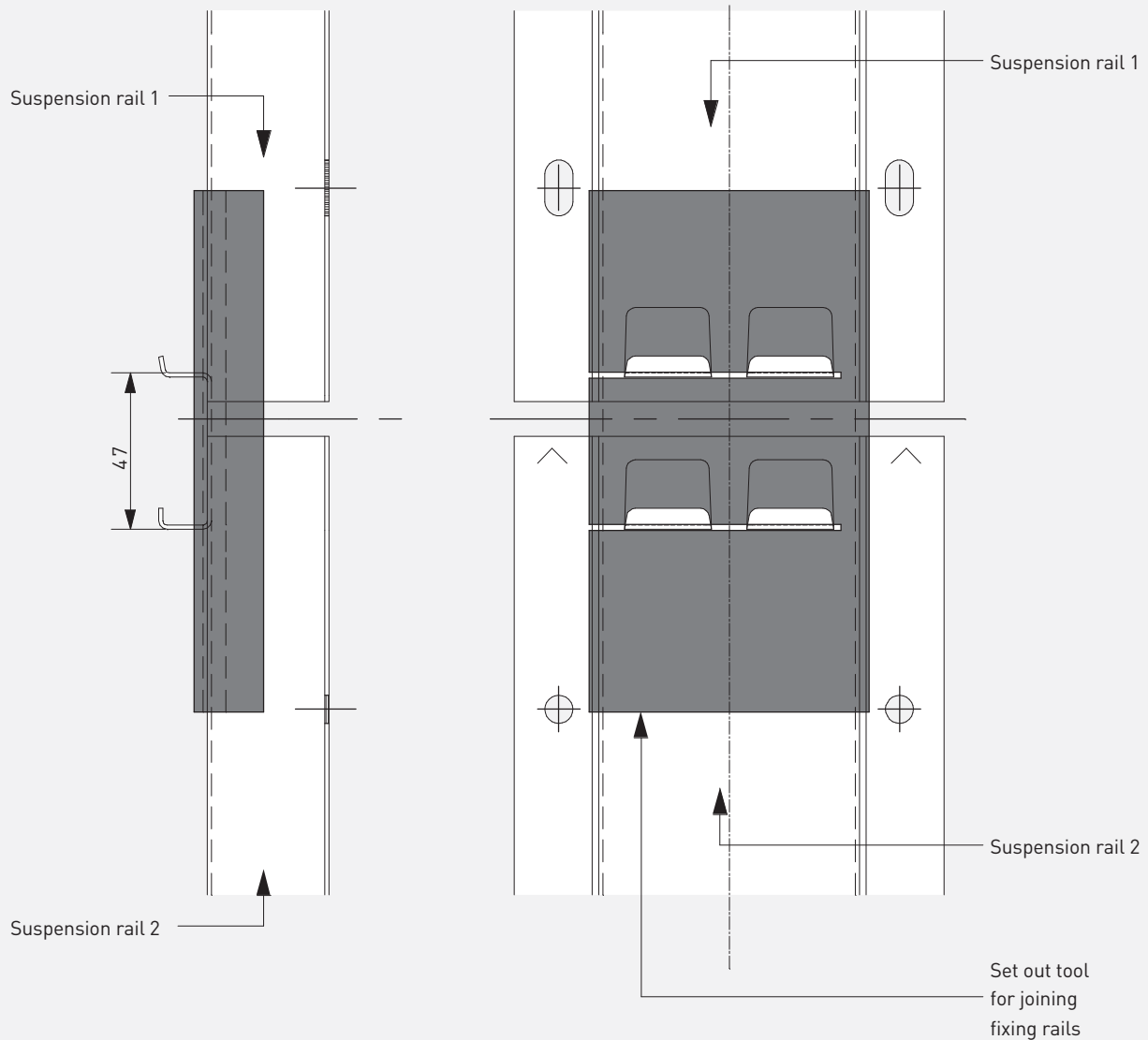
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SYSTEM DESIGN:

SET-OUT TOOL – SD 11



HANDY HINT

- The Set Out Tool maintains the vertical continuity of the system when joining rails one above the other. The tool is slotted onto the rails and then removed when both rails are fixed.

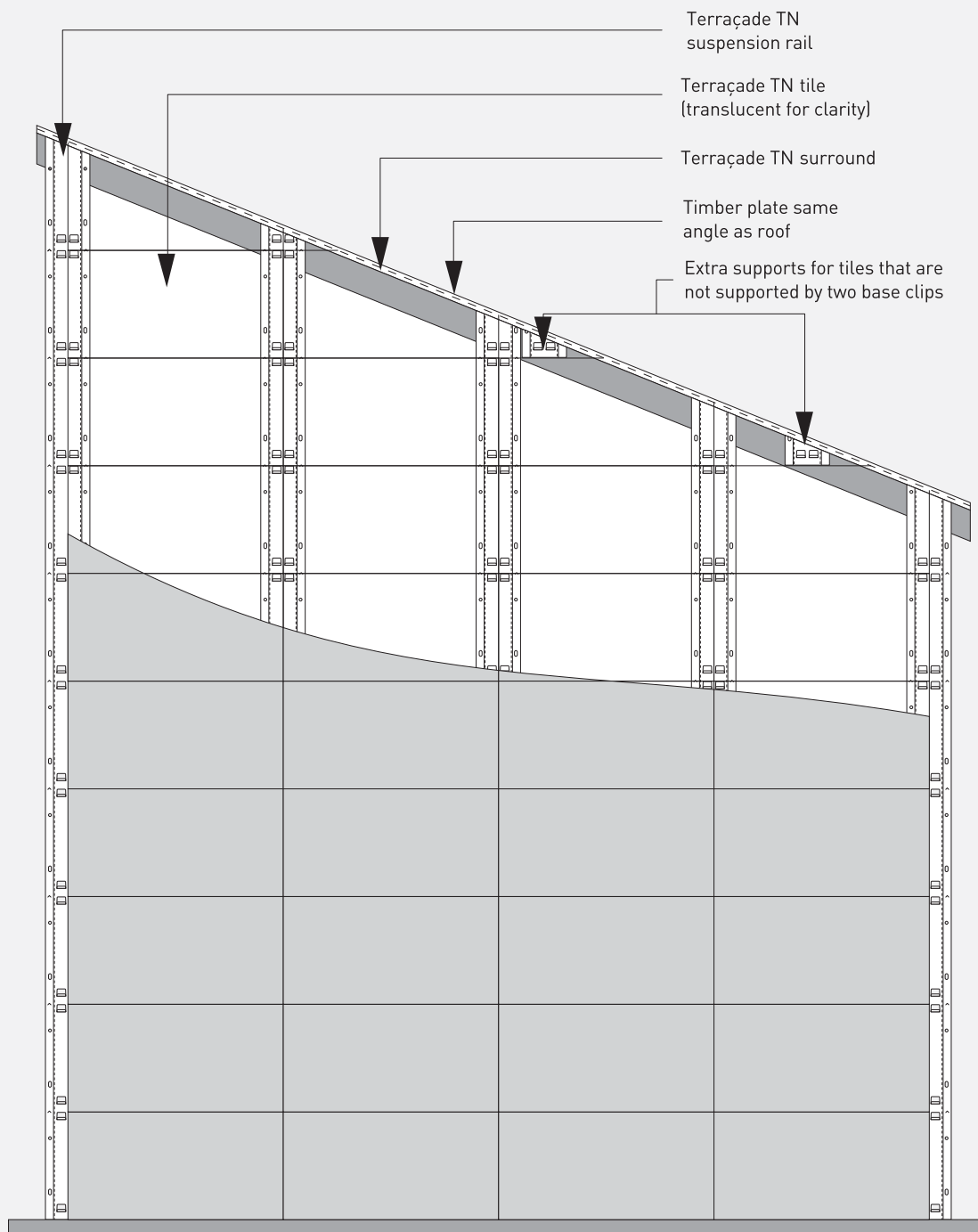
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SYSTEM DESIGN:

RAKE DETAIL – SD 12



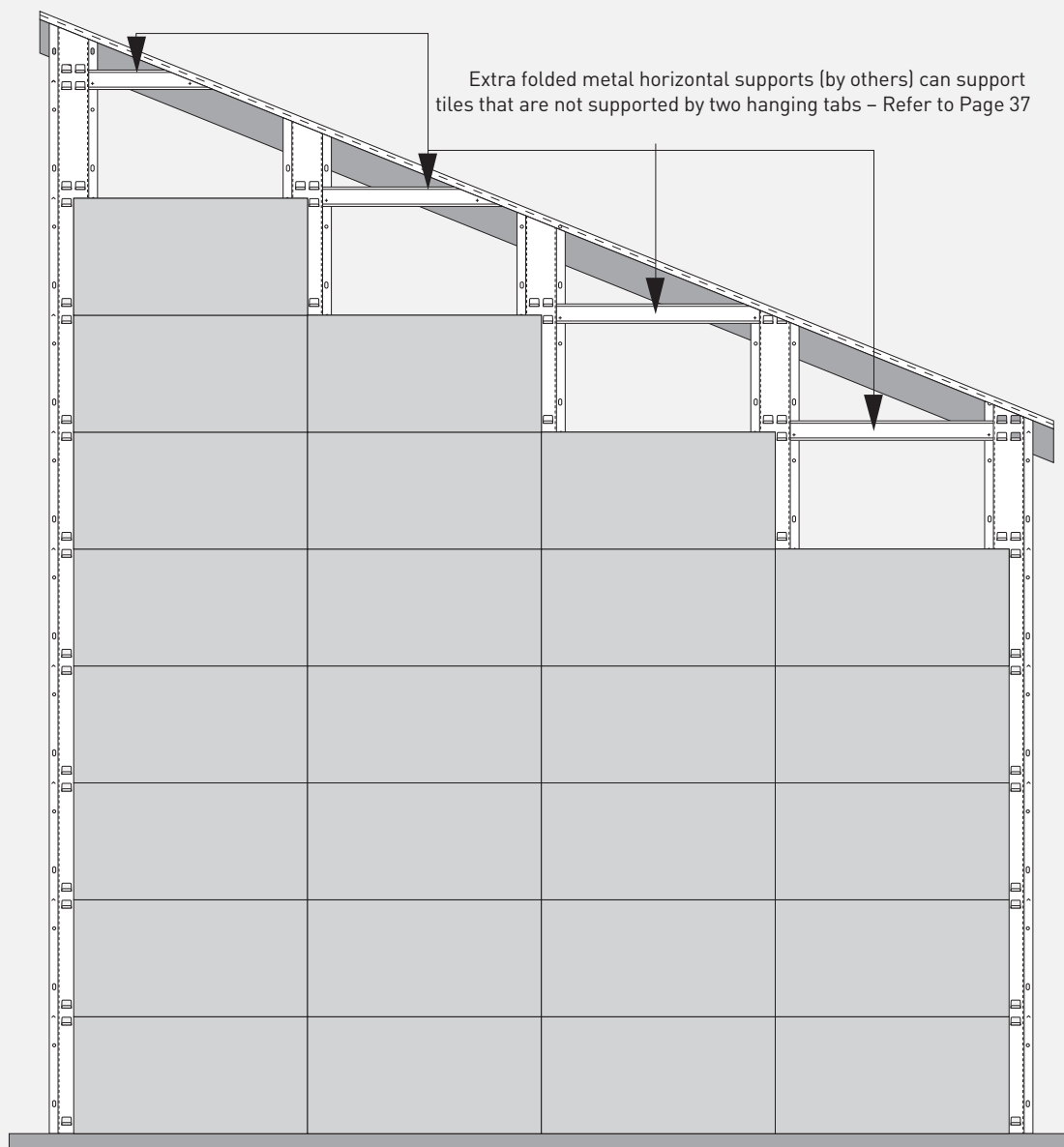
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SYSTEM DESIGN:

RAKE DETAIL – SD 12 (VARIATION)



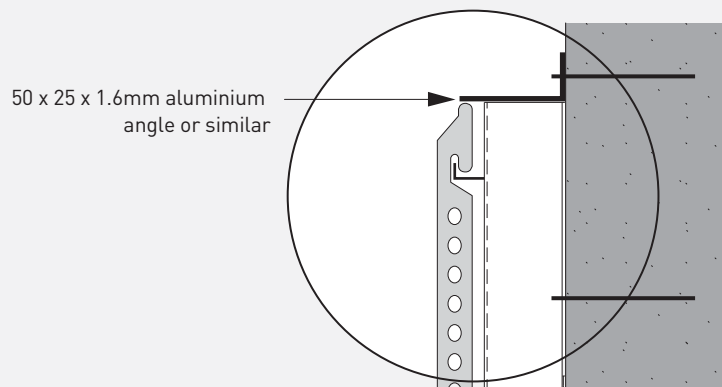
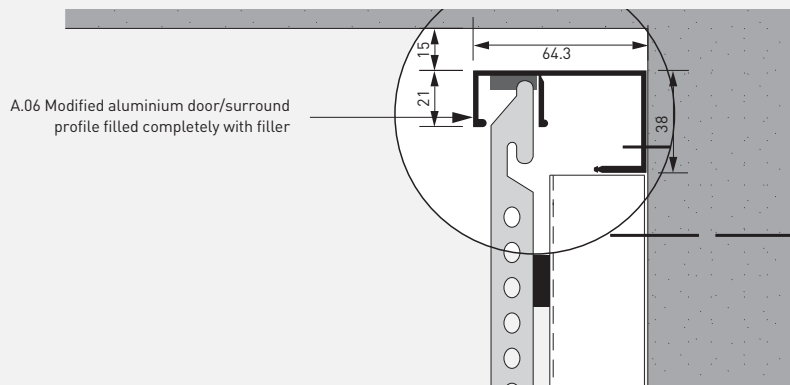
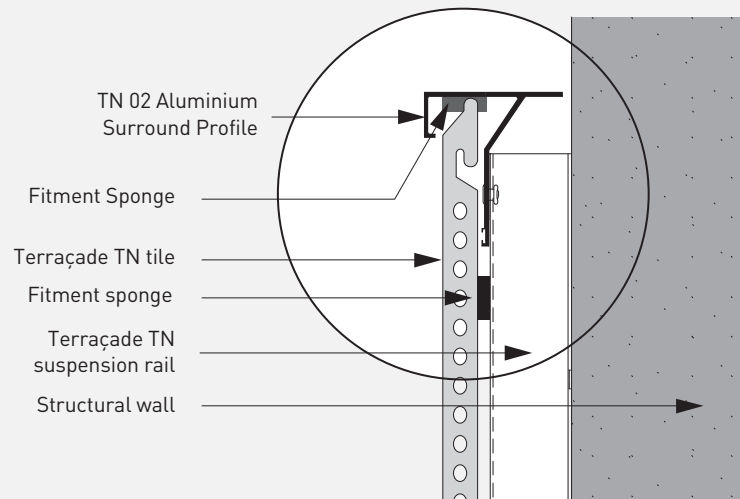
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SYSTEM DESIGN:

TOP RESTRAINT FOR CYCLONE AND EARTHQUAKE ZONES – SD 13



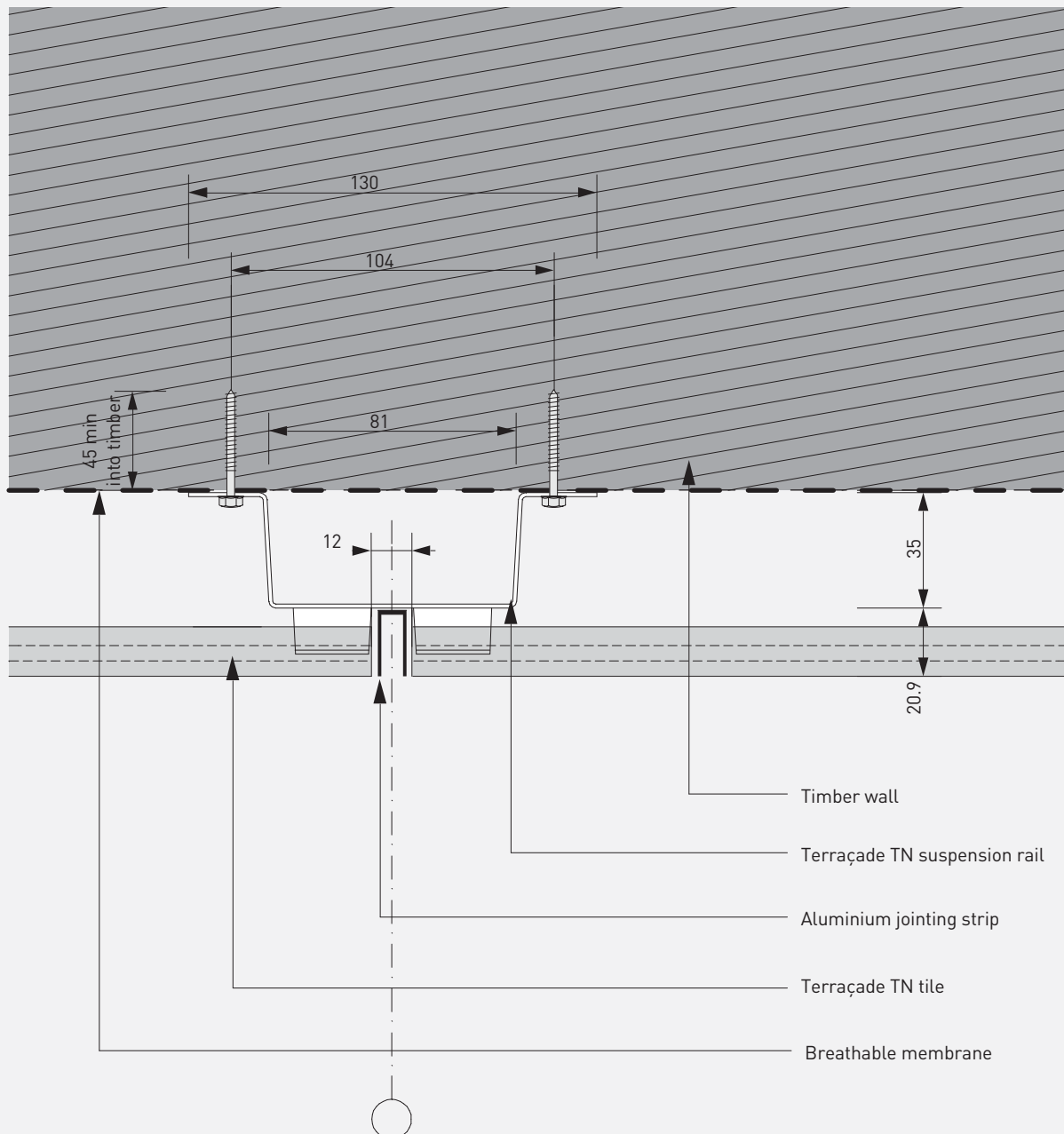
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SYSTEM DESIGN:

D-01 TIMBER – HORIZONTAL DETAIL



HANDY HINT

- Spray or brush the central section of the coastal version suspension rail face (between the hanging tabs) matt black to reduce reflection through any gaps

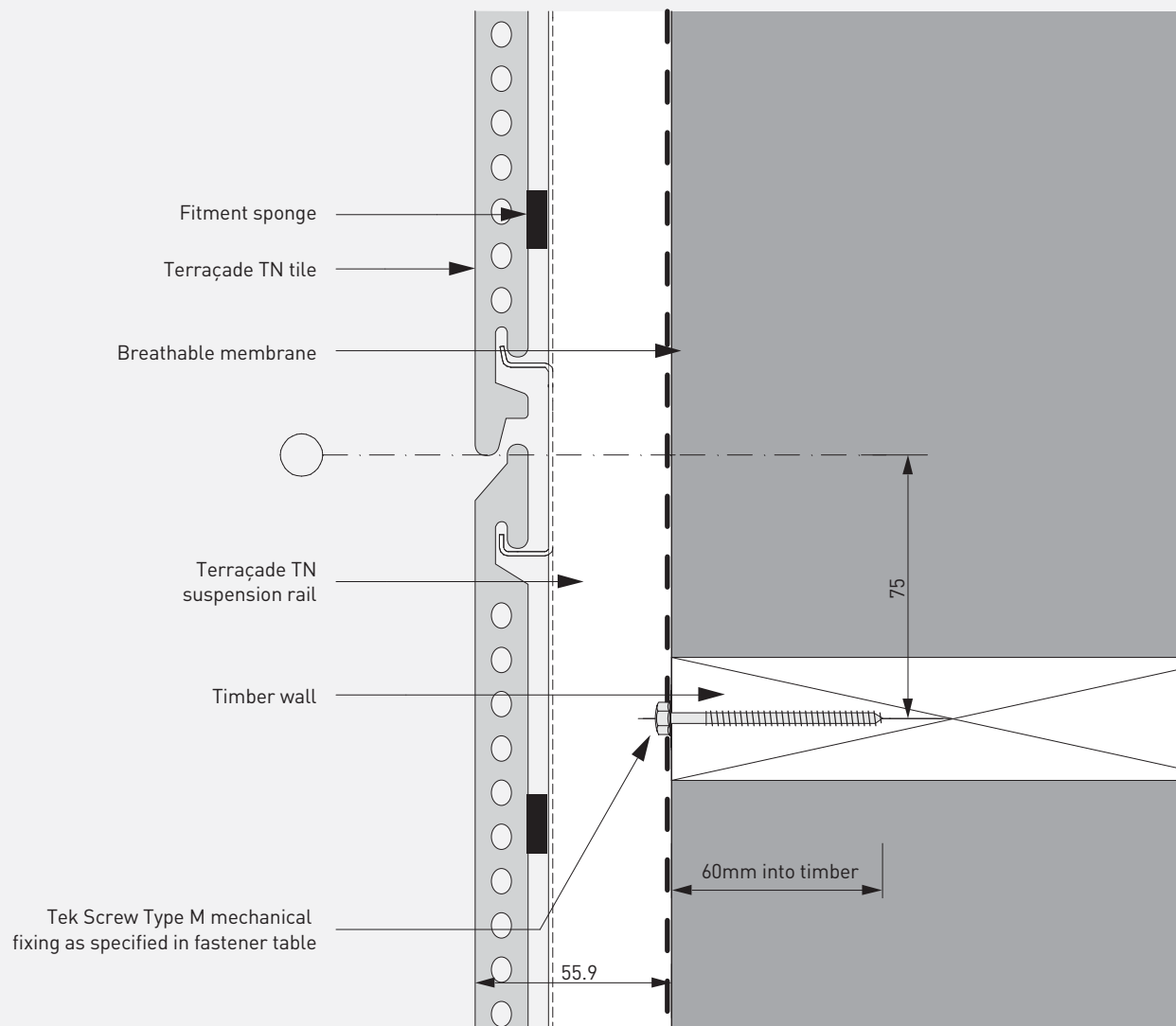
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SYSTEM DESIGN:

D-02 TIMBER – VERTICAL DETAIL



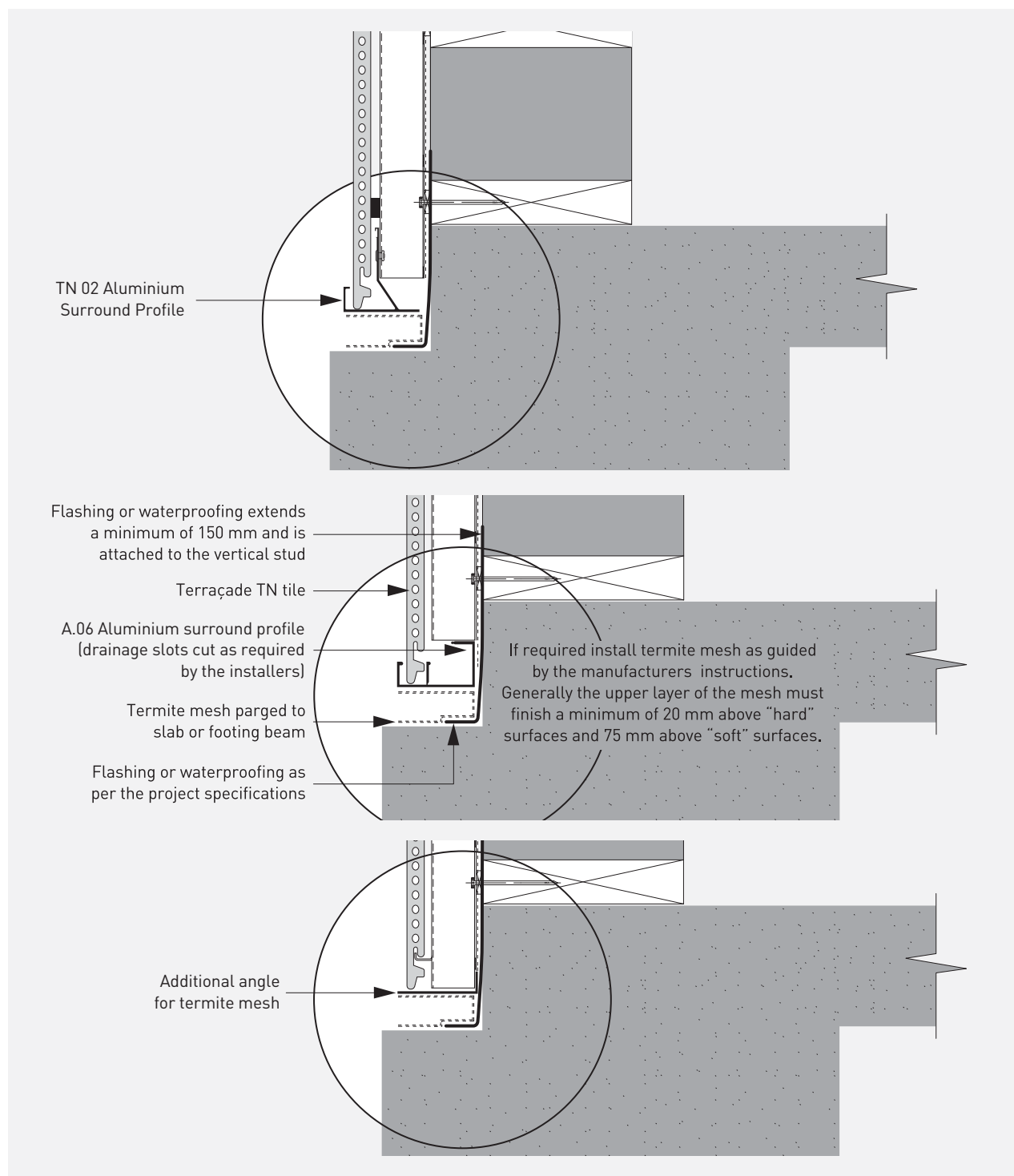
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SYSTEM DESIGN:

D-03 TERMITE DETAIL – RECESSED SLAB



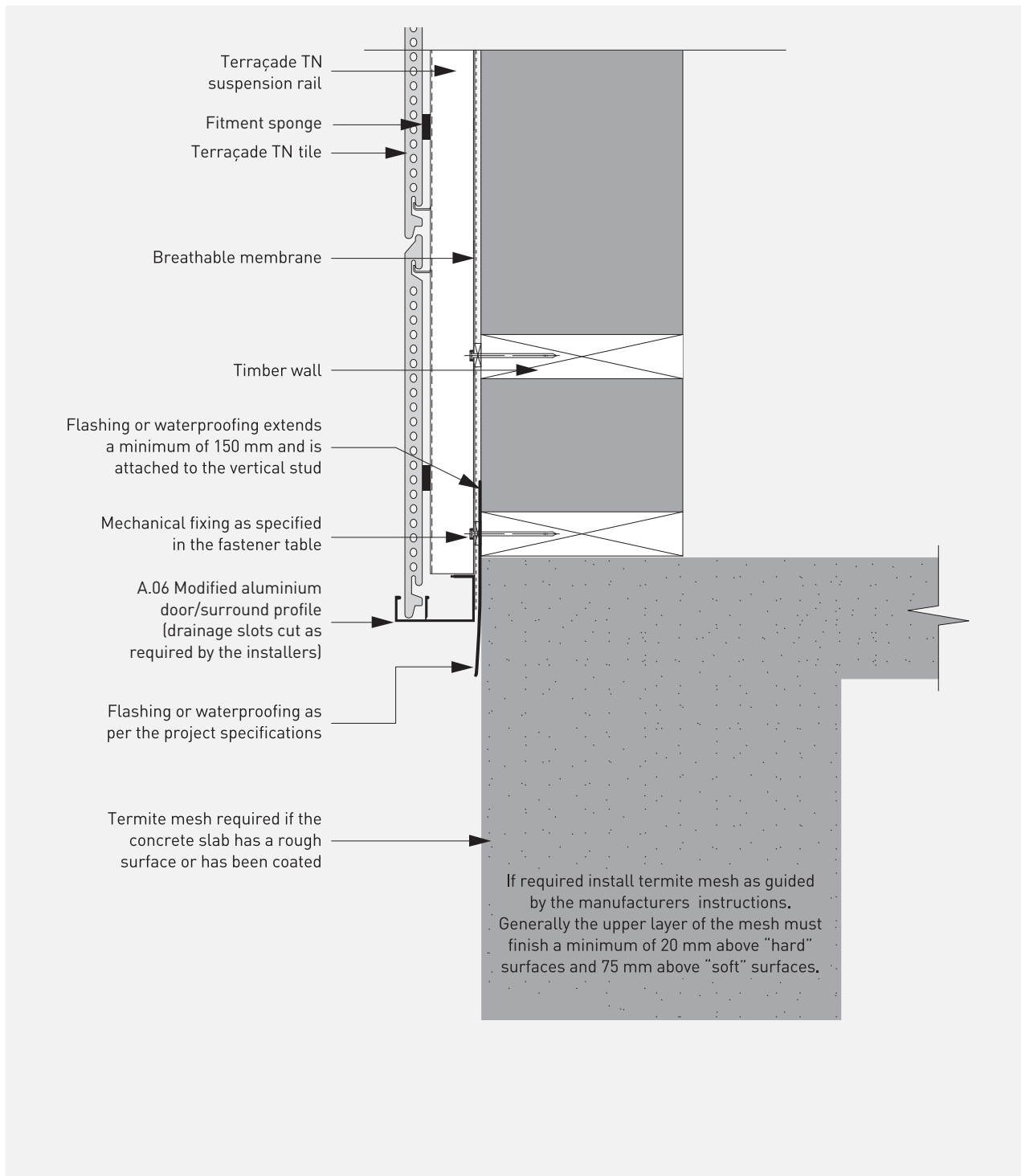
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SYSTEM DESIGN:

D-03 TERMITE DETAIL – SLAB VARIATION



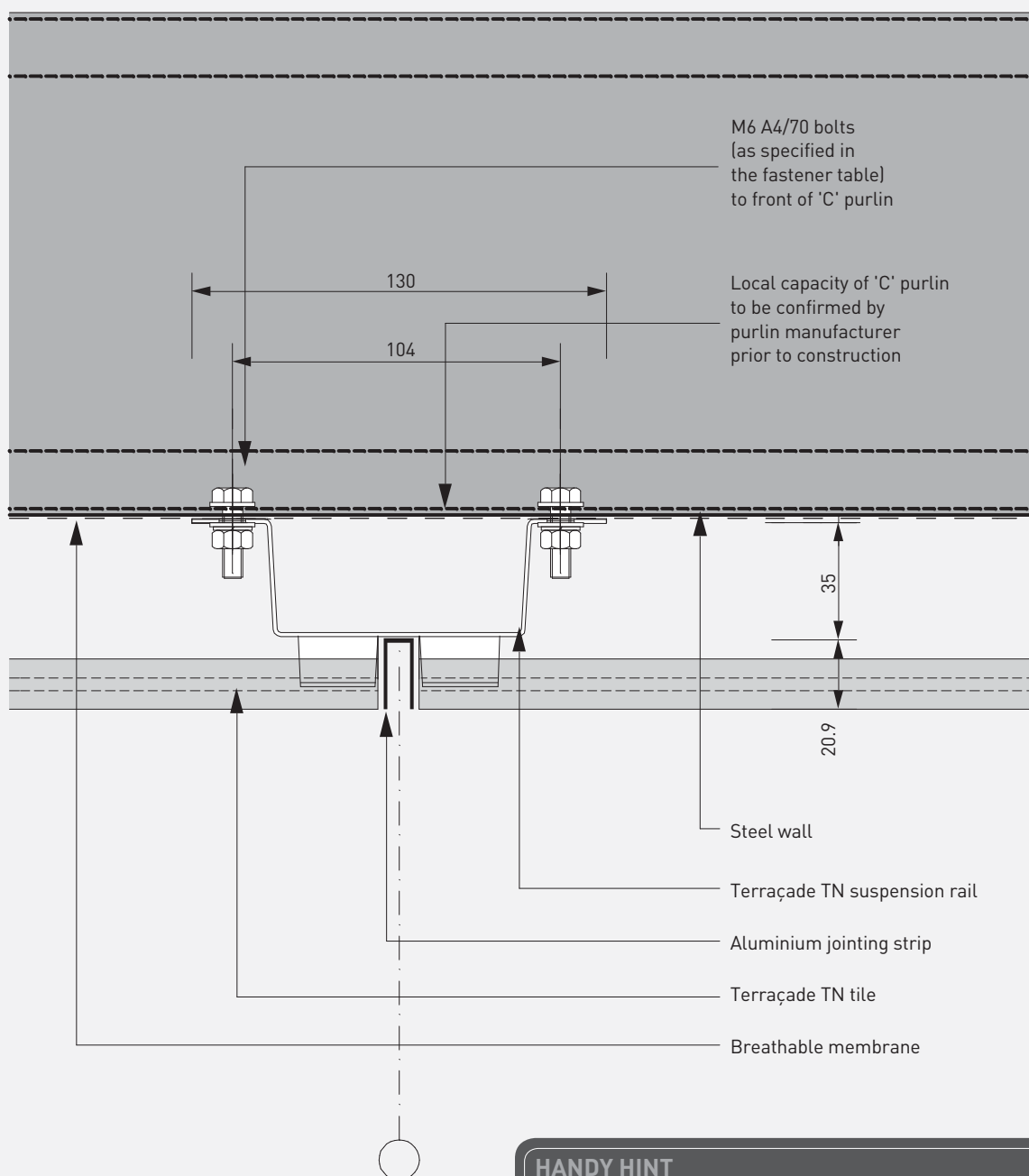
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SYSTEM DESIGN:

D-04 STEEL – HORIZONTAL DETAIL



HANDY HINT

- Spray or brush the central section of the coastal version suspension rail face (between the hanging tabs) matt black to reduce reflection through any gaps

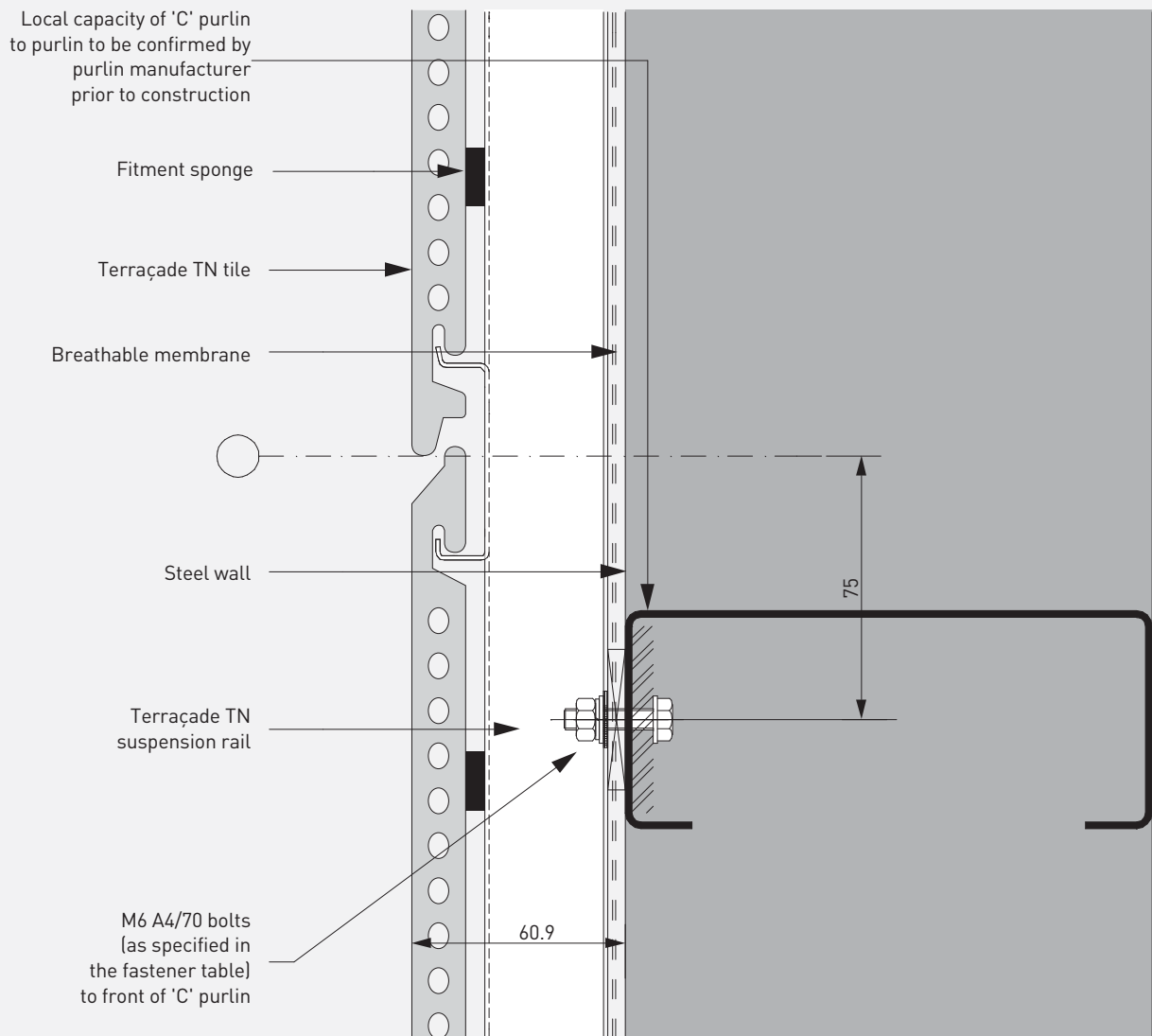
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SYSTEM DESIGN:

D-05 STEEL – VERTICAL DETAIL



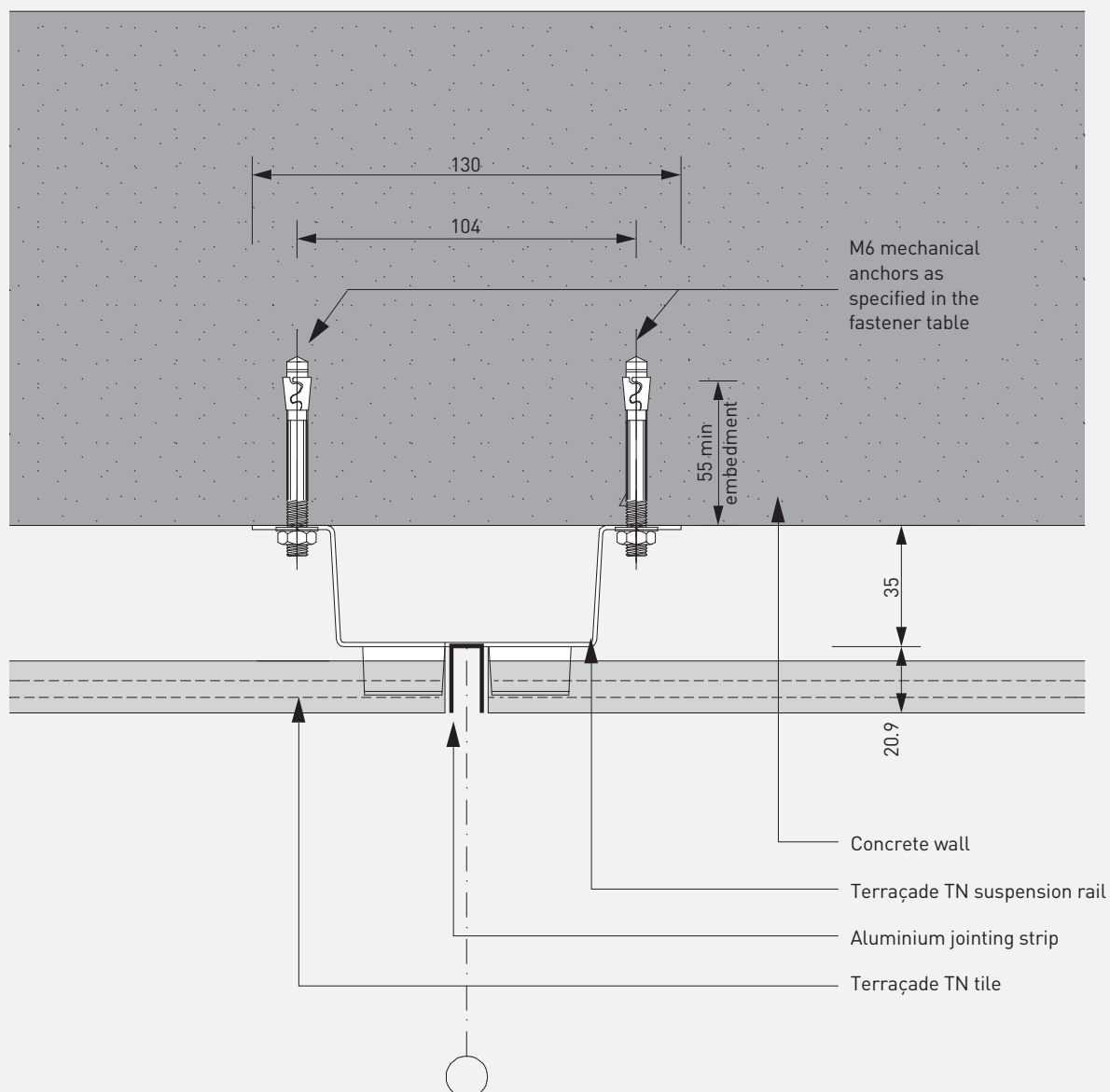
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SYSTEM DESIGN:

D-06 CONCRETE – HORIZONTAL DETAIL



HANDY HINT

- Spray or brush the central section of the coastal version suspension rail face (between the hanging tabs) matt black to reduce reflection through any gaps

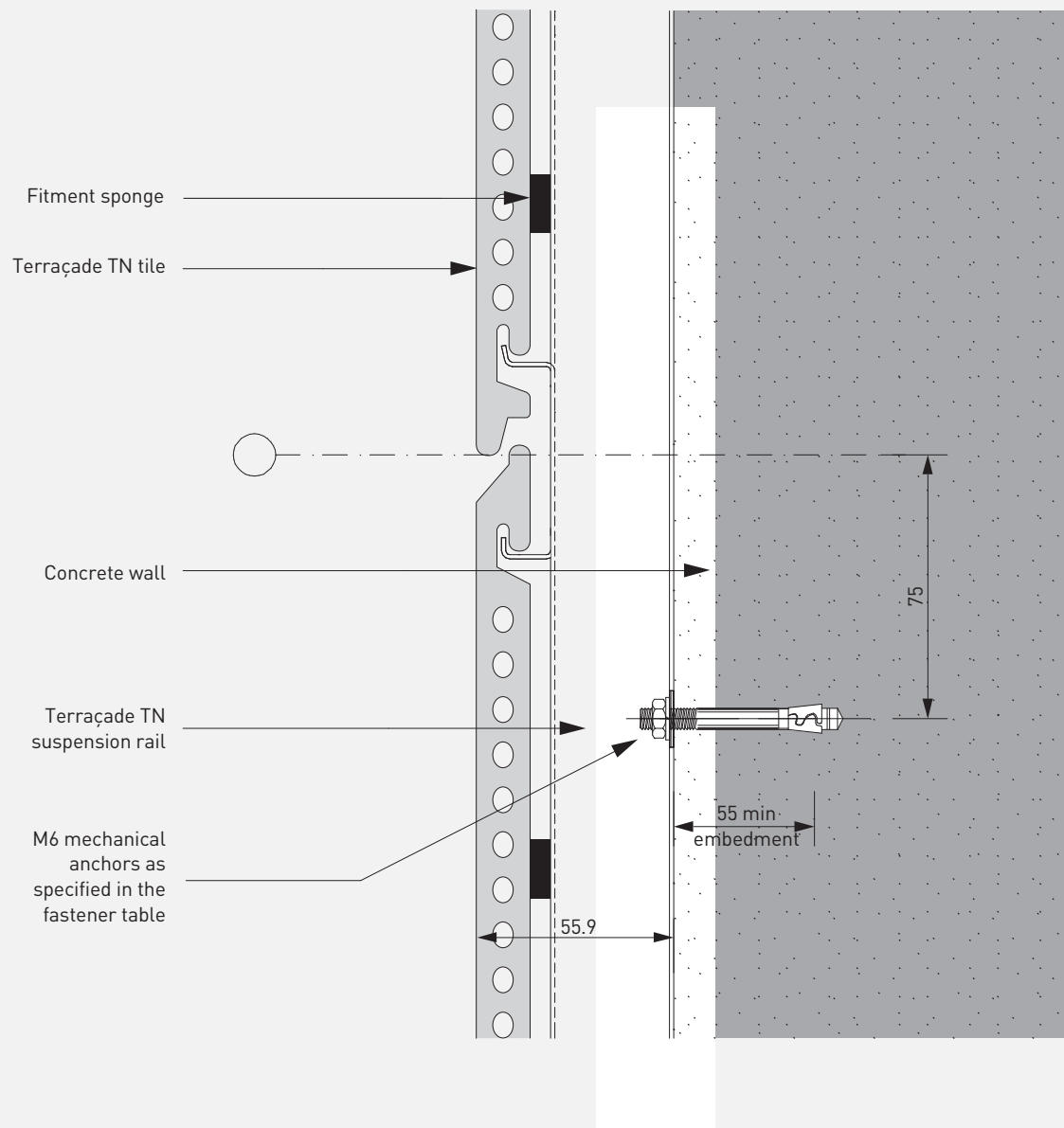
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SYSTEM DESIGN:

D-07 CONCRETE – VERTICAL DETAIL



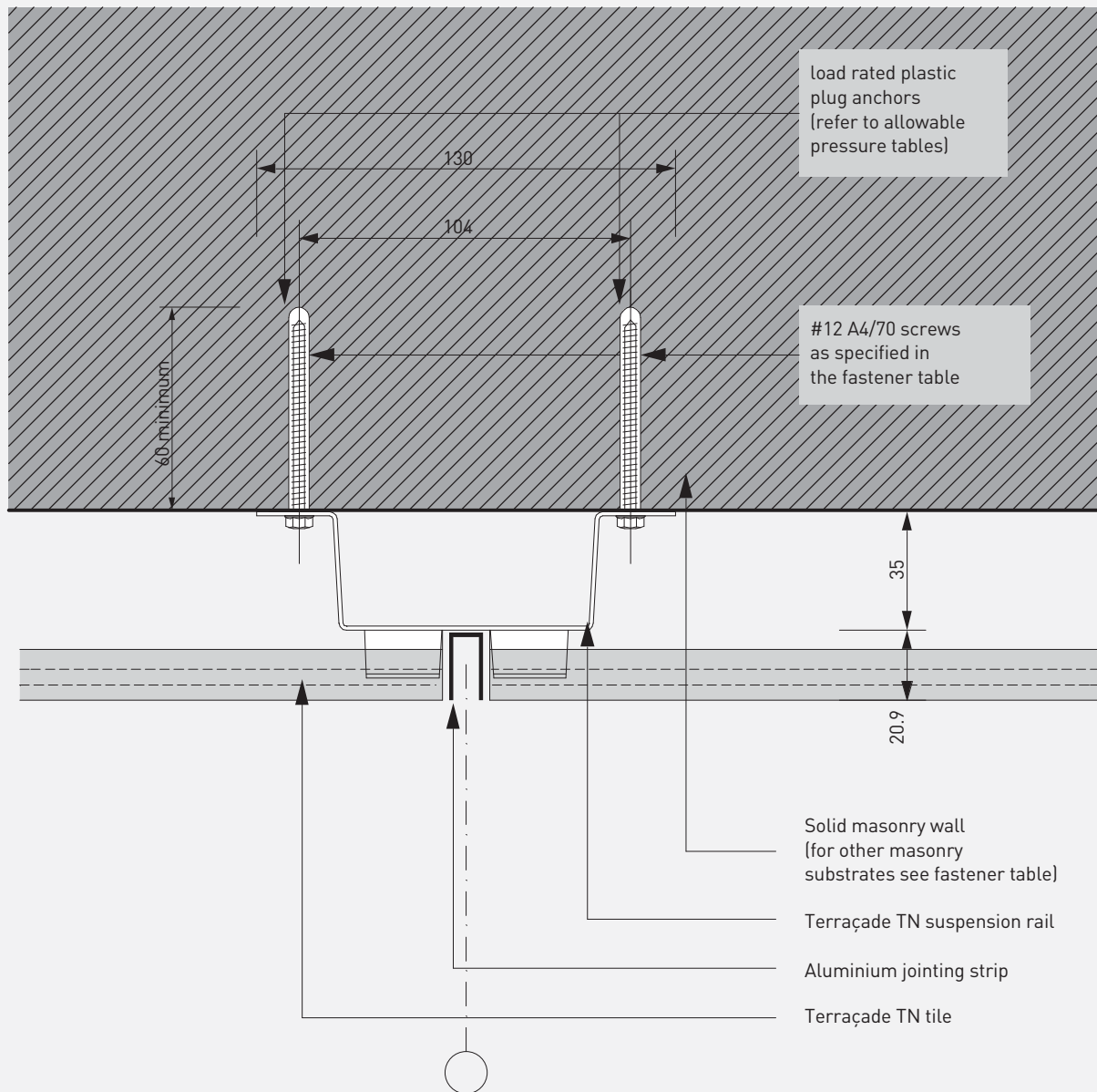
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SYSTEM DESIGN:

D-08 MASONRY – HORIZONTAL DETAIL



HANDY HINT

- Spray or brush the central section of the coastal version suspension rail face (between the hanging tabs) matt black to reduce reflection through any gaps

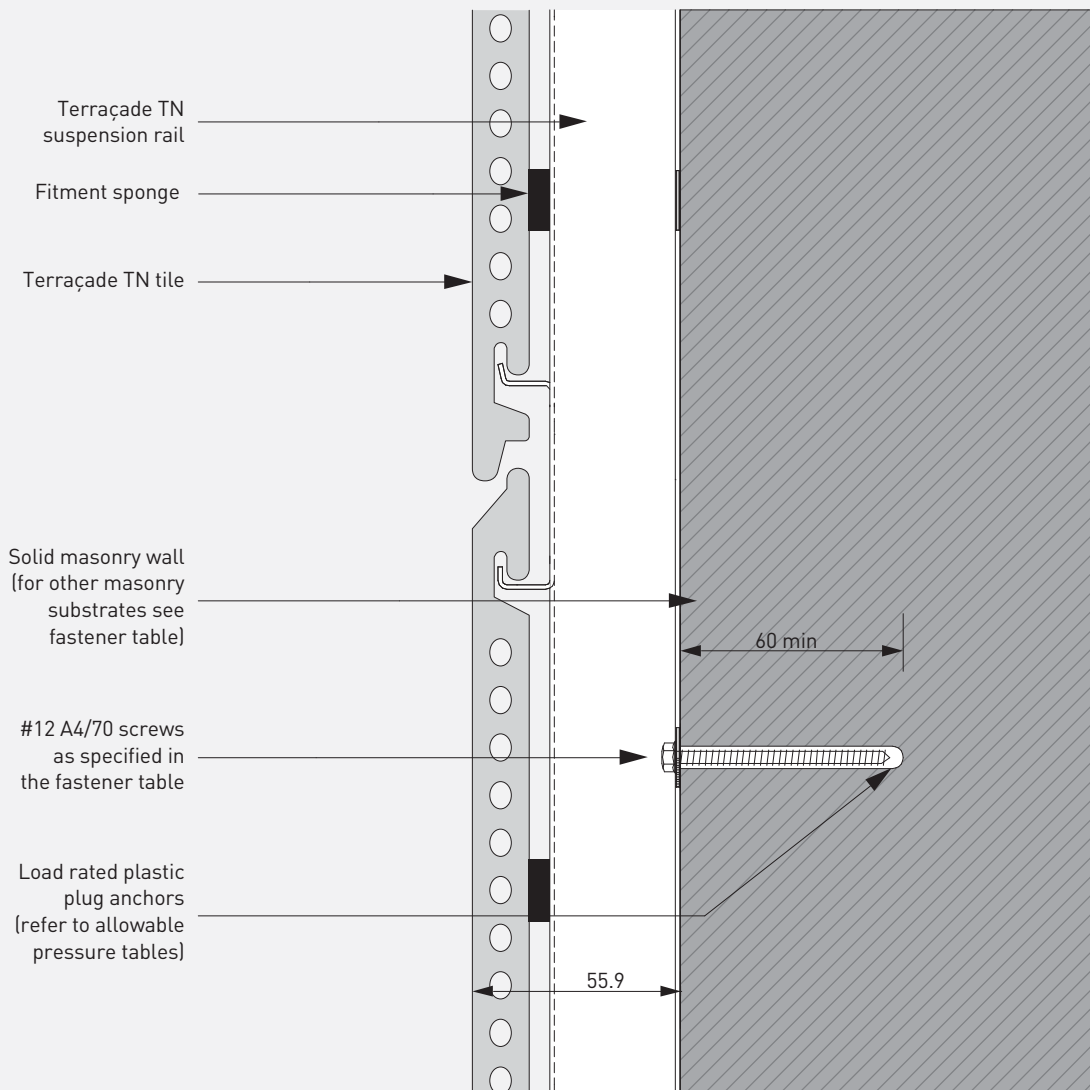
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SYSTEM DESIGN:

D-09 MASONRY – VERTICAL DETAIL



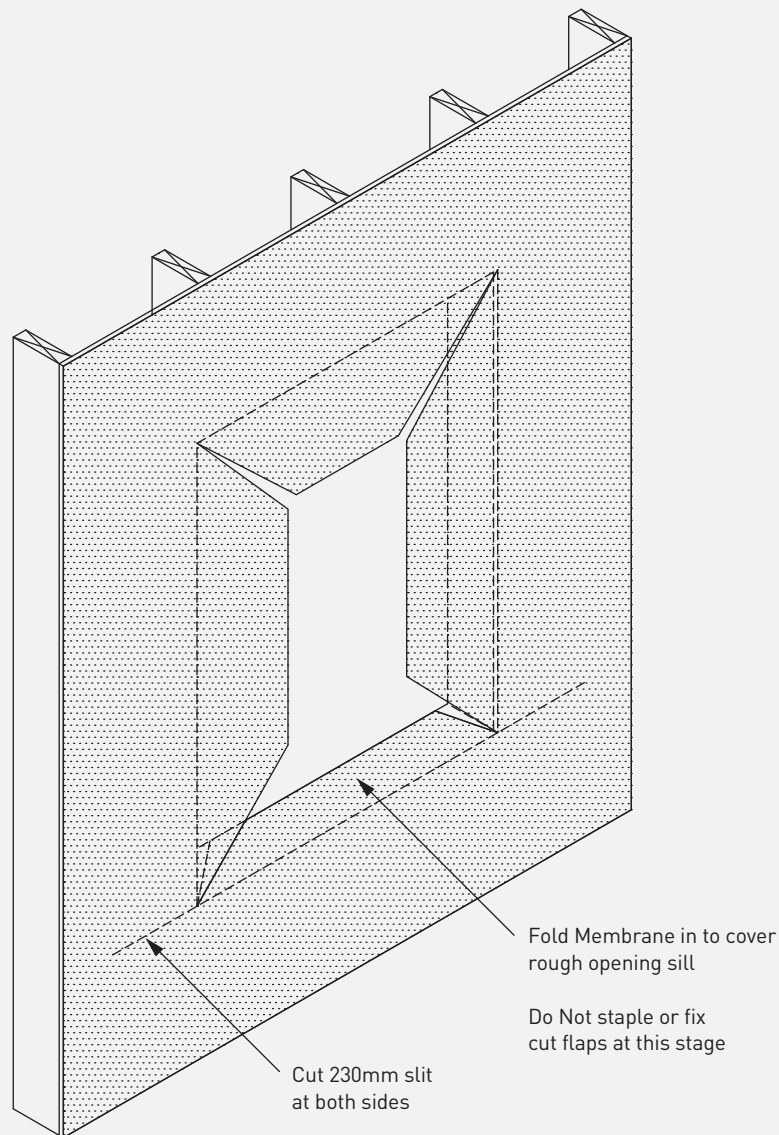
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SYSTEM DESIGN:

MEMBRANE



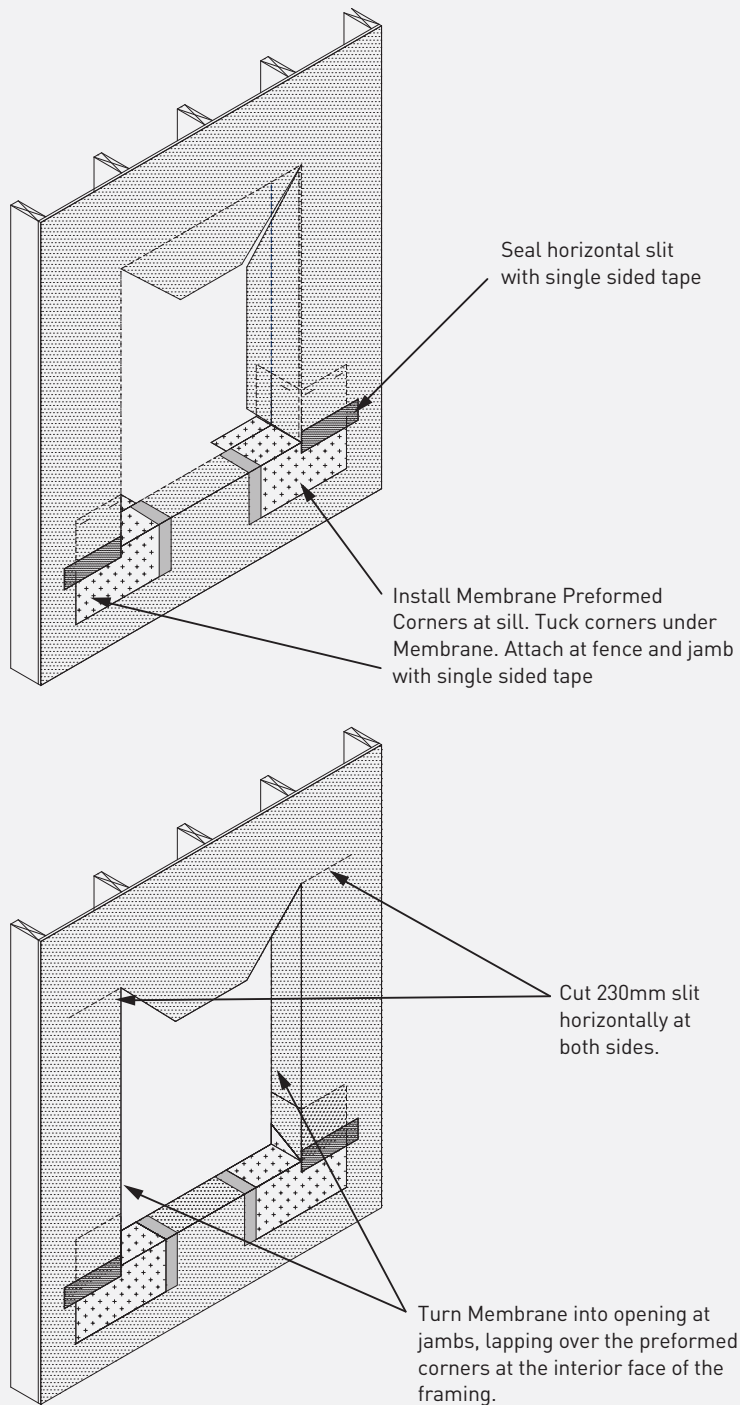
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SYSTEM DESIGN:

MEMBRANE



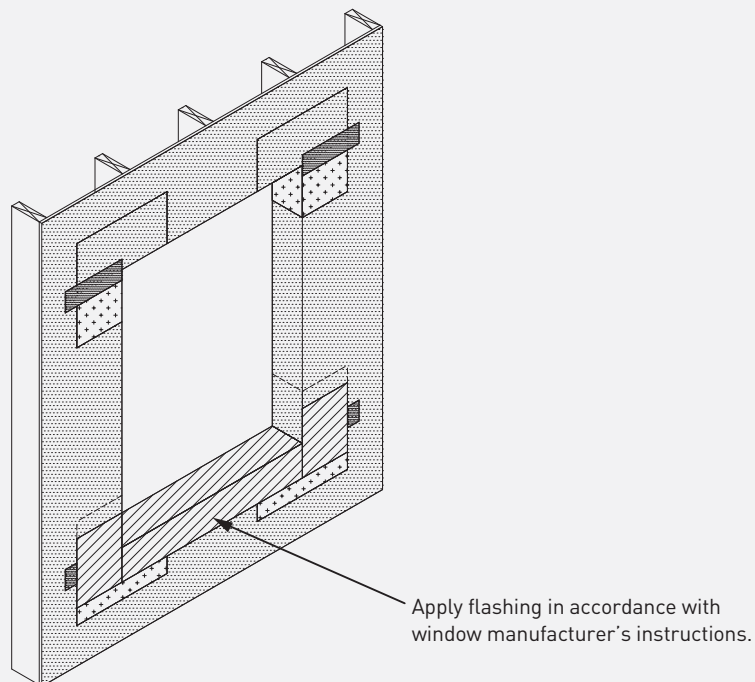
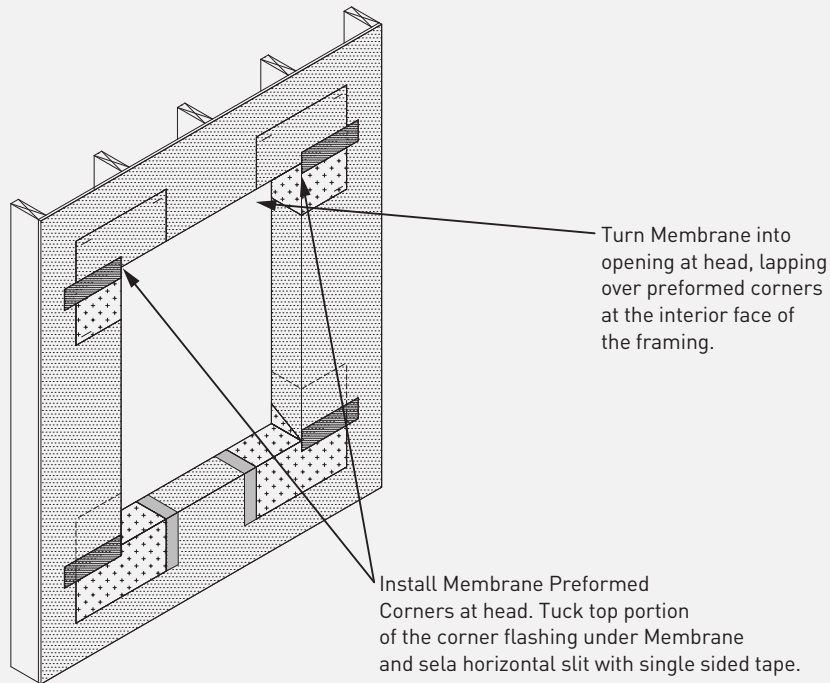
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SYSTEM DESIGN:

MEMBRANE

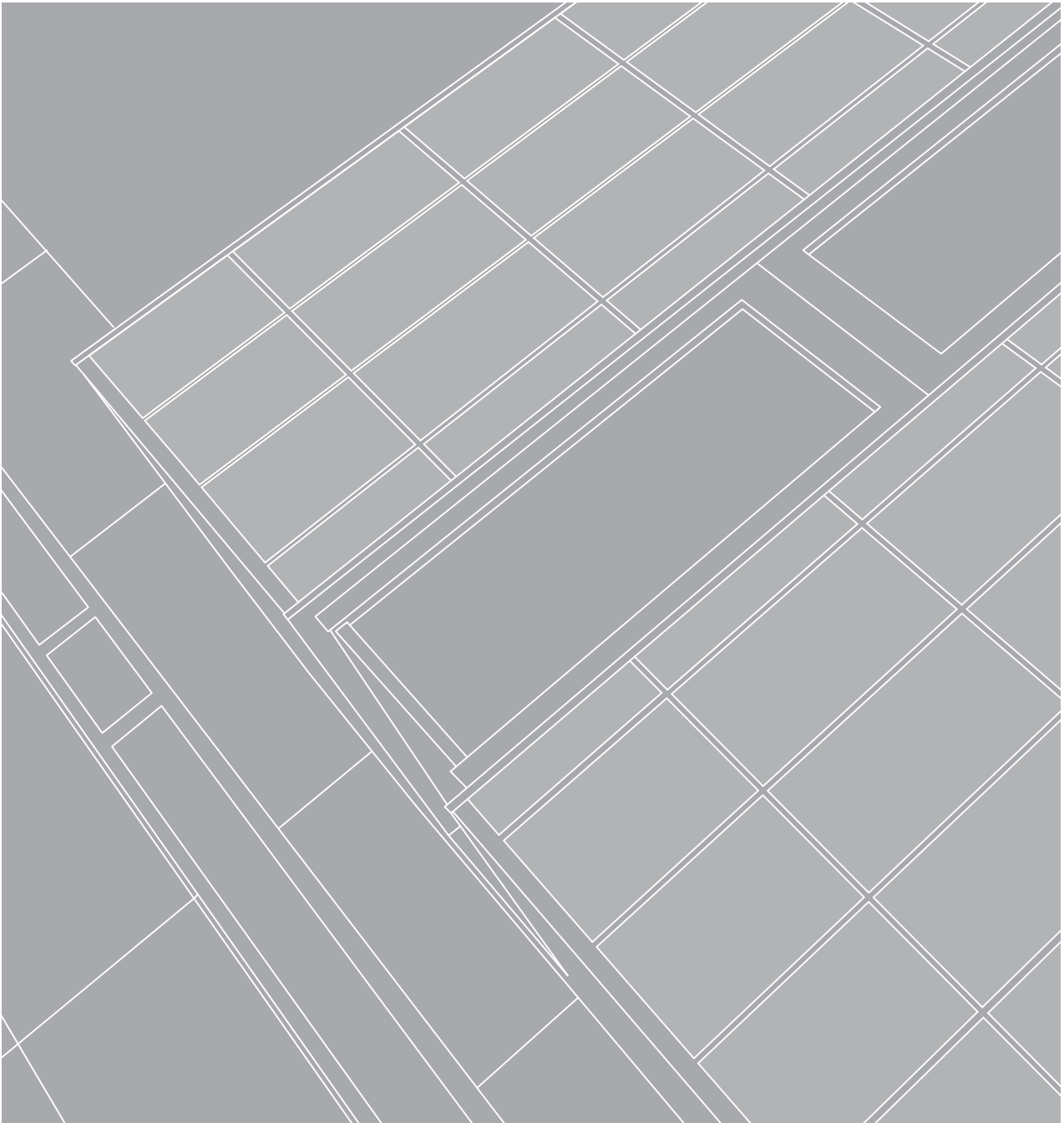


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INSTALLATION



For the most up to date information on
Terraçade products and the latest version
of this manual, please refer to our website.
www.terraçade.com.au
www.terraçade.co.nz

SAFE WORKING INSTRUCTIONS:

SITE PREPARATION

REWORKING TILES

Silica dust can be liberated from the Terraçade TN tiles when they are reworked. Chronic inhalation of crystalline silica has been associated with impairment of lung function. Please refer to MSDS for Terraçade, which is available from the Terraçade websites (www.terraçade.com.au or www.terraçade.co.nz) for further information. Care should be taken when reworking Terraçade TN tiles to maintain the exposure to crystalline silica below the Exposure Standard proscribed by Worksafe Australia (0.1 mg/m³). Safe working procedures should include:

- Utilising a wet saw when cutting or reworking tiles. Contact the saw manufacturer for further details.
- Wear appropriate personal protective equipment, such as approved dust mask and safety goggles, when utilising power tools or abrasive hand tools on the tiles.
- Ensure that dust is disposed of during clean up and disposal appropriately, by either wetting or vacuuming. (refer to the below diagram)

USING BRICK/TILE SAWS OR POWER SAWS

- Ensure that adequate personal protective equipment, such as approved safety glasses, gloves, dust mask and hearing protection, is worn.
- Try and use a wet saw to cut tiles, or ensure that adequate ventilation or dust extraction equipment is available if dry cutting is used.

HANDLING

- Care should be taken when handling suspension rails and trims to avoid cuts and abrasions. The use of appropriate gloves may be of benefit. Extra care should be taken when handling cut pieces.
- It is recommended that packs of suspension rails should be broken up, so that they may be handled individually.
- Ensure clear passage when moving the suspension rails and trims due to their size. Also allow for adequate storage of the suspension rails and trims to avoid trip hazards.

- Take care when handling cut tiles, to avoid cuts or abrasions from sharp surfaces or broken tiles.
- Consider manual handling issues when lifting tiles.
- Ensure that an adequate number of people are available to support the weight of the roll when rolling out the membrane.

STORAGE AND CLEANING OF SURROUNDING MATERIALS

- All materials should be stored to avoid damage. Particularly, ensure that the hangers on the suspension rails are protected from distortion and the edges and corners of the tiles are protected from chipping.
- Protect the tiles, rails and trims from exposure to rain, water or chemicals during storage.
- Ensure that pressure water jet cleaning of any surrounding surfaces is conducted prior to the installation of the tiles.
- Protect aluminium components during chemical cleaning of nearby materials, especially during acid cleaning of brick work.

RECOMMENDED SAFETY PROTECTION



Face Masks P1 or P2 type approved to the relevant Australian Standards.



Safety Goggles approved to the relevant Australian Standards.



Hearing Protection approved to the relevant Australian Standards.



Clean up, wet down or vacuum



Dispose containment of dust

INSTALLATION:

GENERAL INSTALLATION PROCEDURE

THE TERRAÇADE TN SYSTEM IS EASILY INSTALLED AS THE TILES ARE SECURELY ATTACHED BY PURPOSE DESIGNED SUSPENSION RAILS.

The speed of installation of the tiles and the effectiveness of the panel support system is dependent on achieving close control of tolerances in the fixings of the vertical support system. The unique design of the vertical suspension rails ensures that the vertical module distance is maintained within the rail.

PREPARATION

01. Ensure that adequate structural members are available to fasten the suspension rails to. Additional noggings or purlins may be necessary to accommodate the required span configuration. Design documentation should accommodate these requirements.

02. Specify adequate waterproofing measures for the backup structural wall. For framed systems a waterproof membrane is supplied as part of the system's tested performance.

03. Determine the set-out of tiles, based upon the design requirements. The tiles could be set from the base, the top or from any important structural features.

04. Determine the quantities of the components required for a particular design. Contact an Brickworks Building Products representative if you require assistance.

05. Obtain the correct fasteners, as per the fastener table, for the design.

06. Ensure that the installers are aware that irregularities of shape in backup wall must be packed out or accommodated for, to ensure that the suspension rails are installed correctly.

EXAMINATION OF SUBSTRUCTURE

07. Examine back-up wall for compliance with design requirements (check for discrepancies with drawings, cracks and other possible air leakage sources).

08. Ensure that adequate support structure is available to comply with the span configurations specified.

09. The maximum horizontal or vertical deviation of a surface from a plane surface (bow) in any 2m length;

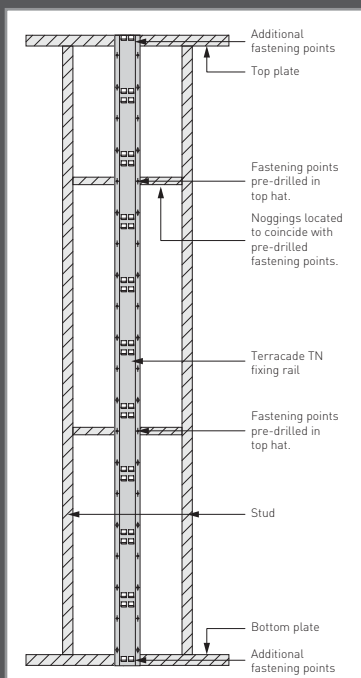
- Structural Tolerance - 5mm
- Non - Structural Framework Tolerance - 3mm

SET OUT AND COORDINATION

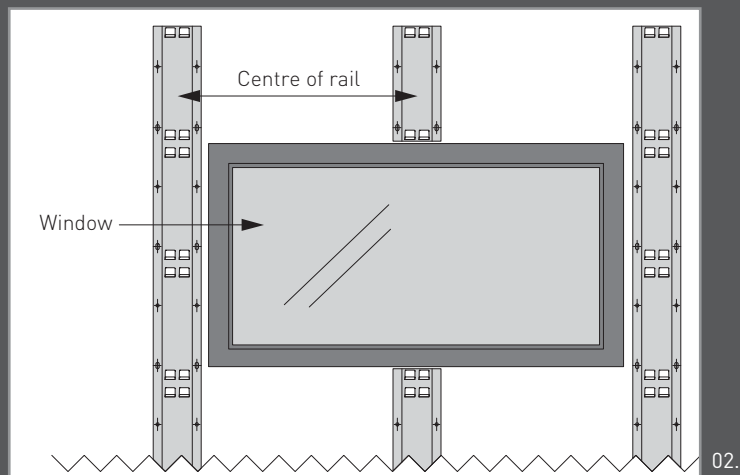
10. Establish and coordinate set-out lines, following design requirements for the set-out of the tiles. For example, the design may require that the tile module is spaced from an important feature or be designed to reduce cut tiles around a window.

(See below diagram 01 and 02)

11. Install any secondary framing necessary to support suspension rails including bimetallic separation, line and level.



01.



02.

INSTALLATION:

GENERAL INSTALLATION PROCEDURE

12. Confirm support centres for rail as required by the span chart have been achieved.

INSTALLATION OF WATERPROOFING

13. Install air and/or waterproofing (eg. waterproof membrane) as applicable to the system. Check for holes and gaps in the seal and ensure compliance with the manufacturer's requirements.

The waterproof membrane, will be supplied for framed structures in rolls of 1.5 m high. The waterproof membrane must be installed in accordance with the manufacturer's instructions and recommendations.

a. For framed structures, install the waterproof membrane to frames with stainless steel (grade A) nails or staples at maximum centres of 500 mm. If lapped joints are required the minimum overlap required for a vertical lap is 150 mm space from the last stud and for a horizontal lap 100 mm. Ensure that upperlayers overlap over lower layers and stagger vertical joints.

INSTALLATION OF SUPPORT RAILS, FLASHINGS AND TRIMS

14. Cut support rails to size, if necessary, paying particular attention to top and bottom termination and fixing points.

(See below diagram 03)

15. Install vertical suspension rails, ensuring that the rails are installed straight and as per the design specifications (with particular reference to the fastener table and the allowable pressures). A level line, spirit level or laser level can be used to ensure accuracy. Note that vertical misalignment between adjacent rails must not exceed 1 mm.

(See below diagram 04)

16. A set-out tool should be used to ensure continuity of the vertical module when more than one suspension rail is required in one vertical line.

a. When attaching a suspension rail above a pre-attached suspension rail, loosely attach the top suspension rail using the slot holes punched in the top hat.

b. Engage the set-out tool onto the two rails, by slotting it over the hangers.

(See overleaf diagram 05)

c. Once the top suspension rail is positioned correctly and is vertically plumb and level tighten the fastenings and lock the suspension rail into place.

d. Remove the set-out tool for use elsewhere.

17. Place fitment sponge horizontally onto the suspension rail at mid tile span.

(See overleaf diagram 06)

18. Do not leave the fitment sponge exposed to sunlight for more than 24 hours.

19. Install any flashings that may be necessary to maintain the building air seal and weather tightener at openings or adjacent claddings.

20. Check all flashings (corners, at each 2-storey location, around all openings etc) are continuous and complete.

21. Install external decorative trims and vertical jointing strips if required (refer to the trim installation procedure for further details).



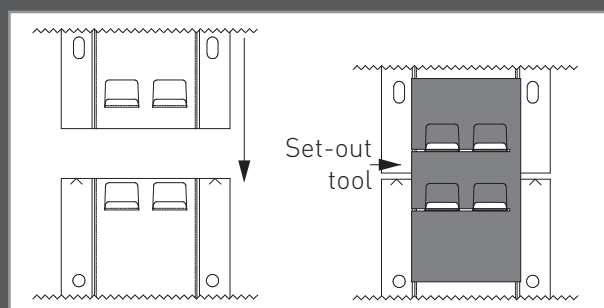
03.



04.

INSTALLATION:

GENERAL INSTALLATION PROCEDURE



05.

Component Description	Page Number	Available from Terraçade	Available from Other suppliers
Terraçade™ TN Tile	39	Yes	-
TN.01 Vertical Suspension Rail	40 & 41	Yes	-
Surround Trim Options			
TN.02 Aluminium Surround Profile	42	Yes	-
A.05 Aluminum door/surround profiles (for use with battons)	41	Yes	-
A.06 Modified aluminium door/surround profile	41	Yes	-
A.07 Aluminium Base Surround Profile (for use with battons)	42	Yes	-
A.08 Modified Aluminium Base Surround Profile	42	Yes	-
Corner Trim Options			
TN.04 Aluminium external corner	45	Yes	-
TN.05 Aluminium internal corner	45	Yes	-
50x50mm Aluminium angle	45	-	Yes
TN Mitre Corner	46	-	Yes
Jointing Strip Options			
TN.03 Aluminium jointing Strip	45	Yes	-
Other Components			
Corner angle fixing for TN.02	47	-	Yes
Corner spigot fixing for TN.02	47	-	Yes
Rail Setting Tool	47	Yes	-
TN.E2 Fitment sponge	47	Yes	-
TN.E3 Breathable membrane	47	Yes	-
Horizontal Supports	47	-	Yes

06.

INSTALLATION:

GENERAL INSTALLATION PROCEDURE

INSTALLATION OF TILES

22. Commence installation of tiles starting from the base and working upwards, ensuring horizontal set out lines are maintained.

a. Install tiles onto the vertical suspension rail by initially placing the top receiver of the tile securely on the top hanger. Lift the base of the tile and tilt inwards slightly to engage the bottom hanger. Check that the tile has been securely engaged visually and by physically moving the tile.

(See below diagram 07)

b. Tiles can be cut to any length or height using a wet saw with appropriate continuous rim diamond blades. Surround trims are used to capture cut tiles.

(See below diagram 08)

c. Insert either santoprene or aluminium tile spacers if necessary. Tile spacers will be necessary if a cut tile is not supported by the top hanger to maintain continuity in the tile overlap.

23. Insert vertical aluminium joining strips and fix them mechanically using blind rivets or screws at maximum 600mm centres. 3M VHB tape maybe used to position the joining strip prior to mechanical fixing.

24. Brush down or sponge with a moist cloth on completion to remove loose material.

NOTES:

a. Every length of suspension rail should be fastened at least at one position in solid hole. That is, do not use only the slots to fasten the suspension rail.

b. Every fastener location on the suspension rail should have fixings on both sides and not only one side.

c. If a secondary framing system is required, its suitability should be confirmed with a structural engineer.

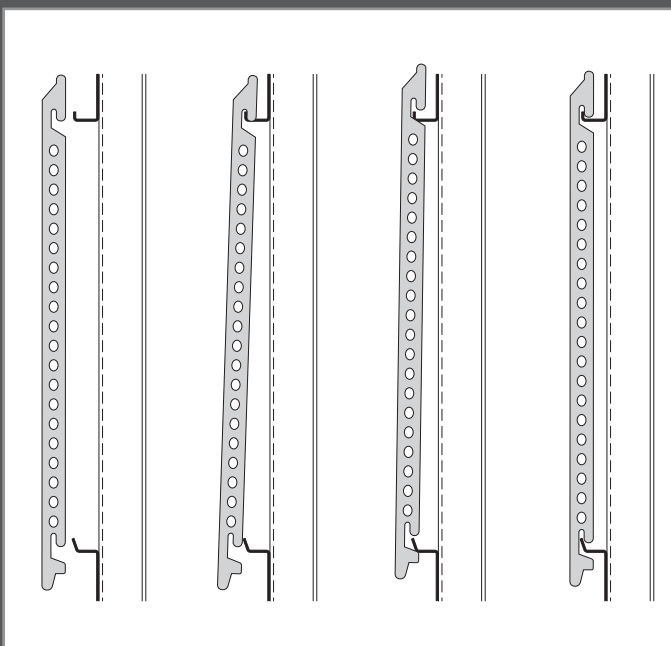
d. It is difficult to remove individual tiles from a wall as it requires 'shuffling' of immediately adjacent tiles. The use of trims and a top wedge should prevent this shuffling as the top tile becomes locked into position.

e. If additional drill holes in the suspension rail are required, they must not be drilled adjacent to the punched hangers. The only exception occurs when drill holes are required at the top and bottom of the top hat length, for example at the top plate or bottom plate of a timber frame.

f. Where multiple lengths of the support rails are butted end to end it is recommended that the set-out tool supplied is used to ensure tolerances are maintained.

g. The suspension rails are designed to accommodate thermal expansion for full lengths butted vertically against one another when placed using the set-out tool. However, if cut rails are butted against one another a vertical gap of ~5 mm should be left between the rails to accommodate thermal expansion.

h. If installing tiles on a rake, the tile weight must be supported at least at two locations.



07.



08.

INSTALLATION:

TRIM INSTALLATION PROCEDURE

SURROUND FOR PARAPET AND WINDOW SILL

01. Cut the suspension rail to a length that accommodates the leg of the surround, otherwise the back angled section of the surround will impede on the suspension rail. This may involve cutting the top hanger off the top hat for a full tile.

02. Fasten the suspension rail (refer to fastener table) to the structural wall.

03. Attach the surround to the suspension rail with a stainless steel rivet or flat head screw.

04. For a cut tile, insert the top of the cut tile into the surround and lift the base of the tile so that it is captured by the bottom hook. Ensure that the tile is securely engaged by visual and manual checks.

(See below diagram 09.)

SURROUND FOR BASE AND WINDOW HEAD

01. Cut the suspension rail to a length that accommodates the leg of the surround, otherwise the back angled section of the surround will impede on the suspension rail. This may involve cutting the bottom hanger off the top hat for a full tile.

02. Fasten the suspension rail (refer to fastener table) to the structural wall.

03. Attach the surround to the suspension rail with a stainless steel rivet or flat head screwless steel rivet or flat head screw or flat head screw.

04. Insert the base of the tile into the surround and lift the top of the tile so that it is captured by the top hanger. Ensure that the tile is securely engaged by visual and manual checks.

(See below diagram 010.)

SURROUND FOR SIDE AND WINDOW JAMB

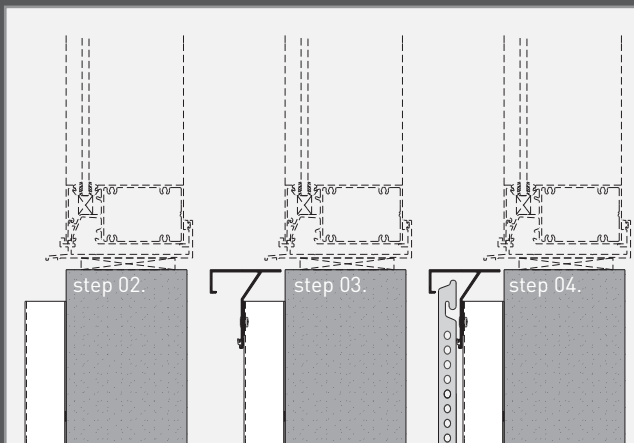
01. Fasten the suspension rail to the structural wall (refer to fastener table). Ensure that any minimum edge distance required for the mechanical fixings is met.

02. Pre-attach pieces of standard aluminium angle to the suspension rail.

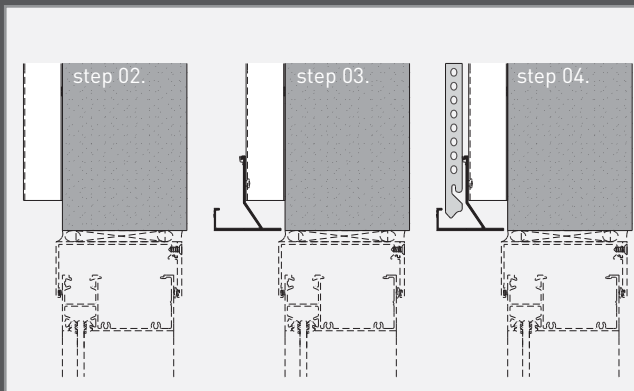
03. Attach the surround to aluminium angle with a stainless steel rivet or flat head screw or flat head screw.

04. Engage the tile in the normal manner, but slightly to the side of the surround. Slide the tile gently into the surround. Ensure that the tile is securely engaged by visual and manual checks.

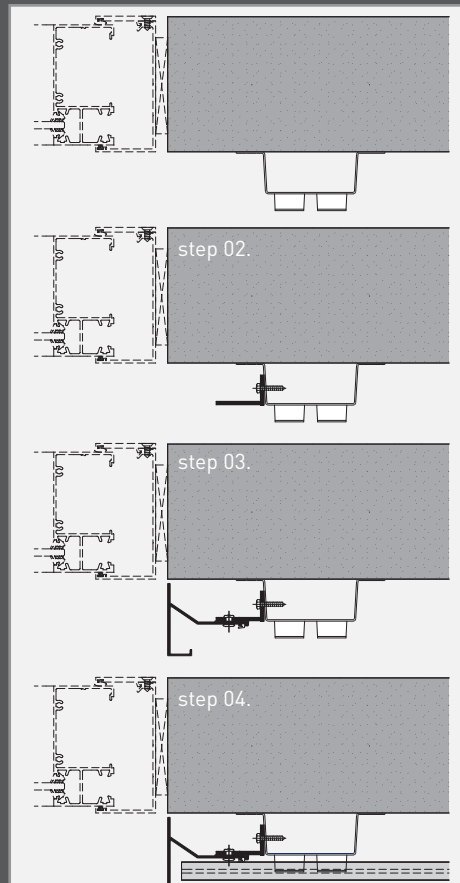
(See below diagram 011.)



09.



010.



011.

INSTALLATION:

TRIM INSTALLATION PROCEDURE

INTERNAL CORNER

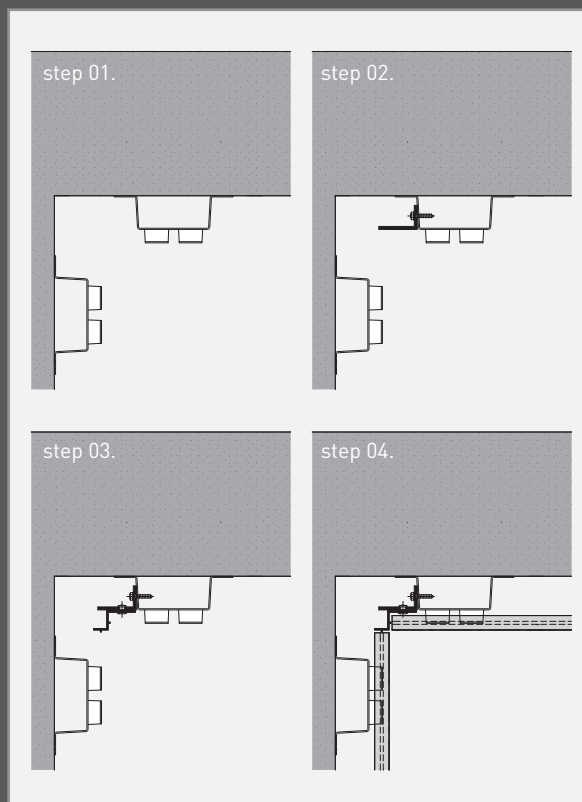
- 01.** Fasten the suspension rail (refer to fastener table) to the structural wall at a suitable dimension to form the internal corner.
 - 02.** Pre-attach pieces of standard aluminium angle to the suspension rail.
 - 03.** Attach the surround to aluminium angle with a stainless steel rivet or flat head screw.
 - 04.** Engage the tiles in the normal manner, but very slightly to the side of the surround. Slide the tiles gently into place. Ensure that the tile is securely engaged by visual and manual checks.
- (See below diagram 012.)

EXTERNAL CORNER

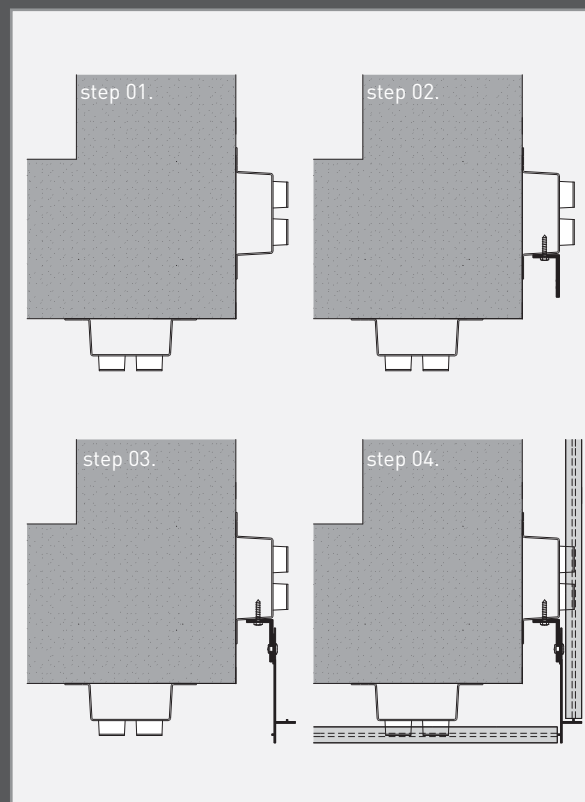
- 01.** Fasten the suspension rail (refer to fastener table) to the structural wall at a suitable dimension to form the external corner. Ensure that any minimum edge distance required for the mechanical fixings is met and that the anchors are staggered so that they do not clash.
 - 02.** Pre-attach pieces of standard aluminium angle to the suspension rail.
 - 03.** Attach the surround to aluminium angle with a stainless steel rivet or flat head screw.
 - 04.** Engage the tiles in the normal manner, but very slightly to the side of the surround. Slide the tiles gently into place. Ensure that the tile is securely engaged by visual and manual checks.
- (See below diagram 013.)

NOTES

- a.** It is recommended that aluminium trims are predrilled.
- b.** The maximum distance that a tile should overhang a suspension rail is 240 mm.
- c.** If trims are butted against one another, a gap of 5mm should be left between the trims to accommodate thermal expansion.



012.



013.

MAINTENANCE GUIDE:

FOR TERRAÇADE™ FAÇADE SYSTEM COMPONENTS

1. SYSTEM INSPECTION

It is recommended that the Terraçade façade system be inspected at regular intervals to ensure the integrity of the system. The inspection interval will vary according to the sub-frame and trim components utilised in the system. Below is a summary of cleaning and maintenance information that can be accessed at the Terraçade website

2. CLEANING

Terraçade tiles are a natural terracotta product and are therefore virtually maintenance free. If you wish to remove any dirt or pollution grime that has built up over time, simply lightly hose or sponge down the tiles with water.

The tiles should be washed down during installation using a sponge with water and a neutral pH cleaner and then rinsed off with clean water. For ongoing maintenance the tiles may be hosed or sponged to remove dust and the build-up of dirt. Normally, cleaning the tiles will be as easy as letting the rain do the work for you.

3. ALUMINIUM TRIMS

a. Care & Maintenance Instructions

A simple regular clean will minimise the effects of weathering and will remove dirt, grime and other build-up detrimental to all powder coatings.

b. Recommended cleaning method

Just a gentle clean with a soft brush and mild detergent, followed by a fresh water rinse, will maintain the long-term performance of your powder coated products. In rural or normal urban environments cleaning should occur every 12 months. In areas of high pollution, such as industrial areas, geothermal areas or coastal environments, cleaning should occur every three months. In particularly hazardous locations, such as beachfronts, severe marine environments or areas of high industrial pollution, cleaning should be increased to monthly.

c. Recommended cleaning products

To protect the surface of your powder coated products, do not use strong

solvents, abrasive cleaning products or those products that are recommended for thinning various types of paints. If you need to remove splashed paint, sealants or mastics from your powder coated products, you can use white spirits. When using white spirits, cleaning should be carried out in shade and during cooler temperatures using a soft cloth and gentle wiping only. It is also recommended that, prior to use, a small non-visible area of your powder coated products be tested to ensure that no visual colour change or damage will occur, particularly with bright and deep colours.

4. SEALING TILES

Terraçade tiles have a hard wearing surface that is resistant to most normal staining agents. In particularly difficult environments, for instance high traffic city areas, Terraçade may be exposed to graffiti vandalism or build up of carbon dirt from passing motor vehicle traffic. A high quality impregnating (penetrating) sealer can be used to make the surface easier to clean and prevent permanent staining as much as possible.

5. DRY TREAT STAIN-PROOF

Dry treat Stain-Proof is a permanent, visible, fully breathable impregnating sealer for protection against water ingress and salt attack. It has graffiti resistance and a 15 year performance warranty when sealing is performed by an Accredited Applicator (visit www.drytreat.com for more detail).

Stain-Proof has special molecules which bond permanently inside the terracotta. It is highly recommended for such surfaces for its 15 year plus durability and its ability to stand up to commercial cleaning techniques such as pressure hosing which are commonly used to clean vertical surfaces.

a. Maintenance after sealing

Due to superior bonding, Stain-Proof will not be harmed by strong alkaline cleaners or pressure hosing. Standard cleaning regimes (except for acid washing) can continue to be used on

the treated surfaces, and the use of special proprietary cleaning chemicals or equipment is not required to uphold the performance warranty.

b. Pre-sealing preparation

Any surface to be sealed should be clean and looking just as you want it before it is sealed - it may be impossible to remove stains after sealing. Ensure the material is thoroughly dry before applying any Dry-Treat sealer

c. Test area

Always test any cleaning chemical or sealer on a small, inconspicuous area of the surface 24 hours before doing the project, to check that it will produce the desired result.

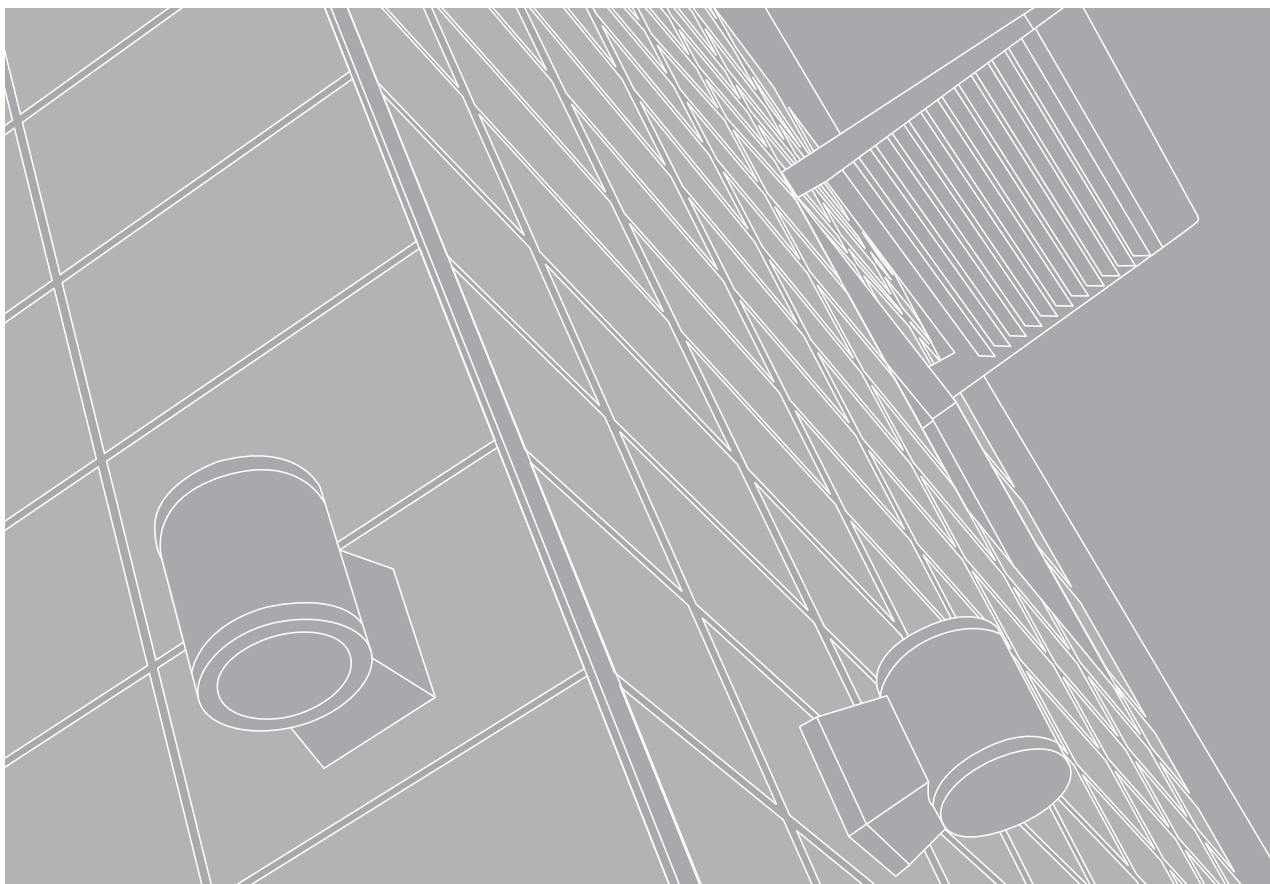
6. REPLACING INDIVIDUAL TILES

It is difficult to remove individual tiles from a wall as it requires 'shuffling' of immediately adjacent tiles. It may be more practical to break the damaged tile with a rubber mallet so that it can be removed piece by piece. Care must be taken if this option is used as falling or sharp pieces of tiles may cause injuries. Ensure that no falling pieces will hit passers-by and that adequate personal protective equipment such as approved gloves and safety glasses are worn.

To place a new tile into position, insert the top edge of the tile beneath the bottom edge of the tile above. Shuffle the tile above up slightly, ensuring that it is restrained from falling by an assistant. Capture the tile on the top hook first and then the bottom hook. Check that the tile and the tiles above are fully engaged by visual and manual checks.

NOTES:

TERRAÇADE TN NOTES



QUALITY GUARANTEE:

Brickworks Building Products continued commitment to quality and innovation ensures that Terraçade TN will remain the benchmark for excellence for many years to come.

Our tradition, experience and financial strength have made Brickworks Building Products the first choice for many architects, builders and designers.

Please note: Photographs should be considered indicative of colour and texture only. Variations in colour and shade are inherent in all clay fired products. All Terraçade tiles and accessories should be ordered at the same time to avoid the possibility of batch to batch variations. No responsibility will be accepted for colour selection, matching, blending and any other physical or colour related defects once the tiles have been incorporated into any construction. Terraçade™ and Terracade TN™ are registered trademarks of the Brickworks Building Products or its wholly owned subsidiaries. ACN 119 059 513

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Terraçade TN has a warranty of 15 years on the system and a lifetime warranty on colourfastness and durability, as per Terraçade Warranty for Terraçade.

Contact Brickworks Building Products to have an architectural consultant visit you with samples and technical information, or to discuss your next project.

