

Houses and Low Rise Multi Residential 50mm External Walls

DESIGN AND INSTALLATION GUIDE



STODDART[®]
GROUP



CONTENTS

1. INTRODUCTION	3
2. COMPLIANCE WITH THE NATIONAL CONSTRUCTION CODE OF AUSTRALIA (NCC)	5
3. MATERIAL PROPERTIES	7
4. SYSTEM COMPONENTS	8
5. INSTALLATION OVERVIEW	11
6. COATING REQUIREMENTS	13
7. DESIGN RESPONSIBILITIES	14
8. EXTERNAL WALL DESIGN STEPS	14
9. STRUCTURAL DESIGN	15
10. FIRE RESISTANCE DESIGN	19
11. THERMAL DESIGN	20
12. WEATHERPROOFING	23
13. DESIGN & DETAILING CONSIDERATIONS	24
14. DURABILITY	28
15. DELIVERY, STORAGE & HANDLING	30
16. CONSTRUCTION DETAILS	32
17. APPENDIX: REFERENCING CODES AND STANDARDS	56





1. INTRODUCTION

STAAC Wall 50 Vertical External Wall Cladding System is a cladding system of Autoclaved Aerated Concrete designed as an external and intertenancy wall cladding system for residential, commercial or light industrial buildings.

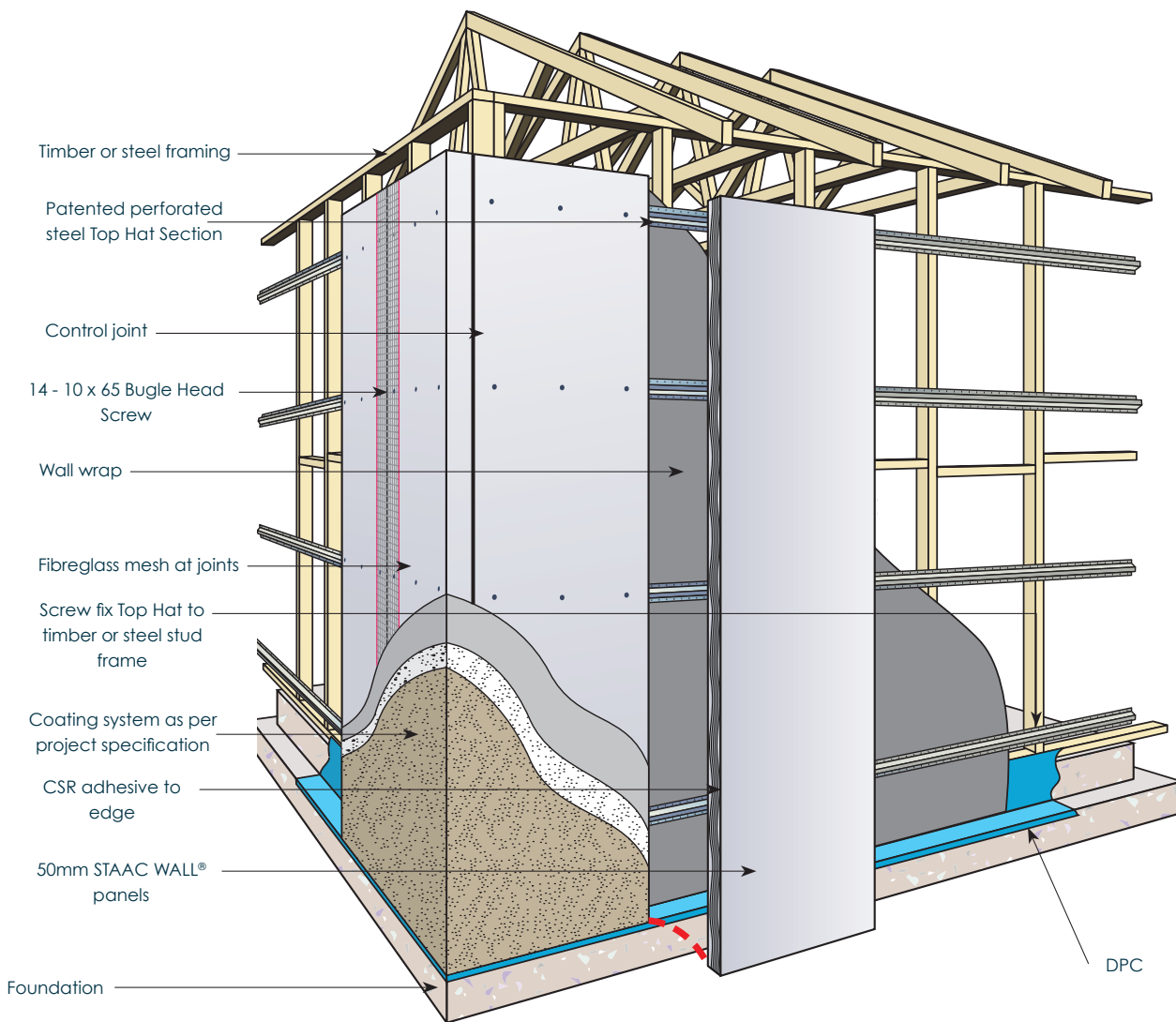
STAAC WALL® systems can deliver exceptional advantages in terms of performance, quality, speed of installation and risk minimisation. STAAC WALL® is non-combustible and manufactured in Australia. AAC is a building material well-known for its exceptional thermal performance. It is also lightweight when compared with traditional masonry materials and provides a flat surface for quality render finishes on the exterior building shell.

50mm STAAC WALL® panels are reinforced with steel mesh in both directions. It has a standard width of 600mm. The available standard lengths are 2000, 2200, 2400, 2550, 2700, 2750, 2850 and 3000mm, making STAAC WALL® a robust and versatile system for residential construction. STAAC WALL® is commonly installed vertically for speedy construction. It can also be installed horizontally if required.

Section 2.1 provides a summary of performance conformances of 50mm STAAC WALL® for external wall application to NCC volumes 1 and 2. It is aimed to ease the work load of Building Certifiers by clearly and transparently demonstrating how STAAC WALL® satisfies the performance requirements of the NCC through either Deemed-to-Satisfy provisions or performance solutions or a combination of both. Test reports by NATA accredited laboratories, expert evaluation statements and technical data are referenced in Section 2.1 and may be provided upon request.



Typical home construction application





2. COMPLIANCE WITH THE NATIONAL CONSTRUCTION CODE OF AUSTRALIA (NCC)

All building solutions for use as walls and floors etc. must comply with the regulations outlined in the NCC or other authority.

The NCC is a performance based document, and is available in two volumes which align with two groups of 'Class of Building':

- ▶ Volume 1 – Class 2 to Class 9 Buildings; and
- ▶ Volume 2 – Class 1 & Class 10 Buildings & Housing Provisions

Each volume presents regulatory performance requirements for different building solutions for various classes of buildings and performance provisions.

These performance provisions include: structure; fire resistance; damp and weatherproofing; sound transmission & insulation; and energy efficiency.

This technical guide provides information necessary to assist in the design of a system incorporating 50mm STAAC WALL® that complies with the performance requirements of the NCC. The designer must check the adequacy of the building solution for performance requirements outlined by the appropriate authority.

2.1 SUMMARY OF COMPLIANCE FOR 50MM EXTERNAL STAAC WALL®

50mm STAAC WALL® has been CodeMark® certified for external wall application. Table 2.1 and Table 2.2 summarises the relevant clauses which 50mm STAAC WALL® complies with where applicable. Documents demonstrating evidence of suitability may be available upon request and are subject to commercial confidence.

Table 2.1 Summary of Compliance to NCC Volume 1

NCC 2022 VOL 1			
	CLAUSE	APPLICATION	EVIDENCE OF SUITABILITY
PERFORMANCE REQUIREMENT(S)	B1P1(1) & (2)(a), (b), (c)	Structural reliability	A5 G3 (1)(e). Reports from accredited Professional Engineer.
	F3P1	Weatherproofing – up to N3	Weatherproofing Performance - A5G3(1)(e). Reports from Professional Engineers.
DEEMED-TO-SATISFY PROVISION(S)	C2D2(2)	Fire Resistance – (90/90/90 from panel side only)	Fire Assessment - A5G3(1)(d). Reports from accredited test laboratories.
	J4D6	Walls (as applicable to Table J4D6a (Can be used in conjunction with other building elements to achieve a Total R-Value)	Thermal Performance - A5G3(1)(e). Reports from Professional Engineers.
	F8D3(1)(a)	Condensation Management - Pliable building membrane.	Compliance to Australian Standards.

Table 2.2 Summary of Compliance to NCC Volume 2 & Housing Provisions

NCC 2022 VOL. 2 & HOUSING PROVISIONS			
	CLAUSE	APPLICATION	EVIDENCE OF SUITABILITY
PERFORMANCE REQUIREMENT(S)	H1P1(1) & (2) (a), (b), (c)	Structural reliability and resistance	A5G3(1)(e). Reports from accredited Professional Engineer.
	H2P2	Weatherproofing – up to N3	Weatherproofing Performance - A5G3(1)(e). Reports from Professional Engineers.
DEEMED-TO-SATISFY PROVISION(S)	9.2.3(2)	FRL - Construction of external walls	Fire Assessment - A5G3(1)(d) Reports from accredited test laboratories.
	13.2.5 Part 13.2 (NSW, NT, Qld, TAS, Act) State or territory variation(s)	Energy Efficiency - External Walls. (Can be used in conjunction with other building elements to achieve a Total R-Value)	Thermal Performance - A5G3(1)(e). Reports from Professional Engineers.
	10.8.1(1)(a)	Condensation Management - Pliable building membrane.	Compliance to Australian Standards.

2.2 OTHER RELEVANT TECHNICAL INFORMATION

Non-combustibility

STAAC WALL 50 – Autoclaved Aerated Concrete (AAC) panel had been tested for Combustibility for Materials in accordance with AS 1530.1:1994. The material is NOT deemed combustible - Limited to the panel only.

Source: CSIRO; NATA Accreditation No. 165; Report No. FNC12427A; dated 24/07/2019.



3. MATERIAL PROPERTIES

Material Properties are determined in accordance with AS 5146 Parts 1 & 2- Reinforced Autoclaved Aerated Concrete.

3.1 PHYSICAL PROPERTIES

- ▶ **Thickness:** 50mm, tolerance: ± 1.5 mm
- ▶ **Standard Width:** 600mm, tolerance: ± 1.5 mm
- ▶ **Standard Length:** 2000, 2200, 2400, 2550, 2700, 2750, 2850, 3000mm, tolerance: 5mm
- ▶ **Edge Straightness Deviation (max.):** 1.5mm
- ▶ **Reinforcement:** 5 x 4mm diameter steel bars for 2000-2700mm long panels. 5 x 5mm diameter bars for 2850 and 3000mm panels
- ▶ **Nominal Dry Density** = 510 kg/m³
- ▶ **Average working density** = 689 kg/m³ at 35% moisture content
- ▶ **Average service life density** = 561 kg/m³ at 10% moisture content

3.2 STRENGTH PROPERTIES

- ▶ **Characteristic Compressive Strength** of AAC, f'_{cm} = 2.8 MPa
- ▶ **Average Compressive Strength** of AAC = 3.2 MPa
- ▶ **Characteristic Modulus of Rupture**, f'_{ut} = 0.6 MPa

3.3 ACOUSTIC PROPERTIES

- ▶ **Panel only with no plasterboard or other lining:** R_w = 35dB, $R_w + C_{tr}$ = 31dB.
(State Acoustic Logic Report 20130786.1/0209A/R0/GW)

3.4 THERMAL PROPERTIES

- ▶ **R-Value of 50mm STAAC WALL® panel with no plasterboard or other lining** = 0.313m².K/W
(4% moisture content)


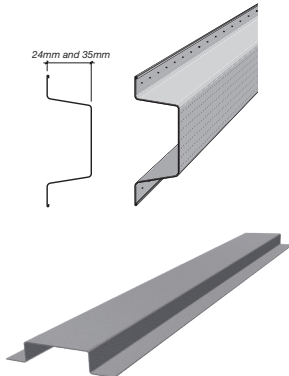



3.5 CUTTING

- ▶ **Panels typically should not be less than 270mm wide.** Where narrower panels are used, these panels must not be less than 100mm in width and must be installed between full width panels. Reinforced fibreglass mesh is to be embedded in the base levelling coat across the full width of the narrower panel. In cases where the installation is such that a panel as narrow as 100mm in width is to be installed on its own i.e such as between two adjacent window or door openings, then this installation method is deemed acceptable provided that this narrow panel can be cut, handled and installed without the panel cracking or becoming damaged (damaged or cracked panels must be discarded). In these cases, reinforced fibreglass mesh is also to be embedded in the base levelling coat across the full width of this narrow panel.



4. SYSTEM COMPONENTS

The 50mm STAAC WALL® External Wall System is a complete system.

PRODUCT	DESCRIPTION	DIAGRAM																		
50mm STAAC WALL®	<table><tr><th>Length (mm)</th><th>Mass (kg)</th></tr><tr><td>2000</td><td>42</td></tr><tr><td>2200</td><td>46</td></tr><tr><td>2400</td><td>50</td></tr><tr><td>2550</td><td>53</td></tr><tr><td>2700</td><td>56</td></tr><tr><td>2750</td><td>57</td></tr><tr><td>2850</td><td>59</td></tr><tr><td>3000</td><td>62</td></tr></table>	Length (mm)	Mass (kg)	2000	42	2200	46	2400	50	2550	53	2700	56	2750	57	2850	59	3000	62	
	Length (mm)	Mass (kg)																		
	2000	42																		
	2200	46																		
	2400	50																		
2550	53																			
2700	56																			
2750	57																			
2850	59																			
3000	62																			
	Standard width: 600mm																			
	NOTE: Average panel mass calculated at 35% moisture content.																			
Steel battens	Perforated steel top hat battens in 24mm and 35mm depth to provide immediate support to STAAC WALL® panels.																			
Fasteners & Fixings	Internal fixing of top hat to timber stud frame; 12-11x35mm hex head type 17 screw.																			
	Fixing of top hat to steel framing; 10-16x16mm hex head self drilling screw.																			
	Face fixing of STAAC WALL® panels to top hat 14-10x65mm bugle head type 17 screw.																			

PRODUCT	DESCRIPTION
HEBEL® Mortar	Mortar (supplied in 20kg bags) when required is used as a thick bed mortar base to provide a level base for STAAC WALL® installation as well as providing acoustic and fire protection at the base of the panels.
HEBEL® Adhesive	CSR Adhesive (supplied in 20kg bags) is used for gluing the STAAC WALL® panels together at vertical and horizontal joints.
HEBEL® Patch	Minor chips or damage to STAAC WALL® panels are to be repaired using Patch (supplied in 10kg bags).
HEBEL® Anti-Corrosion Protection Paint	To coat exposed reinforcement during cutting.

NOTE:

STAAC WALL® has been engineered and tested to comply with the NCC and relevant Australian Standards. It cannot be guaranteed for products and accessories not specified by STAAC WALL® will perform to these standards. The Product Guarantee will only apply if all components used in the system are specified by STAAC WALL®.





4.1 TOOLS & EQUIPMENT





The basic tools required to install STAAC WALL® System are:

- ▶ **Stirrer** – fitted to an electric drill, the stirrer is used to mix the STAAC WALL® Mortar, STAAC WALL® Adhesive and base levelling coat render inside the mixing bucket.
- ▶ **Notched trowel** – the notched trowel is used to apply adhesive to the panel surfaces. The width of the trowel must match the panel thickness to ensure the adhesive is applied with full and even coverage.
- ▶ **Panel lifters** – used to carry the panels around the work site.
- ▶ **Sand float** – used to remove excess adhesive and smooth joints between panels.
- ▶ **Levelling plane** – used to even out inconsistencies in the panels.
- ▶ **Power drill (clutch driven)**
- ▶ **Power saw with metal or diamond tipped cutting blades**
- ▶ **Dust extraction system** – that complies with class M or H requirement of AS/NZS 60335.2.69
- ▶ **Power screw gun**
- ▶ **Sockets for screws**
- ▶ **Personal Protective Equipment (PPE)** – such as goggles, ear muffs/plugs and fit tested face mask are a mandatory requirement when cutting the STAAC WALL® panels.



5. INSTALLATION OVERVIEW

STAGE	INSTALLATION STEPS	DIAGRAM
1	COMPLETE FRAMES AND TRUSSES <ul style="list-style-type: none">▶ Check readiness for installation, e.g. window reveals, fascia offset position	
2	DAMP PROOF COURSE (DPC) <ul style="list-style-type: none">▶ Fix DPC to bottom plate of frame▶ Cover rebate completely▶ Overlap DPC at corners	
3	WALL WRAP <ul style="list-style-type: none">▶ Install wallwrap as per supplier's instructions, ensuring it overlaps DPC at base	
4	BATTEN INSTALLATION <ul style="list-style-type: none">▶ Check control joint layouts for installation of discontinuous top hats▶ Check the number of top hats and screws required (refer to Table 9.1, Table 9.2 & Table 9.3)▶ Use packers and pack top hat to string line where required, screw to frame▶ Check with a straight edge/spirit level that top hats are plumb▶ Install top hats above and below openings	
5	CUTTING PANELS <ul style="list-style-type: none">▶ Cut panels to size▶ Ensure any exposed steel reinforcing has been coated with anticorrosion paint	

STAGE	INSTALLATION STEPS	DIAGRAM
6	<p>ADHESIVE</p> <ul style="list-style-type: none"> ▶ Mix adhesive according to manufacturer's specification ▶ Apply CSR adhesive to entire edge of panel with notched trowel 	
7	<p>STAAC WALL® PANEL INSTALLATION</p> <ul style="list-style-type: none"> ▶ Fix panel to top hats (refer to Table 9.1, Table 9.2 & Table 9.3) ▶ Corner panel to be installed first, lift into place using panel lifters ▶ Check panel is straight and level ▶ Continue installation by lifting panels into position ▶ Butt panel tightly to adjoining panel, screwing off as you go ▶ Adhesive should slightly ooze from the joint ▶ Once the joint adhesive is semi hard it can be cleaned up with a pallet knife, ensuring adhesive is flush with the panel face ▶ Patch holes and minor panel damage 	
8	<p>CONTROL JOINT</p> <ul style="list-style-type: none"> ▶ Check vertical control joint layout ▶ Install backing rod into control joint at the required depth ▶ Check horizontal control joint layout ▶ Install packer and backing rod ▶ Apply suitable sealant to control joint ▶ Clean up any excess sealant ensuring it does not adhere to panel face 	
9	<p>FINISH WALL</p> <ul style="list-style-type: none"> ▶ Trim off excess DPC ▶ Lightly sand and prepare surface ready for acrylic coating 	



6. COATING REQUIREMENTS

50mm STAAC WALL® panels require an appropriate external coating system and sealant detailing to ensure a water resistant and vapour permeable building envelope is achieved.

Generally, the external face of the 50mm STAAC WALL® panel is coated with a high build acrylic levelling and finishing system, applied in accordance with the recommendations of the coating manufacturer.

The external coating of the panel shall contain an embedded fibreglass reinforcing mesh (200mm width minimum) positioned centrally over vertical panel adhesive joints. The minimum specification of the reinforcing mesh should be a maximum aperture of 10mm by 10mm and a minimum weight of 145g/m² (incorporated in base levelling coat).

6.1 PERFORMANCE REQUIREMENTS

The following performance requirements indicate that a specific fit-for purpose coating system must be adopted, and that a simple paint coating would most likely be an inadequate coating system. Variations to the coating system must be approved and warranted by the coating system manufacturer.

Surface Adhesion:

The substrate preparation and coating application should be in accordance with the coating manufacturer's specification.

Before applying finishes in coastal areas, all STAAC WALL® panels must be thoroughly washed with fresh water to remove any salt residue.

Water Resistance:

The primary objective of the coating system is to prevent liquid water ingress, yet allow water vapour transmission both in and out of the AAC substrate.

Proven water resistance capability: Transmission: <10 grams/m²/24hr at the nominated minimum coating dry film thickness.

Compatibility:

Ensure the coating system is compatible with the AAC substrate and construction system components, i.e:

- ▶ Coatings may not adhere to silicone or other sealants and mastics.
- ▶ Excessive joint adhesive or mortar smears across the panel face may require removal or the use of specific primers.

Durability:

The coating must be durable and should not overly deteriorate with exposure to light (UV) and weather for the life of the coating system manufacturer's warranty.

Coating Elasticity:

- ▶ The coating system must be able to bridge a 1mm minimum crack width.
- ▶ The coating system manufacturer will specify the minimum design specification (thickness), so that the coating is serviceable and durable.

Surface Preparation

Clean, patch and remove any dags. Ensure that the surface is free of all incompatible materials, such as silicone sealants. If subject to sea spray or within 1 km of a surf coast, wash with clean fresh water to remove all traces of salt.

Maintenance:

All external coating systems and sealants/caulking should be cleaned and maintained on a regular basis. Please refer to Section 14. Contact reputable coating manufacturers for their current coating maintenance guide.



7. DESIGN RESPONSIBILITIES

The STAAC WALL® External Wall System has been developed based upon numerous testing and assessments by design consultants.

Tests were conducted at NATA accredited testing laboratories. Reports were issued to document the performance of the wall in accordance with the relevant Australian Standards. Consultants were engaged to provide their professional opinions based on the information in these reports (estimates of laboratory performance). The performance levels of walls documented in this guide are either what is reported in a test or the documented opinion of consultants.

Performance in projects is typically the responsibility of design consultants, builders and certifiers. Any party using the information contained in this guide or supplied by STAAC WALL® in the course of a project must satisfy themselves that it is true, current and appropriate for the intended application, consequently accepting responsibility for its use. It is the responsibility of the architectural designer and engineering parties to ensure that the details in this design guide are appropriate for the intended application. The recommendations in this guide are formulated along the lines of good building practice, but are not intended to be an exhaustive statement of all relevant data. The confirmation of wind category for the appropriate use of the design tables in Section 9 must be given by a qualified design engineer.



8. EXTERNAL WALL DESIGN STEPS

Follow the simple steps below to design 50mm STAAC WALL® efficiently for external wall applications.

1	Establish building wind class, support framing layout and what panel length is most suitable for the building.
2	a. Confirm Fire Resistance Level (Commonly minimum 60mins FRL is required for external walls of a residential dwelling) b. Confirm Thermal performance requirement in terms of R-value c. Confirm acoustic performance requirement in terms of Rw value
3	Confirm support batten spacing and fastener specification using Table 9.1 ~ Table 9.3 for structural performance.
4	Refer to Table 11.2 and Table 11.3 to select insulation and wall wrap material specification to suit thermal and condensation management requirements.
5	Document and confirm design selection for building approval / certification



9. STRUCTURAL DESIGN

The external wall system consists of 50mm STAAC WALL® panels fixed to the support structure with horizontally spaced steel hat battens.

Top Hat batten spacings are based on common wall frame with 450 and 600mm stud spacing and wind classification for housing to AS4055. Table 9.1 to Table 9.3 is suitable for 50mm STAAC WALL® supported by 24mm CSR top hat battens and 35mm CSR top hat battens. Minimum performance requirements for the metal studs, steel battens, fixings and STAAC WALL® have been provided in this section. The support framing which the STAAC WALL® panels and steel battens are fixed onto is assumed to have adequate structural integrity to transfer the loads including but not limited to wind load and the self weight of the STAAC WALL® system to the foundation.

9.1 DESIGN ASSUMPTIONS

- The lateral wind loads applied to the panels are transferred into the horizontal top hats, then to the stud frame, which should be designed in accordance with the relevant Australian Standards for the imposed loads.
- The support framing is adequately braced and have sufficient fixings to transfer loads to the foundation. Light-gauged steel framing shall comply with NASH standard. Timber framing shall comply with AS1684.
- Support framing is adequate to support the weight of STAAC WALL® panels and substructure.
- The system is not considered as cavity construction, as the batten bridges the cavity, hence the details show the necessity of sealing the windows and door frames, as well as applying a water-resistant external coating.
- The localised effects of wind around corners of buildings have been considered in the design and included in the tables. The extent of this effect is discussed towards the end of this section.

9.1.1 Design Procedure

Design procedures for the verification of wall systems consisting of STAAC WALL® Autoclaved Aerated Concrete (AAC) panels generally follow the design principles detailed in Australian Standard AS 5146.1 – Reinforced Autoclaved Aerated Concrete Part 1: Structures (Incorporating Amendment No.1) , AS 5146.2 – Reinforced Autoclaved Aerated Concrete Part 2: Design for strength and serviceability requirements.

The serviceability design of the STAAC WALL® panels complies with AS5146.2. The load carrying capacity of the STAAC WALL® panels is influenced by several factors, such as:

- ▶ Wind load
- ▶ Support frame stiffness
- ▶ Wall height
- ▶ Batten spacing and layout
- ▶ Fastener quantity and location

9.1.2 Criteria for Corner Panels

Due to the increase of wind load around the corners of buildings, extra top hats and screws may be necessary (N3) for a distance of 1200mm in each direction from the corner. Table 9.1 and Table 9.2 identify the installation criteria in these areas in the columns titled 'Panel Location – Corner'.

It is important to consider the changes that may occur during the design life of the building. For instance, when a row of individually titled terrace houses are constructed on a zero lot boundary, the zero lot boundary walls between 2 houses may need to be considered for corner effects if there is a possibility for the adjacent house to be removed during the life of the house.

9.1.3 Earthquake Loads

Earthquake loading has not been considered in this design guide. Consult a qualified design engineer for design of AAC panel for earthquake loading.



9.2 SUPPORT WALL FRAMING

Steel stud frames shall be designed and constructed in accordance with NASH standards & handbooks and AS/NZS 4600 (NCC Deemed-to-Satisfy requirement). Timber stud frames shall be designed and constructed in accordance with AS 1684. The support framing system shall have adequate structural integrity to support AAC panels, this includes but is not limited to lintel structures to support wall panels over an opening or at a cantilevered wall.

9.3 SUPPORT BATTENS

CSR 24mm and 35mm perforated hat type battens and CSR top hats are used to provide immediate support for STAAC WALL® panels.

Batten requirements are in Table 9.1. The structural performance of the hat batten complies with NASH standards and AS/NZS 4600 (NCC Deemed-to-Satisfy requirement).

TOP HAT BATTEN SPECIFICATION	24mm	35mm
		
OVERALL DEPTH	24mm	35mm
BASE MATERIAL THICKNESS BMT:	0.42mm	0.55mm
STEEL GRADE:	G550	Galvabond fy = 270mPa
COATING CLASS:	AM150	Z275

9.4 BATTEN AND FIXING SELECTIONS

The tables below provide the required rows of battens for different panel heights for different wind categories.

Table 9.1 Number of support battens for panel supported at base or suspended from frame

WIND CLASSIFICATION	ULTIMATE WIND PRESSURE (kPa)		STUD SPACING (mm)	NUMBER OF TOP HATS PER PANEL					
	AWAY FROM CORNERS	WITHIN 1200mm OF CORNERS		PANEL LENGTH (mm)					
				≤ 2400		≤ 2700		≤ 3000	
				PANEL LOCATION		PANEL LOCATION		PANEL LOCATION	
				TYPICAL	CORNER	TYPICAL	CORNER	TYPICAL	CORNER
N2	0.67/-0.62	-1.25	600	4	4	4	4	4	4
N3	1.05/-0.98	-1.95	600	4	4	4	4	4	5
N3	1.05/-0.98	-1.95	450	4	4	4	4	4	4

Table 9.2 Number of screws per panel at each batten location

WIND CLASSIFICATION	ULTIMATE WIND PRESSURE (kPa)		STUD SPACING (mm)	NUMBER OF SCREWS PER PANEL PER BATTEN			
	AWAY FROM CORNERS	WITHIN 1200mm OF CORNERS		PANEL LOCATION			
				TYPICAL		CORNER	
				END	INTERNAL	END	INTERNAL
N2	0.67/-0.62	-1.25	600	2	2	3	4
N3	1.05/-0.98	-1.95	600	2	3	3	4
N3	1.05/-0.98	-1.95	450	2	3	4	4

NOTE:

1. Negative wind pressure (-); Positive wind pressure (+). Negative pressure is acting away from the panel and positive pressure is acting towards the panel.
2. All battens to be spaced equally, with top and bottom battens positioned at maximum 250mm from the end of the panel.
3. Corner panel location applies to panels within 1200mm of a building corners.
4. For intermediate panel lengths, use the design from the longer panels presented in Table 9.1.
5. "End" refers to the top and bottom rows of battens. "Internal" refers to rows of batten excluding the top and bottom row. Refer to Figure 16.3.2.

9.5 FASTENER SPECIFICATION

The following table provides recommended fastener types for steel and timber support. Fastener coating class to be minimum class 3 in accordance to AS3566.

Table 9.3 Fastener Specification

TYPE OF SCREW	APPLICATION	SOCKET TYPE
12-11x35mm hex head type 17 screw	Fix top hat to timber frame	5/16" hex mag. socket
10-16x16mm hex head self-drilling screw	Fix top hat to steel stud frame (1.2mm BMT max.)	5/16" hex mag. socket
14-10x65mm bugle head type 17 screw ¹	Fix STAAC WALL® panel to top hat from outside of building	5mm hex drive

NOTE:

1. Countersunk head driven min. 5mm into the panel and filled with CSR Adhesive.
2. Minimum screw embedment depth into timber support must be 25mm.

9.6 SUPPORT STRUCTURE REQUIREMENT

When 50mm STAAC WALL® panels are suspended from the stud frame and not directly bear on the slab e.g. upper storey cantilevered wall, the project engineer must design the frame to support the weight of the suspended panels.

The use of 50mm STAAC WALL® in two-storey construction involves a number of design issues that require consideration. In conjunction with the following, refer to the Construction Details (Section 16).

9.6.1 Bracing Of The Building

The walls of the dwelling should be braced using steel cross bracing wherever possible to allow the fixing of the 50mm STAAC WALL® panels without the need for additional packing. Ply or sheet bracing should be used on the external wall if the walls are too short for the steel cross bracing (refer AS 1684 – cyclonic or non-cyclonic areas). In this case, the full length of the wall should be sheeted to prevent misalignment of the panels. For cold-formed steel framing, refer to NASH standard for bracing requirements. In the case where sheet bracing is required, the full width of the wall should be sheeted to assure STAAC WALL® panel alignment.

Alternatively, localised strips of the sheeting can be fixed to the intermediate studs between the areas of full sheet bracing to maintain the panel alignment. Panels to be fixed externally. Zero boundary walls may be internally fixed, but must not penetrate through to the external face of the panel. The extent of the bracing should be determined by the frame designer or project engineer.



10. FIRE RESISTANCE DESIGN

The STAAC WALL® External Wall System can be subjected to a fire loading as the result of either an external fire source, or an internal fire source.

10.1 OVERVIEW

When the wall requires a fire resistance level (FRL) rating, several factors must be considered at the design stage. The FRL rating of the wall can be affected by the penetrations and the method adopted to protect these penetrations. For example, a fire collar with a –/60/60 FRL rating will govern the FRL of the wall, even if the wall configuration has a FRL rating of –/90/90. Where required, the performance of the external coating when subjected to a fire loading shall meet the appropriate performance requirements outlined in the NCC. Joints and gaps need to be appropriately fire rated, e.g. vertical control joint will need fire rated sealant and horizontal joints must be blocked with compressible fire rated material.

10.1.1 Fire Sources

For an external fire source, the excellent fire resistance qualities of the STAAC WALL® External Wall System protects the structural support framing and provides a high fire resistance level. For an internal fire source, the studs must be protected by the internal wall linings. Refer to internal lining technical literature such as the CSR Gyprock Red Book™ for specifications.

10.1.2 Fire Safety Performance Requirement For External Walls

Where necessary the designer and builder should ensure the structural support framing, its connections and the STAAC WALL® installation are satisfactory when subjected to fire conditions. The NCC Vol 2 & Housing Provisions outlines provisions for external walls for fire resistance in a residential building where the external wall is less than 900mm from an allotment boundary or 1.8m from another building on the same allotment. If this occurs an FRL of not less than 60/60/60 is required from the outside.

10.2 FIRE PERFORMANCE OF 50MM STAAC WALL®

The 50mm STAAC WALL® External Wall System achieves a FRL of 90/90/90 minutes. Only the construction details identified in Construction details section achieve a fire performance (See Figures 16.3.1, 16.4.6, 16.6.1, 16.6.2, 16.6.5, 16.6.9, 16.6.10). Where other details are required to provide a fire performance or where a greater Fire Rating Level (FRL) is required, then assessment by a qualified fire engineer is necessary to verify such performance.

The 90/90/90 fire resistance (FRL) rating performance of the STAAC WALL® wall system has been derived from CSIRO fire assessment report FCO-3241.

10.3 BUSHFIRE ZONE REQUIREMENTS

The STAAC WALL® External Wall System had been tested for FRL performance in accordance to AS1530.4 that satisfied the construction requirements up to BAL - FZ as specified in Australian Standard AS3959. It is the responsibility of the building designer to ensure compliance to AS 3959 is achieved in accordance with clause H7D4(2)(a) of NCC 2022 Volume 2 & Housing Provisions.

10.4 DESIGN CONSIDERATIONS

10.4.1 Fire Stop Penetrations

Penetrations through STAAC WALL® to accommodate pipework, electrical cabling or ductwork will have to be protected (fire stop), to prevent the spread of fire through the penetration. The penetration can be protected with proprietary products such as:

- ▶ Fire rated sealants
- ▶ Fire collars and intumescent wraps
- ▶ Fire rated mortars
- ▶ Fire rated pillows
- ▶ Fire rated switch boxes

STAAC WALL® recommends contacting the manufacturer to obtain the appropriate product/solution and installation method for the application and wall configuration.

11. THERMAL DESIGN

Several international comparative studies have been conducted to investigate the benefits of incorporating AAC walls in place of conventional wall systems.

A common trend was the lower heating and cooling energy consumption and smaller mechanical equipment required to maintain a comfortable living environment, especially with regards to regions of mainly cold weather. The excellent performance was the result of the three characteristics – thermal mass, thermal insulation and the air tightness of the construction.

The level of insulation provided in a wall is determined by the required Total R-Value. The higher the required Total R-Value the greater the insulation provided. STAAC WALL® External Wall System incorporating the recommended insulation can provide the R-Value ratings outlined in Table 11.2 and Table 11.3.

11.1 INSULATION

It is recommended that insulation materials be installed to enhance thermal insulation properties and occupant comfort. Insulation also improves the acoustic performance of the wall against outside noise.

The NCC provides Deemed-to-Satisfy Provisions for compliance and installation of the various types of insulation. The insulation should be installed with STAAC WALL® such that it forms a continuous barrier to contribute to the thermal barrier. All insulation installed in STAAC WALL® External Wall systems must comply with: AS/NZS 4859.1.

11.2 AIR TIGHTNESS

The thermal performance can be influenced by many factors. Most of these are related to the design decisions and properties of the adopted materials. Construction practices can also significantly affect the performance with poor sealing resulting in drafts. The tight construction tolerances of AAC provide a wall with low air infiltration rate. Testing at the CSIRO (Test Report DTM327) on AAC blockwork with thin bed adhesive joints has determined an air infiltration rate of 0.3L/s (0.014% of internal volume). For STAAC WALL® panels having fewer thin bed adhesive joints, a rate less than this could be achieved.

11.3 WALL WRAP (SARKING)

As well as controlling condensation and acting as an air barrier, sarking can be used to significantly improve the thermal insulation and energy efficiency performance of a building solution.

The design of the sarking arrangement can be complex and we highly recommend that condensation management should be confirmed by the appropriate project design consultant. To satisfy minimum performance requirement, Pliable building membrane commonly known as sarking or wall wrap when installed in an external wall must comply with AS/NZS 4200.1:2017 for material performance requirement and must be installed in accordance with AS 4200.2:2017. For climate zones 4, 5, 6, 7 and 8 as defined in NCC 2022 Vol. 2 & Housing Provisions Clause 10.8.1, the pliable building membrane must be a vapour permeable membrane. It must be located on the exterior side of the primary insulation layer of wall assemblies that form the external envelope of a building.

Table 11.1 Guidance on wall wrap/sarking

PERFORMANCE CRITERIA	GUIDANCE ON WALL WRAP / SARKING	RECOMMENDED WALL WRAP / SARKING	REFLECTIVE OR NON-REFLECTIVE
Vapour Barrier	Vapour barrier products are not recommended for condensation control in colder climate zones in conjunction with high insulation R Values.	Thermoseal Wall Wrap XP	Reflective Single-sided
Vapour Permeable	Vapour permeable products are not recommended for use in tropical climate zones.	Enviroseal ProctorWrap RW	Non-reflective

The following tables show the performance levels required for walls as per NCC and the thermal performance of the STAAC WALL® External Wall System.

Table 11.2 Thermal performance of 50mm STAAC WALL® external wall system - timber stud frame

DESCRIPTION						TOTAL R-VALUE m2.K/W	
PLASTERBOARD	STUD FRAME	BATTS	WALL WRAP	TOPHAT CAVITY	AAC	SUMMER	WINTER
10mm Plasterboard	70mm Timber Stud Frame	None	Polyair Performa 4.0 XHD	24mm	50mm STAAC WALL® Panel	1.92	2.1
		70mm Bradford Soundscreen R2.0 Batts	Thermoseal Wall Wrap XP			3.19	3.45
		70mm Bradford Soundscreen R2.0 Batts	Enviroseal ProctorWrap RW			2.76	2.98
		None	Polyair Performa 4.0 XHD	35mm		1.99	2.22
		70mm Bradford Soundscreen R2.0 Batts	Thermoseal Wall Wrap XP			3.22	3.5
		70mm Bradford Soundscreen R2.0 Batts	Enviroseal ProctorWrap RW			2.77	2.98
	90mm Timber Stud Frame	None	Polyair Performa 4.0 XHD	24mm		2.15	1.94
		90mm Bradford Gold Wall Batts R2.0	Thermoseal Wall Wrap XP			3.19	3.45
		90mm Bradford Gold Wall Batts R2.5	Enviroseal ProctorWrap RW			3.24	3.51
		90mm Bradford Gold Wall Batts R2.7	Enviroseal ProctorWrap RW	3.43		3.72	
		None	Polyair Performa 4.0 XHD	35mm		2.1	2.27
		90mm Bradford Gold Wall Batts R2.0	Thermoseal Wall Wrap XP			3.22	3.5
		90mm Bradford Gold Wall Batts R2.5	Enviroseal ProctorWrap RW			3.25	3.51
		90mm Bradford Gold Wall Batts R2.7	Enviroseal ProctorWrap RW			3.44	3.72

NOTE:

1. Refer to NCC for state and territory variations.
2. The Total R-values provided in this table has been evaluated based on the properties of the specified components. Products with similar or equivalent properties may achieve the same performance. Consult product manufacturer for substitution recommendation and evidence of conformity.
3. Refer to NCC for alternative means of satisfying the required performance levels.
4. Refer to manufacturer's product literature for design and installation requirements on wall wrap/ sarking and insulation.
5. Stated R-values has been provided by J. Fricker in report i107f dated 24/07/2018.
6. Stated R-values include a 6mm skim render.

Table 11.3 : Thermal performance of 50mm STAAC WALL® external wall system - steel stud frame

DESCRIPTION						TOTAL R-VALUE m2.K/W	
PLASTERBOARD	STUD FRAME	BATTS	WALL WRAP	TOPHAT CAVITY	AAC	SUMMER	WINTER
10mm Plasterboard	64mm Steel Stud Frame	None	Polyair Performa 4.0 XHD	24mm	50mm STAAC WALL® Panel	1.92	2.1
		70mm Bradford Soundscreen R2.0 Batts	Thermoseal Wall Wrap XP			3.05	3.30
		70mm Bradford Soundscreen R2.0 Batts	Enviroseal ProctorWrap RW			2.63	2.83
		None	Polyair Performa 4.0 XHD	35mm		1.99	2.22
		70mm Bradford Soundscreen R2.0 Batts	Thermoseal Wall Wrap XP			3.09	3.35
		70mm Bradford Soundscreen R2.0 Batts	Enviroseal ProctorWrap RW			2.64	2.84
	92mm Steel Stud Frame	None	Polyair Performa 4.0 XHD	24mm		2.15	1.94
		90mm Bradford Gold Wall Batts R2.0	Thermoseal Wall Wrap XP			3.19	3.45
		90mm Bradford Gold Wall Batts R2.5	Enviroseal ProctorWrap RW			3.24	3.51
		90mm Bradford Gold Wall Batts R2.7	Enviroseal ProctorWrap RW	35mm		3.43	3.72
		None	Polyair Performa 4.0 XHD			2.1	2.27
		90mm Bradford Gold Wall Batts R2.0	Thermoseal Wall Wrap XP			3.22	3.50
		90mm Bradford Gold Wall Batts R2.5	Enviroseal ProctorWrap RW			3.25	3.51
		90mm Bradford Gold Wall Batts R2.7	Enviroseal ProctorWrap RW			3.44	3.72

NOTE:

1. Refer to NCC for state and territory variations.
2. The Total R-values provided in this table has been evaluated based on the properties of the specified components. Products with similar or equivalent properties may achieve the same performance. Consult product manufacturer for substitution recommendation and evidence of conformity.
3. Refer to NCC for alternative means of satisfying the required performance levels.
4. Refer to manufacturer's product literature for design & installation requirements on wall wrap/ sarking and insulation.
5. Stated R-values has been provided by J. Fricker in report i107f dated 24/07/2018.
6. Stated R-values include a 6mm skim render.



12. WEATHERPROOFING

12.1 SEALANTS

All control joints must be sealed with a suitable external grade acoustic and/or fire rated paintable sealant. All gaps between the 50mm STAAC WALL® panels and framing around windows must be caulked with an appropriate external grade sealant.

NOTE:

1. Caulking should be applied prior to base coat with care taken not to cut the caulking during application of trowelled on render coating.
2. The sealant should be installed in accordance with the sealant manufacturer's specifications.

12.2 WALL FLASHINGS

In general, flashings shall be designed and installed in accordance with SA HB 39: 2015 – Installation Code for Metal Roofing and Wall Cladding.

12.3 WALL WRAP

For 50mm STAAC WALL®, wall wrap is only required for insulation and condensation control as well as a corrosion barrier over CCA treated timber frames. Although not a mandatory requirement, the installation of wall wrap is considered good building practice. Wall wrap must be designed and installed in accordance with AS/NZS 4200.1 for materials and AS 4200.2 for installation.

Where wall wraps are installed on a timber stud frame, the timber must be dry to prevent mould, decay or rotting of timber.

12.4 WEATHERPROOFING COMPLIANCE TO NCC

The 50mm STAAC WALL® External Wall System has been tested (and results of the test assessed by AECOM) in accordance with the Verification Methods of NCC 2022, specifically the verification methods F3V1 for clause F3P1 (Volume 1) and H2V1 for clause H2P2 (Volume 2).

The results of this test demonstrate the 50mm STAAC WALL® External Wall System (with adhesive applied at the panel joints) and with a suitable acrylic coating system applied over the panel will comply with the performance requirements NCC 2022 for Wind Categories N1, N2 & N3, specifically the verification methods F3V1 for clauses F3P1 (Volume 1) and H2V1 for clause H2P2 (Volume 2).



13. DESIGN & DETAILING CONSIDERATIONS

13.1 BUILDING SETOUT

The 50mm STAAC WALL® External Wall System is principally designed for modular construction. The full benefit of savings in time and cost will be fully realised when the construction is designed to suit a 300mm module. In principle, thoughtful set out on the drawing board will minimise the site-cutting of the panels, which is time consuming and wasteful compared to the installation of stock 50mm panels.

13.1.1 External Wall Height

Typically the external wall height is the distance from the base of the slab step down and up to 50mm above the height of the eaves lining.

Window and door heights should also be considered when determining panel layout. Typically a 300mm distance below or above door or window heights is desirable.

13.1.2 Wall Length (Horizontal Dimensions)

Although not as critical as the wall height, the wall length designed to 300mm increment dimensions will help reduce waste.

13.1.3 Unsuitable Applications

50mm STAAC Wall panels have not been designed for applications in the horizontal plane, e.g. soffits/eaves, bulkheads, coffers and balustrade cappings. Exceptions to this rule are to window sills, see Figure 16.7.3, and to cappings of half piers independent from the building structure.

13.2 TERMITES

It is the builder's responsibility to ensure that all council and NCC requirements are fully adhered to in regard to the design of the house for preventing termite attack. The construction details contained in this guide do not attempt to fully address the issues due to the variation of requirements from state to state. STAAC WALL® is ideally suited to the exposed edge method of perimeter protection. NCC 2022 Vol. 2 Part 3.4 deals with termite risk management and the full detail of termite management is covered comprehensively in AS 3660.

13.3 FOOTINGS & FOUNDATIONS

Footings to support STAAC WALL® system should be designed by a qualified engineer and comply with articulated masonry veneer construction as specified in Australian Standard AS 2870.

13.4 MOVEMENT CONTROL JOINTS

During the life cycle of a building, the building and the materials that it is constructed from will move. These movements are due to many factors working together or individually, such as support structure movement (lateral sway or vertical deflection), thermal expansion and contraction and differential movements between materials. This movement, unless relieved or accommodated for, will induce stress in the materials, which may be relieved in the form of cracking. To accommodate these movements and relieve any induced stresses, which could potentially crack the wall, movement joints need to be installed.

Control joints are provided to relieve the induced stresses resulting from thermal expansion or contraction of the AAC, or differential movement between the AAC and another material or structure, such as abutting walls or columns of concrete or brickwork. Control joints can delineate coating shrinkage breaks.

Vertical control joints should coincide with control joints in the supporting structure and anywhere that significant structural movement is expected, where the wall abuts a vertical structure, such as an existing building, or adjacent to large openings. Refer to control joint details in construction details section.

Table 13.1 Spacing of vertical control joint based on site classification

SITE CLASS AS PER AS2870	MAXIMUM VERTICAL CONTROL JOINT SPACING
A, S	6m
M, M - D	5.5m
H1, H1 - D	5m
H2, H2 - D	4.5m

This guide proposes minimum widths for the movement joints. The project engineer shall determine if the joints are sufficient to accommodate the movement of the specific project building. Typically, the vertical joint is nominally 10mm wide and filled with an appropriate backing rod and flexible sealant.

At all control joints, the top hat should be discontinuous to allow for the effective movement of the building at these locations.

A horizontal control joint is required beneath slabs or angles to accommodate any expected deflection. The magnitude of the deflection must be verified by the building designer. Typically, the horizontal joint is nominally 10mm wide and filled with an appropriate external grade acoustic and / or fire rated paintable sealant.

13.4.1 DESIGN TIP

In order to reduce the load of the upper storey STAAC WALL® panels and make installation easier, the lower storey panels should be specified as 2700mm/2850mm/3000mm in length and the upper storey panels as 2400mm/2550mm in length. The vertical dimensions can be adjusted to suit. Refer to Section 16 for control joint requirements in association to panel lengths.

Figure 13.1 Side View – Horizontal Control Joint

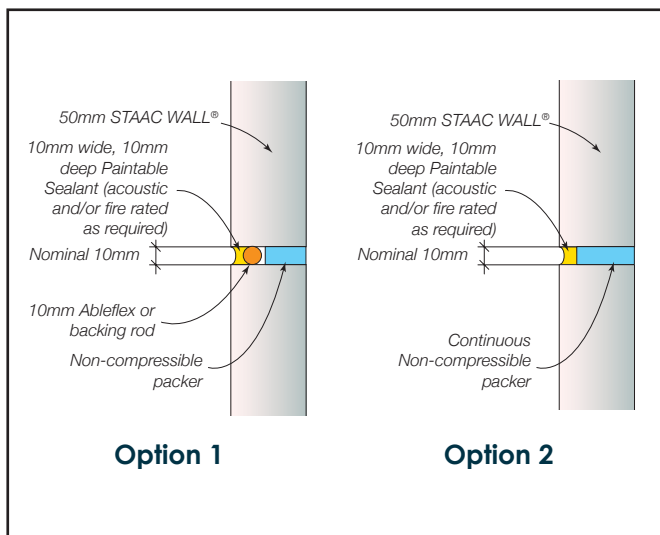
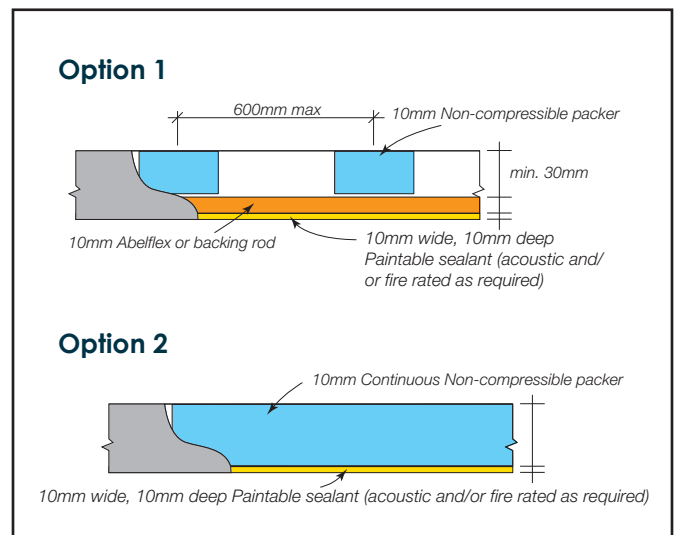


Figure 13.2 Top View – Horizontal Control Joint



NOTE: Use 10mm wide by 10mm deep fireseal sealant at vertical and horizontal control joints to achieve FRL of 90/90/90 for the wall system. See Section 2.2. Protect Fireseal Sealant from rain until sealant has developed a thick skin. Once cured, Fireseal should be painted over with a compatible external grade acrylic coating i.e Dulux Acratex or similar.

13.4.2 STEEL JOISTS OR ENGINEERED TIMBER JOISTS ($\leq 1\%$ SHRINKAGE)

Lower storey panels are to bear on the slab edge. However, consideration should be given to the sectional size of the lintels over openings on the lower storey. As the details reveal, a control joint (nominal 10mm packers, backing rod and an external grade acoustic and/or fire rated paintable sealant joint) is required at the horizontal junction between the upper and lower panels. The panel support packer should consist of a durable material that will not degrade during the life of the structure.

13.4.3 TIMBER FRAME CONSTRUCTION ($> 1\%$ SHRINKAGE JOIST).

Movements in the order of 25mm can occur in a two storey timber frame with a timber first floor. The fixing method used in the STAAC WALL® External Wall System does not allow for this extent of differential movement between the external skin and the timber frame.

The allowances for shrinkage of timber framing in NCC 2022 Vol. 2, by providing gaps between framing and masonry, should be adopted as a minimum.

It is therefore recommended that the upper storey panels be installed 35mm clear of the lower storey panels. During construction a temporary packer is used to separate the panels and is then removed after the panels have been fixed. An architectural trim (feature moulding) must be used to hide the horizontal control joint. Contact STAAC WALL® Technical Services for further details.

The impact of this construction is to load the lower storey frame with the weight of the upper storey panels. In effect, an extra 35kg/m² (for the weight of the upper panels) is being added to the load already carried by the timber frame. The load approximates 0.84kN/m (2.4m wall height). To simplify the design implications of this extra load, it is recommended to add an extra 1.1m of tributary width for a 90kg/m² tile roof load (for 2.4m upper wall heights) for the design of the lower storey frame and timber lintels, when using AS 1684. – non-cyclonic areas.

13.4.4 CONTROL JOINT DETAILS

The following information provides the necessary rules for control joints when installing the 50mm STAAC WALL® External Wall System:

- ▶ Vertical control joint spacing (based on site classification).
- ▶ Vertical control joints required at external and internal corners.
- ▶ Vertical control joints required above and below both sides of all doors, including sliding and garage doors.
- ▶ Vertical control joints required at the position where a wall changes height by more than 20% e.g a vertical control joint is required when wall height changes from 2700mm to ≥ 3240 mm.
- ▶ Horizontal control joints required at every horizontal floor junction.
- ▶ Horizontal control joints required at a maximum height of 3.9m.

For openings < 2450mm in width

Control joint not required. If the straight joint that extends above or below the window jamb is less than 600mm long, a control joint or a glued and meshed joint is not required.

For openings ≥ 2450 mm and < 3600mm wide

Control joint required to at least one side of the opening (i.e. above and below the opening). If the straight joint that extends above or below the window jamb is less than 600mm long a control joint or a glued and meshed joint is required to the opposite side of the opening.

For openings ≥ 3600 mm in width

Control joint required to both sides of the opening (i.e. above and below the opening).

13.5 CONDENSATION

Condensation is a complex problem and can occur under a variety of conditions, not just cold conditions. Literature on this subject is available from CSIRO/BRANZ/ASHRAE and must be consulted when building in areas where condensation is likely to occur.

In these cases, the appropriate use of a sarking as a vapor barrier or as thermal insulation, or both, can be effective in controlling condensation.

13.6 PENETRATIONS

Small service penetrations through the panel should allow for differential movement between the panel and the service. All penetrations are a potential source for water ingress and should be sealed with an appropriate acoustic and/or fire rated paintable sealant.

13.7 INSTALLATION OF SERVICES

Services should be installed through the stud frame as much as possible. If service is installed on the panel, it should run parallel to the battens.

Penetrations through the STAAC WALL® panel for services should be neatly filled and the joint sealed. The sealant must be fire-rated if the wall structure is fire rated.

Figure 13.3 Installed piping services prior to the installation of STAAC WALL® panel



Figure 13.4 Neat finishes of installed services



13.8 WINDOWS

The builder should also ensure that the reveal size is correct to suit STAAC WALL®. Refer to the table below for recommendations. The sizes below typically apply to aluminium framed windows. If timber windows are being used similar tolerances and guidelines apply.

STUD SIZE 70mm		STUD SIZE 90mm	
TOP HAT SIZE	REVEAL SIZE	TOP HAT SIZE	REVEAL SIZE
24mm	100mm	24mm	120mm
35mm	115mm	35mm	135mm

NOTE:

1. Reveal sizes may vary from one manufacturer to another.
2. Figures shown assume brace board is used on framework.
3. The external sealant in the control joints adjacent to windows must be returned to the window frame, and sealant installed along the window head, sill and junction of the sides of window to the panel. No gap should exist between the external sealant and the window frame.



14. DURABILITY

14.1 OVERVIEW

Durability means the capability of a building or its parts to perform a function over a specified period of time. It is not an inherent property of a material or component. It is the outcome of complex interactions among a number of factors, including:

- ▶ The service conditions
- ▶ Material characteristics
- ▶ Design and detailing
- ▶ Workmanship
- ▶ Maintenance

The following sub-sections of the durability topic are written in order to provide general guidelines on how best to provide, enhance and maintain adequate durability of 50mm STAAC WALL® panels.

14.2 MAINTENANCE

The durability of the 50mm STAAC WALL® External Wall System can be enhanced by periodic inspection and maintenance. Inspections should include but are not limited to the examination of the coatings, flashings and sealants. Paint finishes must be maintained in accordance with the manufacturer's recommendations. Any cracked and damaged finish or sealants, which would allow water ingress, must be repaired immediately by recoating or resealing the effected area. Any damaged flashings or panels must be replaced as for new work.

The durability of the system can also be increased by using Class 4 fixings as defined in AS3566 throughout, additional treatment of steelwork, and by painting all exposed sealants to the sealant manufacturer's recommendations.

Stoddart Group does not recommend AAC Panel be exposed to the elements for more than 3 months to avoid deterioration of the panels and system components, else 2 coats of undiluted primer is recommended to minimize deterioration to the STAAC Wall.

14.3 COASTAL AREAS

50mm STAAC WALL® panels can be used in coastal areas with additional precautions to ensure salt does not build up on the surface of the wall. For buildings which are ≤1000 metres from a shoreline or large expanse of salt water one of the following is required:

- ▶ All horizontal and vertical movement joints must be appropriately caulked; and
- ▶ All walls must be sufficiently exposed from above so that rain can perform natural wash-down of the wall; or
- ▶ Walls which are protected by soffits above must be washed down twice per year to remove salt and debris build-up particularly at the joints; and
- ▶ In all cases, Class 3 screws must be used

14.4 FASTENER PROTECTION

Class 3 screws must be countersunk in outer face of the 50mm STAAC WALL® panel by at least 5mm and filled with CSR Adhesive.

14.5 STAAC WALL® PANELS

50mm STAAC WALL® has many characteristics which make it a very durable product, including:

- ▶ Will not rot or burn
- ▶ Is not a food source for termites

- ▶ Approximately quarter the weight of conventional concrete
- ▶ Solid and strong steel reinforcement coated with corrosion protection

14.6 DURABILITY OF COMPONENTS

It is the responsibility of the building designer to ensure that the components such as screws, top hat battens and other steel components have the appropriate corrosion protection to be able to maintain their strength and integrity to suit the required design life of the project.

When assessing durability, the following documents can be referred to for guidance:

- ▶ ABCB Guideline Document – Durability in buildings: 2015.
- ▶ AS/NZS 2312: 2014 – Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings.
- ▶ ISO 9223: 2012 – Corrosion of metals and alloys – Corrosivity of atmospheres – Classification.
- ▶ AS 3566: 2002 – Self drilling screws for the building and construction industries.
- ▶ AS 2331: 2006 – Methods of test for metallic and related coatings.

Reference to AS 3566 should always be adhered to when selecting the screw's corrosion resistance classification.

14.7 WALL FRAMES

Consult frame manufacturer for guidance on framing durability and maintenance requirement.



15. DELIVERY, STORAGE & HANDLING

15.1 UNLOADING PANEL PACKS

Panel packs should only be unloaded and moved with approved lifting devices. Before use, the lifting devices should be checked for the required lifting tags. Packs should be unloaded as close as possible to the intended installation area. This will increase work efficiency and minimise the need for secondary lifting.

NOTE: Secondary handling increases the risk of panel damage. The repair of damage sustained during lifting and moving is the responsibility of the lifter. Where damage is excessive, the panels must be replaced.

15.2 STORAGE

All materials must be kept dry and preferably stored undercover. Care should be taken to avoid sagging or damage to ends, edges and surfaces.

All packs of STAAC WALL® products must be stacked on edge and properly supported off the ground, on a level platform. Panel bundles can be stacked two high. The project engineer should be consulted as to the adequacy of the structure to support the stacked bundles.

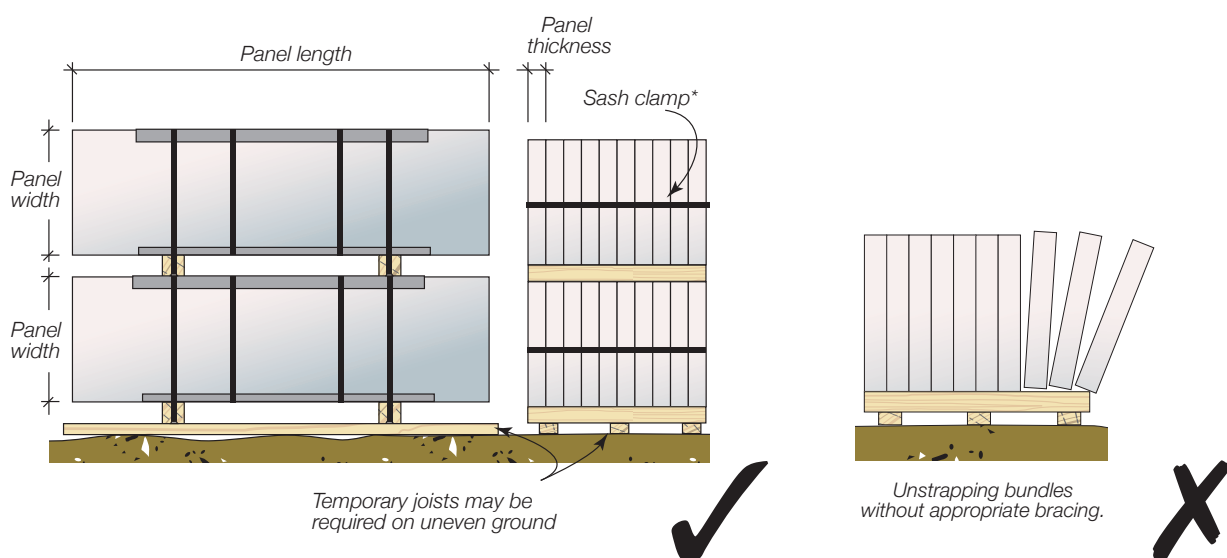
If outside, STAAC WALL® panels must be stored off the ground and protected from the weather. Only single packs positioned on the ground can be opened. To provide a level surface, we recommend placing temporary joists beneath the supporting cleats.

When storing, the panel orientation must be horizontal with the long edge supported to timber bearers.

15.3 UNSTRAPPING PACKS

Ensure appropriate bracing is installed to packs prior to removal of strapping to prevent panels from falling. Panels can be held together with sash clamps, ratchet straps or stabilising bars.

Figure 15.1 Stacking packs of STAAC WALL® panels



15.4 HANDLING

Moving and handling STAAC WALL® panels should be done as much as possible using mechanical aids such as forklifts, cranes or panels lifting trolleys. Manual handling where people physically move a panel should be kept to a minimum, with the weight being supported by an individual kept as small as possible. Any concerns regarding the weight to be handled should be discussed with the panel installation supervisor.

Follow the suggestions below to avoid injuries to installation personnel:

- ▶ Use mechanical lifting / support equipments, such as trolleys, forklifts, cranes and levers
- ▶ Manual lifting and moving of panels should be done in a coordinated team work
- ▶ Keep the work place clean to reduce the risk of slips, trips and falls, which can cause injury
- ▶ Plan the sequence of installation to minimise panel movements and avoid unnecessary lifts
- ▶ Train employees in good lifting techniques to minimise the risk of injury
- ▶ Lift panels only from the edges and not to be handled flat.

15.5 HEALTH, SAFETY & PERSONAL PROTECTIVE EQUIPMENT (PPE)

Always wear gloves when handling panels, AAC is produced from cement and may cause skin irritation.

Approved respirators to AS/NZS 1715 and AS/NZS 1716 and safety eyewear to AS 1336 must be worn at all times when cutting and chasing AAC material. Check the STAAC WALL® Material Safety Data Sheets for material safety information.

15.6 CUTTING

Cutting of cement based products may cause dust, which contains respirable crystalline silica, with the potential to cause bronchitis, silicosis and lung cancer after repeated and prolonged exposure. When using power or hand tools, on AAC products, wear a fit tested P1 or P2 respirator and eye protection. When cutting, routing or chasing AAC products with power tools, use dust extraction equipment that complies with AS/NZS 60335.2.69 class M or H requirements and wear hearing protection. Wet cutting may be mandatory in certain Australian States. Please confirm with local work safe authority on cutting / chasing requirement for AAC products. Refer to the appropriate STAAC WALL® MSDS for further information.

Reinforcement exposed during cutting must be coated with a liberal application of STAAC WALL® recommended Anti-corrosion protection paint.



16. CONSTRUCTION DETAILS

DETAIL CATEGORY	DETAIL	FIGURE	PAGE
Single storey construction details	Isometric view detail panel supported at base	16.1.1	35
Single storey construction details	Isometric view detail panel suspended	16.1.2	35
Single storey construction details	Hip roof elevation	16.1.3	36
Single storey construction details	Gable end elevation	16.1.4	36
Single storey construction details	Typical section detail	16.1.5	37
Single storey construction details	High wall section detail (3900mm max.)	16.1.6	37
Two storey construction details	Isometric view detail	16.2.1	38
Two storey construction details	Hip roof elevation	16.2.2	39
Two storey construction details	Gable end elevation	16.2.3	39
Two storey construction details	Typical timber frame section using joists with >1% shrinkage	16.2.4	40
Two storey construction details	Steel frame section or engineered joists with ≤1% shrinkage	16.2.5	40
Two storey construction details	External wall cladding detail extending above first floor	16.2.6	41
Two storey addition details	Isometric view detail	16.2.7	41
Two storey addition details	Typical section with brick veneer below	16.2.8	42
Two storey addition details	Typical section with double brick below	16.2.9	42
Fixing & installation details	STAAC WALL® External Wall System fixing detail	16.3.1	43
Fixing & installation details	Screw layout drawing	16.3.2	43

DETAIL CATEGORY	DETAIL	FIGURE	PAGE
Footing junction details	Junction to shallow concrete footing	16.4.1	44
Footing junction details	Junction to deep concrete edge beam	16.4.2	44
Footing junction details	Junction to masonry earth retaining wall	16.4.3	44
Footing junction details	Junction to masonry dwarf wall	16.4.4	44
Footing junction details	Junction to existing piers/stumps	16.4.5	45
Footing junction details	Junction to shallow concrete edge beam	16.4.6	45
Footing junction details	Base detail suspended floor – pier connection	16.4.7	45
Footing junction details	Junction to steel shelf angle	16.4.8	45
Wall junction details & sections	Typical roof eaves detail – Option 1	16.5.1	46
Wall junction details & sections	Typical roof eaves detail – Option 2	16.5.2	46
Wall junction details & sections	Roof to wall junction detail – Option 1	16.5.3	46
Wall junction details & sections	Roof to wall junction detail – Option 2	16.5.4	46
Wall junction details & sections	Balcony detail	16.5.5	46
Wall junction details & sections	Parapet capping	16.5.6	47
Wall junction details & sections	Panel to pitched roof junction	16.5.7	47
Wall junction details & sections	Gable end wall detail	16.5.8	47
Wall junction details & sections	Gable end wall detail – lintel panel over window	16.5.9	47
Wall junction details & sections	Beam penetration detail	16.5.10	48
Wall junction details & sections	Column detail (glued and screwed)	16.5.11	48
Control joint details	Internal corner	16.6.1	49
Control joint details	External corner	16.6.2	49

DETAIL CATEGORY	DETAIL	FIGURE	PAGE
Control joint details	Typical detail for control joints positioned on corner	16.6.3	50
Control joint details	Typical detail for control joints positioned away from a corner	16.6.4	50
Control joint details	Typical horizontal control joint – engineered timber or steel frame	16.6.5	51
Control joint details	Horizontal control joint – Cavity brickwork to STAAC WALL® panel	16.6.6	51
Control joint details	Horizontal control joint – Brick veneer to STAAC WALL® panel - Option 1	16.6.7	51
Control joint details	Horizontal control joint – Brick veneer to STAAC WALL® panel - Option 2	16.6.8	51
Control joint details	Typical vertical control joint	16.6.9	52
Control joint details	Typical vertical control joint with double studs	16.6.10	52
Control joint details	Control joint – discontinuous top hats on a single stud	16.6.11	52
Control joint details	Typical window control joint detail – lintel over	16.6.12	52
Door and window details	Typical window sill detail – aluminium window frame – Option 1	16.7.1	53
Door and window details	Typical window sill detail – aluminium window frame – Option 2	16.7.2	53
Door and window details	Typical window sill detail – aluminium window frame – Option 3	16.7.3	53
Door and window details	Header detail	16.7.4	53
Door and window details	Garage head detail	16.7.5	53
Door and window details	Garage door – jamb detail – Option 1	16.7.6	53
Door and window details	Garage door – jamb detail – Option 2	16.7.7	53
Door and window details	Sliding door sill detail – Concrete sill < 270mm	16.7.8	54
Door and window details	Sliding door sill detail – 50mm STAAC WALL® sill > 270mm	16.7.9	54
Miscellaneous detail	Panel layout drawing – Plan view	16.8.1	55

16.1 SINGLE STOREY CONSTRUCTION DETAILS

Figure 16.1.1 Single storey construction – isometric view detail panel supported at base

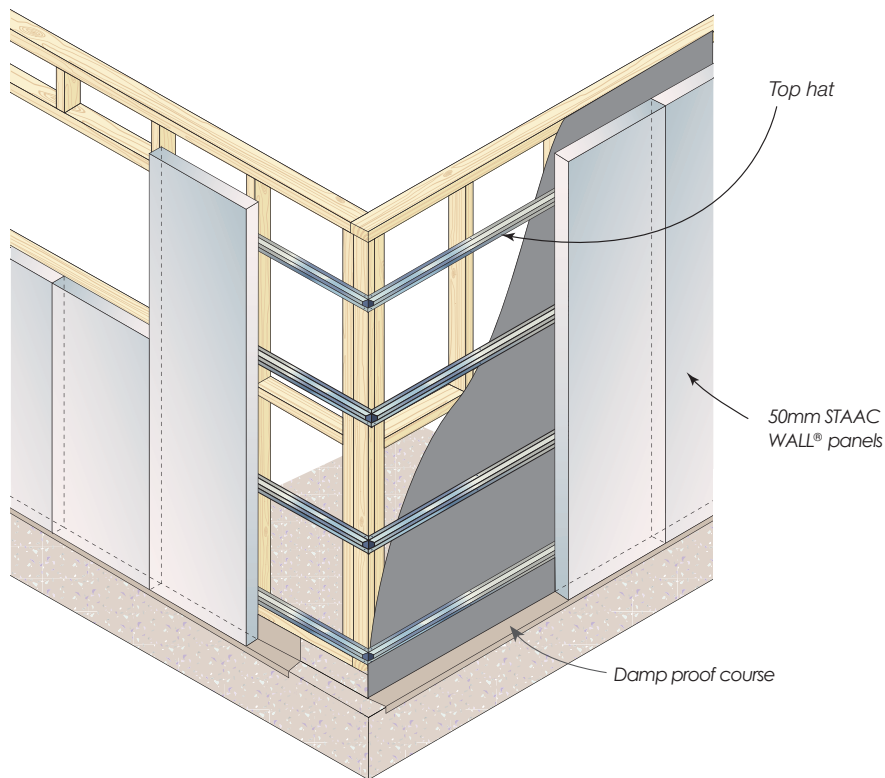
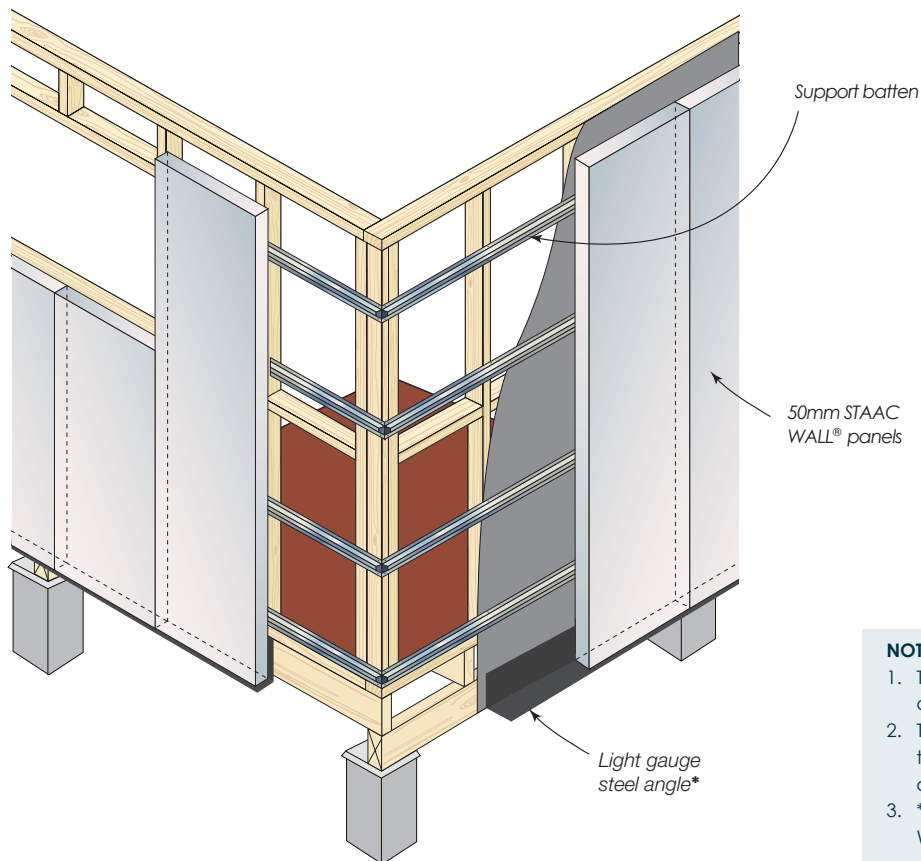


Figure 16.1.2 Single storey construction – isometric view detail panel suspended



NOTE:

- 1. This detail is not considered to achieve a fire rating level.
- 2. The light gauge steel angle is for the purpose of closing the cavity at the base of the wall.
- 3. *Optional, not supplied by STAAC WALL®

Figure 16.1.3 Single storey construction – hip roof elevation

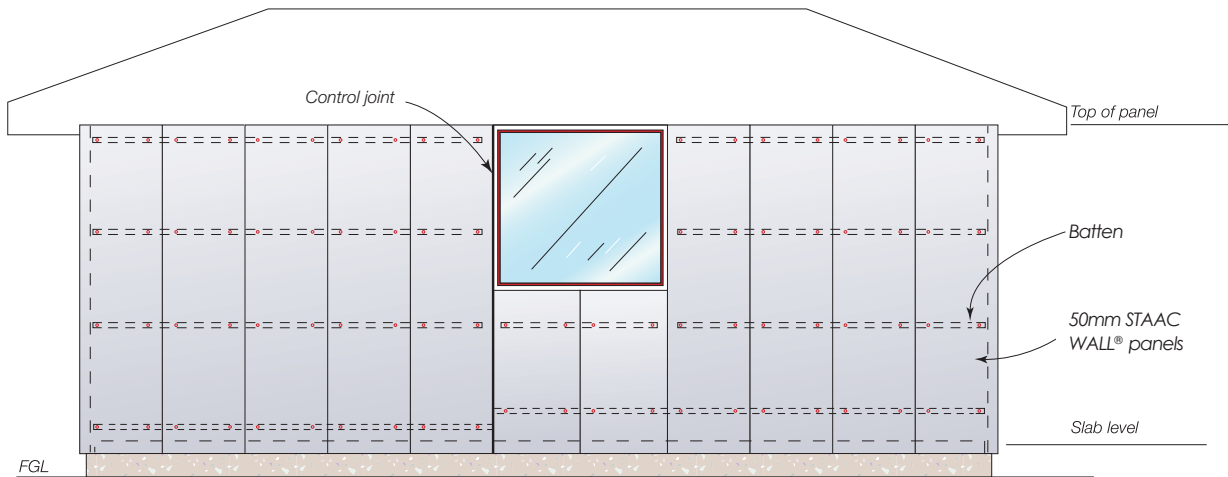
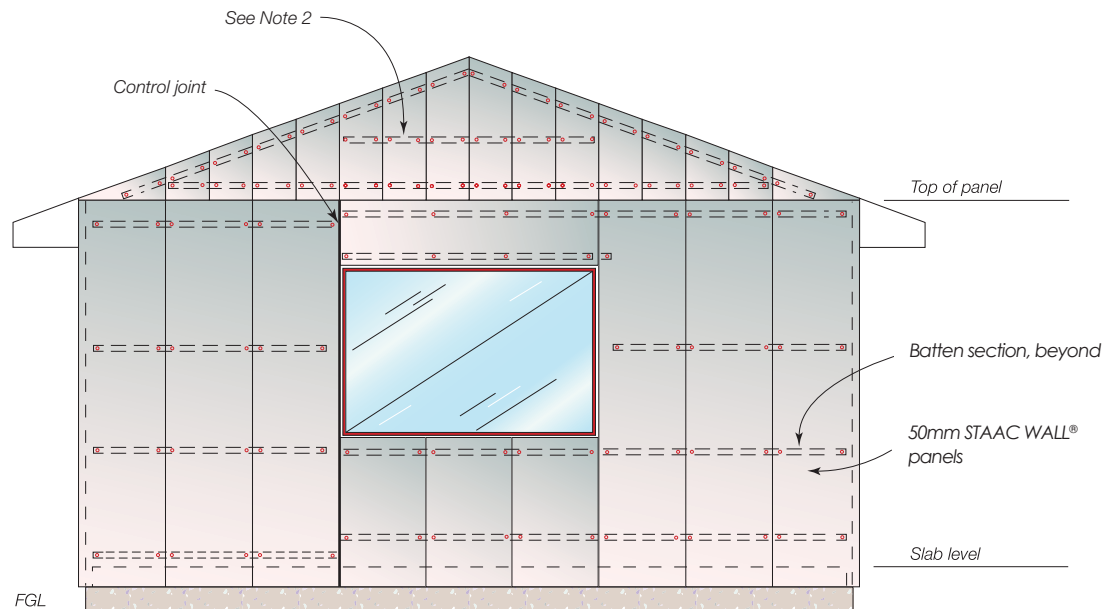


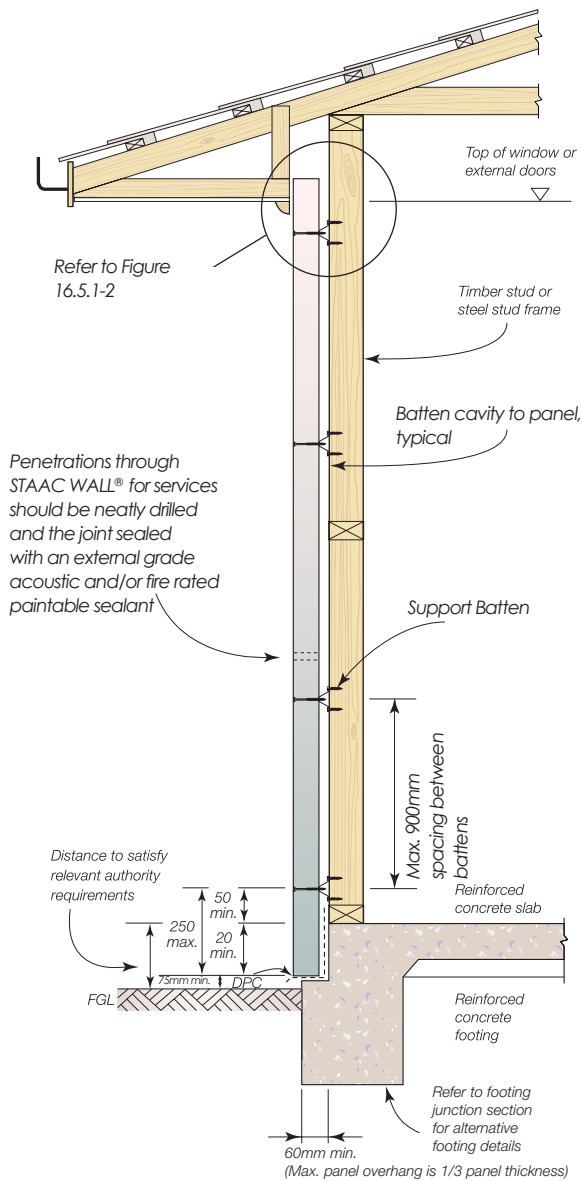
Figure 16.1.4 Single storey construction – gable end elevation



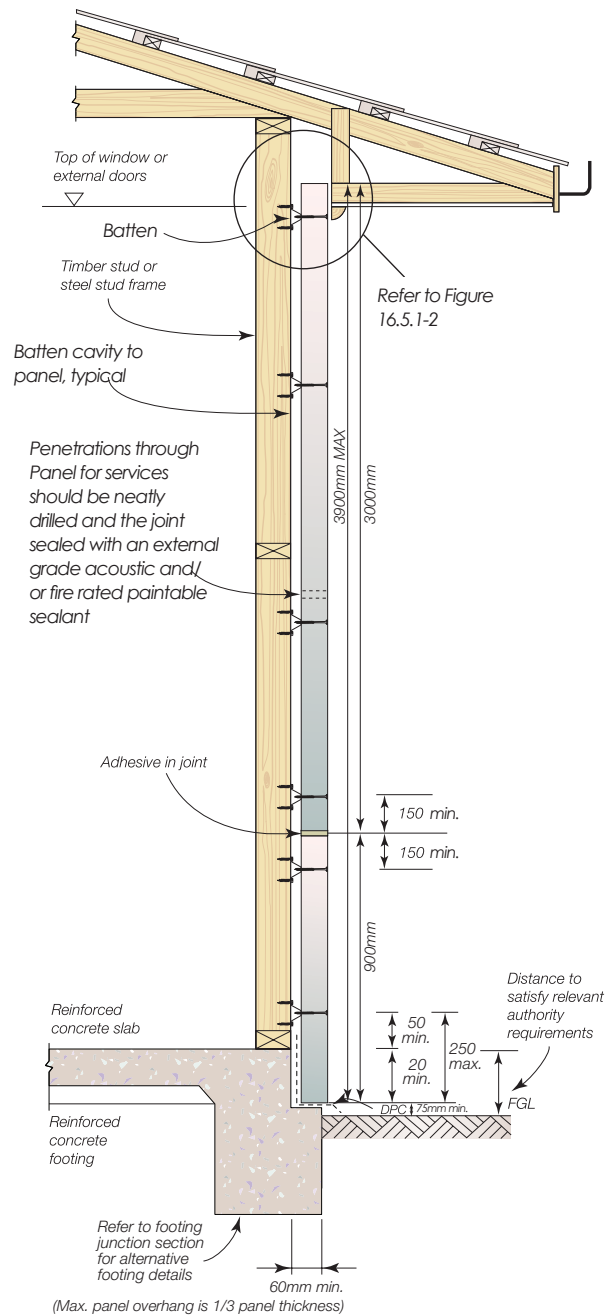
NOTE:

1. Number of top hats and top hat spacing to be confirmed by the building designer.
2. Additional top hats may be required, for suspended panels. Refer to Table 9.1 of this guide.
3. These details have not shown the set-out of top hats to accommodate control joint locations. This is the responsibility of the building designer.

**Figure 16.1.5 Single storey construction
– typical section detail**



**Figure 16.1.6 Single storey construction
– high wall section detail (3900mm max.)**



NOTE:

- Figures 16.1.5 and 16.1.6 slab edge details do not comply with the termite visible inspection zone requirements. Alternate termite management systems must be used when selecting these details. It is the responsibility of the builder to provide a suitable physical or chemical barrier in accordance with AS 3660.
- STAAC WALL® panels are supported at the base on concrete slab edge.

16.2 TWO STOREY CONSTRUCTION DETAILS

Figure 16.2.1 Two storey construction – isometric view detail

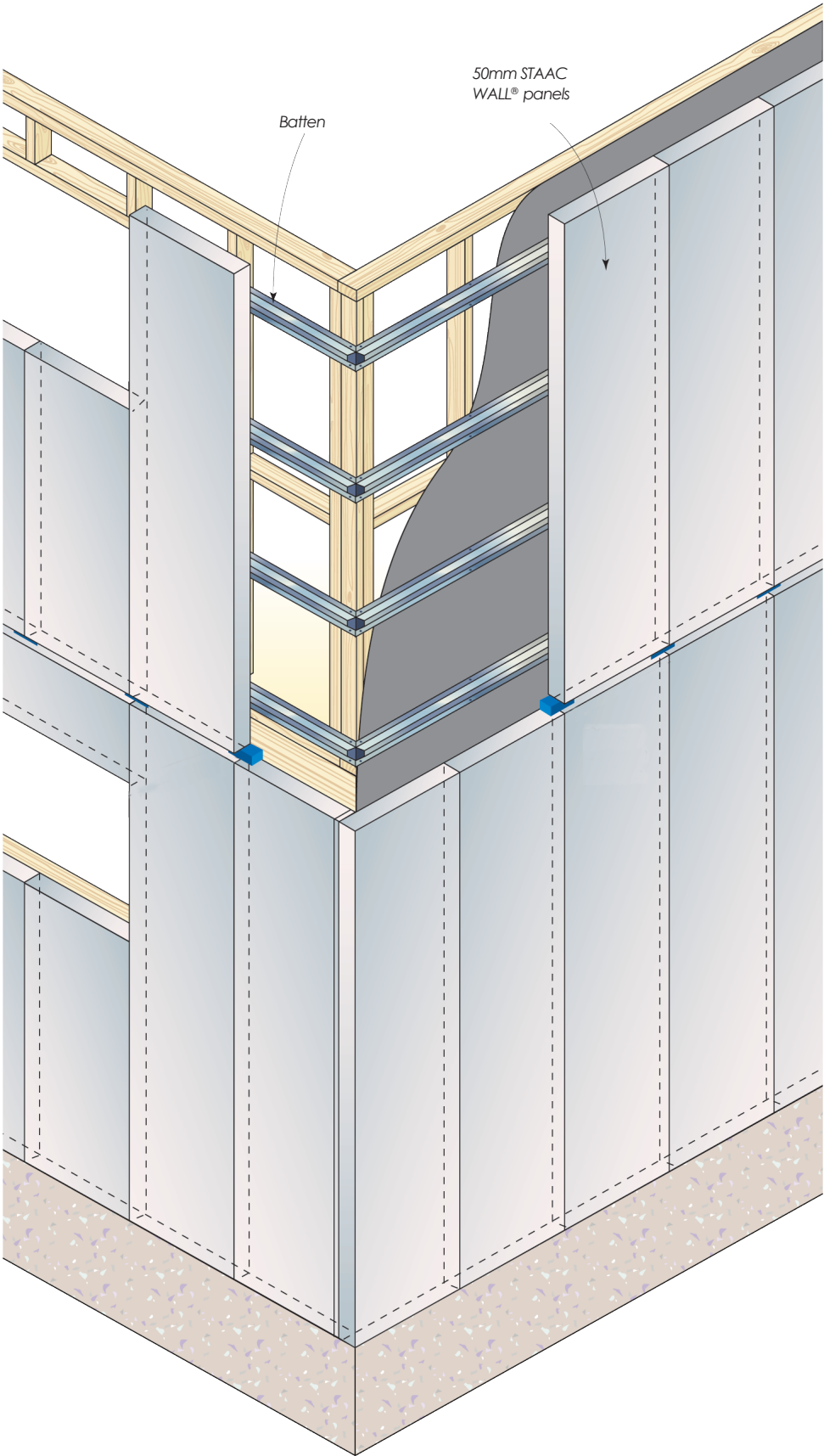


Figure 16.2.2 Two storey construction – hip roof elevation

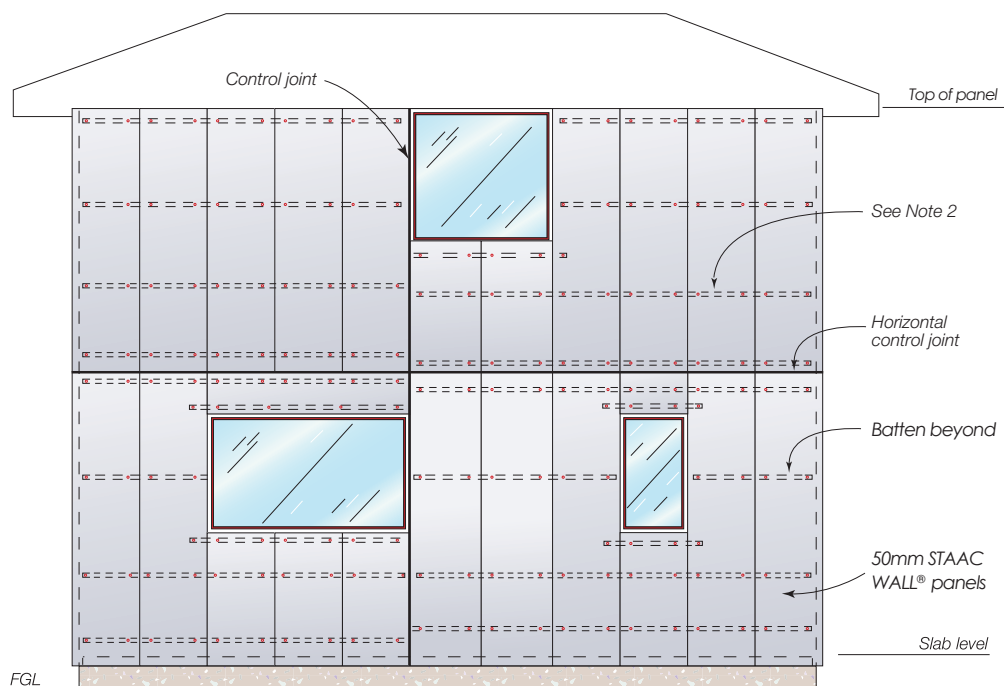
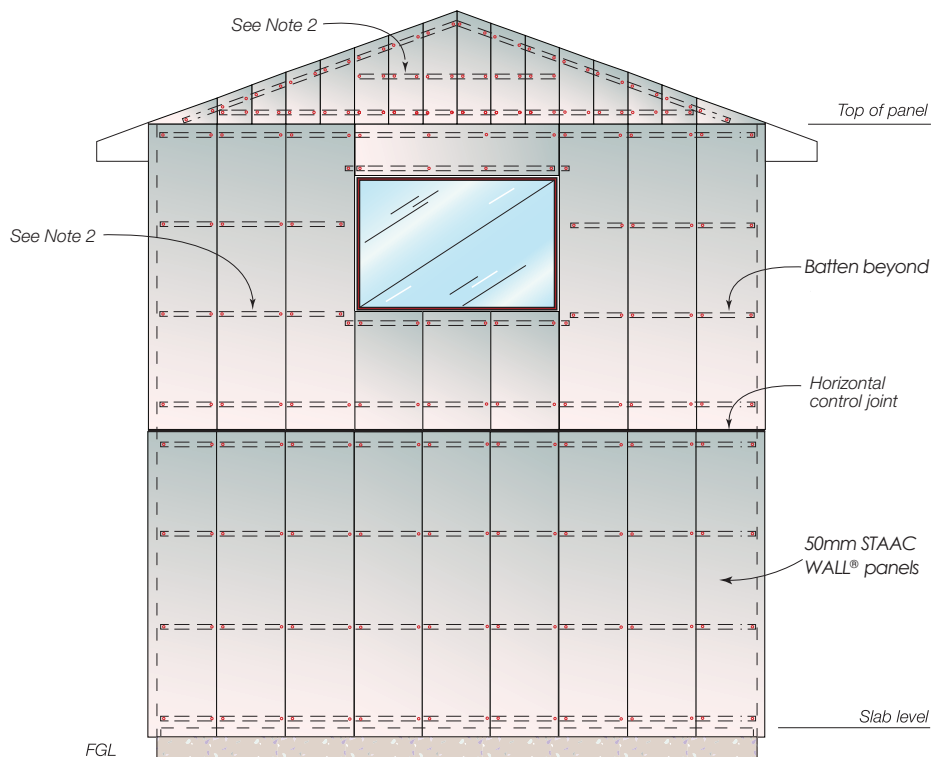


Figure 16.2.3 Two storey construction – gable end elevation



NOTE:

1. Number of top hats and top hat spacing to be confirmed by the building designer.
2. Additional top hats may be required, for suspended panels. Refer to Table 9.1 of this guide.
3. These details have not shown set-out of top hats to accommodate control joint locations. This is the responsibility of the building designer.
4. Frame design of lower floor to allow for extra load on wall from upper floor STAAC WALL® panels.

Figure 16.2.4 Two storey construction – typical timber frame section using joists with >1% shrinkage

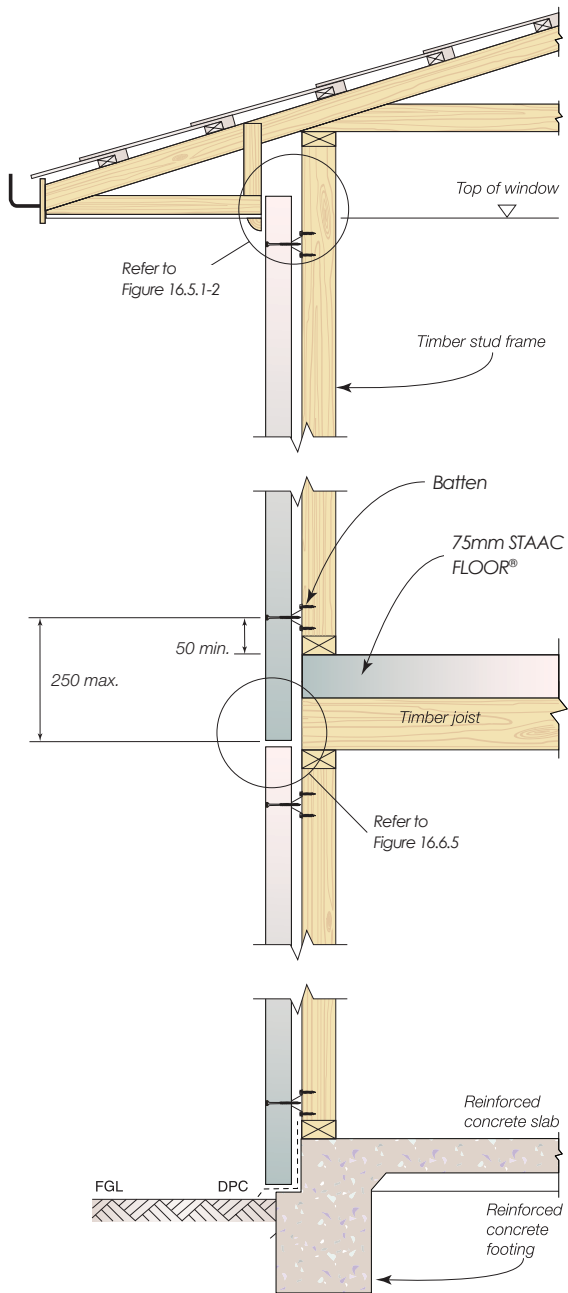
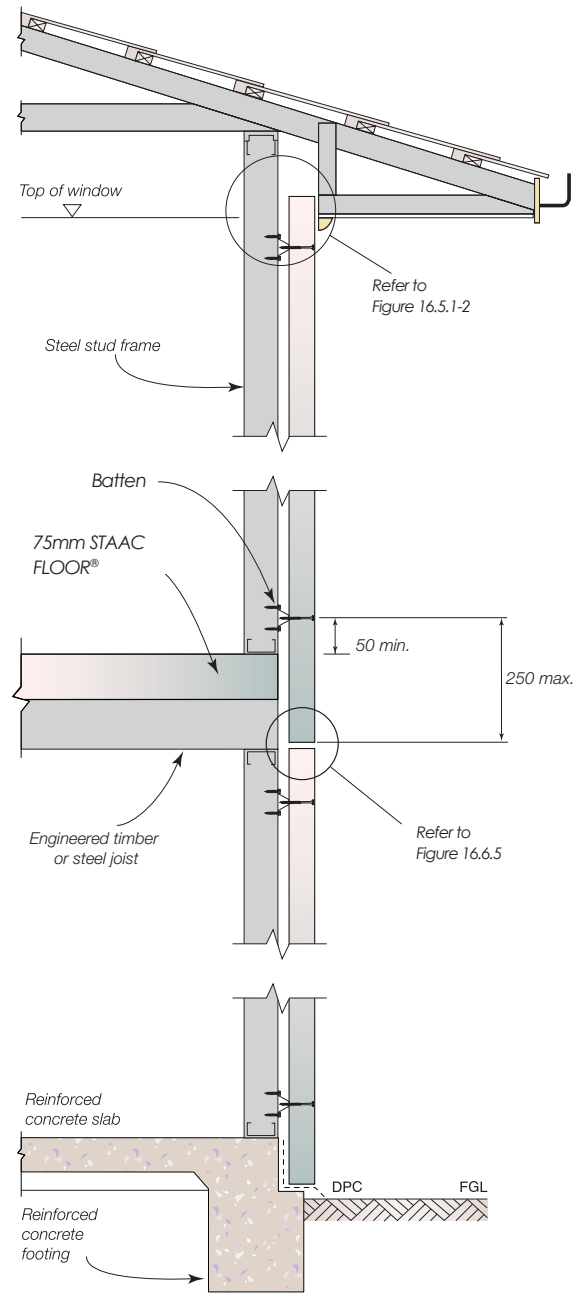


Figure 16.2.5 two storey construction – steel frame section or engineered joists with $\leq 1\%$ shrinkage



NOTE: Lower storey STAAC WALL® Panels are supported at the base on concrete slab edge.

3600 (max.) STAAC WALL® height

600 extension of panel above first floor level

300 floor joist zone (typical)

2400 - 3000 floor slab to ceiling height

3000 panel length

600 wide (horizontally installed panel)

FGL

DPC

Reinforced concrete footing

Reinforced concrete slab

Adhesive in joint with reinforced fibreglass mesh installed in base levelling coat (mesh to extend min. 200mm either side of joint)

150

150

Batten

Lower storey timber stud frame

Timber joists (note: battens are not to be fixed within floor joist zone)

Upper storey timber stud frame

Flashing by others at transition between STAAC WALL® and direct fixed cladding

Direct fixed weatherboard cladding to upper floor external walls

600 max. (batten spacing either side of joist zone)

Batten

50mm STAAC WALL® panels

Figure 16.2.8 Two storey additions – typical section with brick veneer below

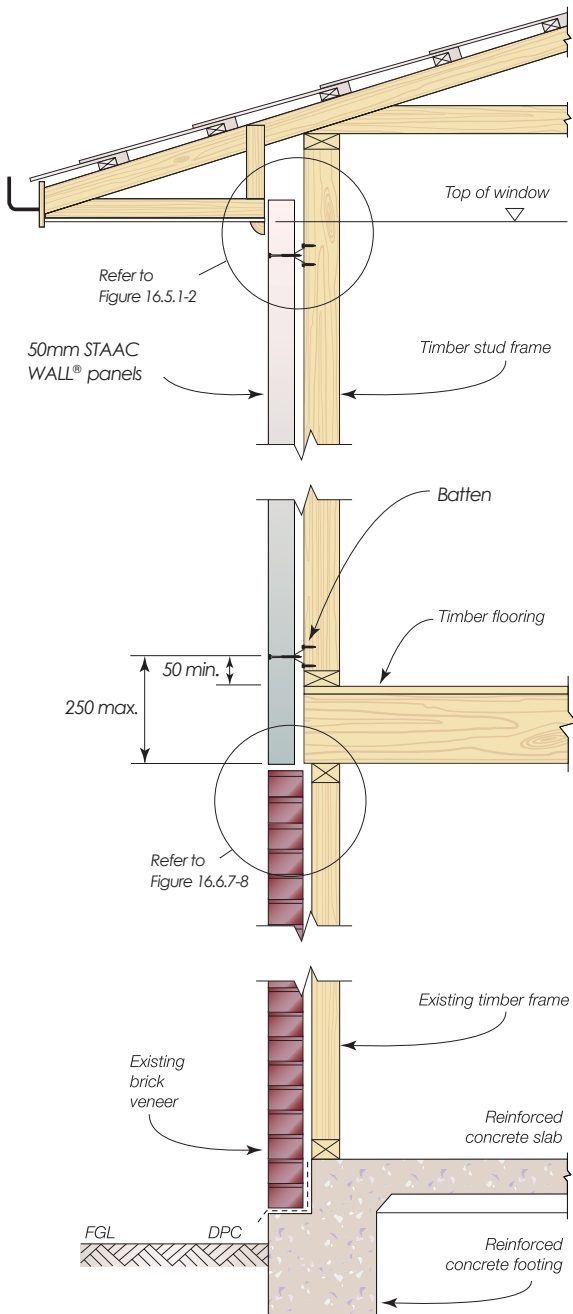
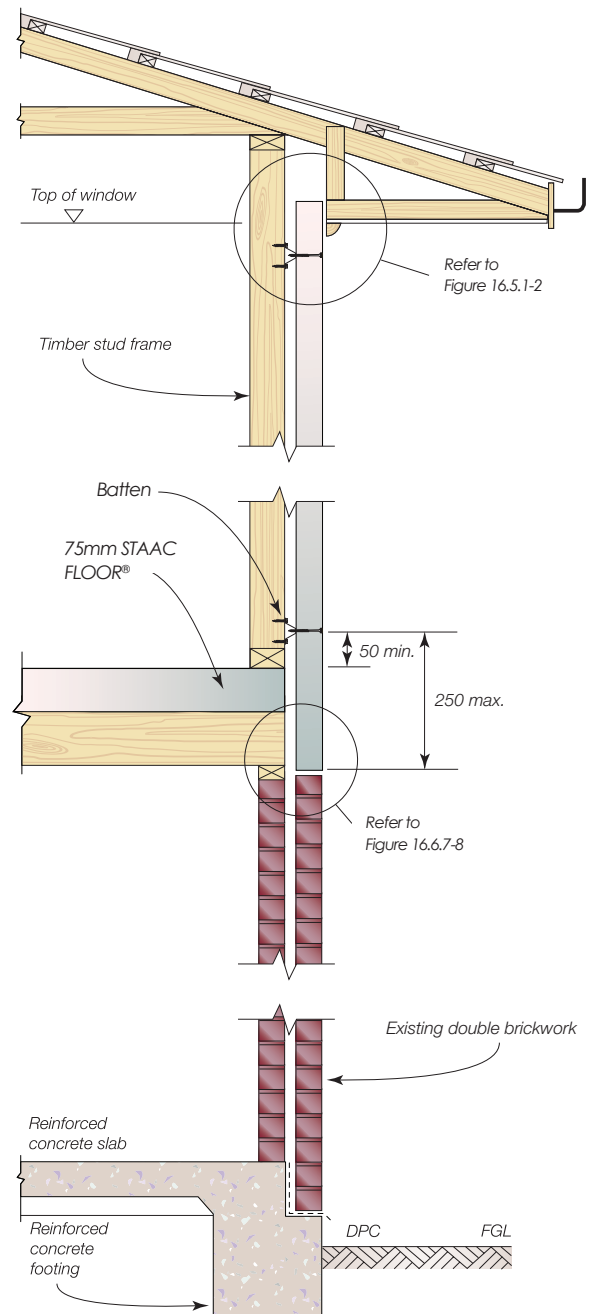


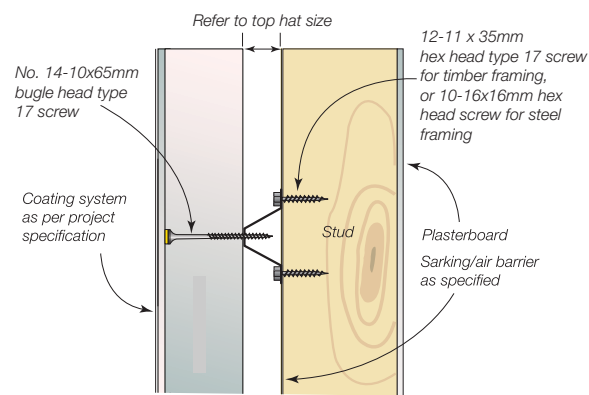
Figure 16.2.9 Two storey additions – typical section with double brick below



NOTE: Minimum 4 rows of battens are required for panels that are suspended off the frame. Refer to Table 9.1 of this guide.

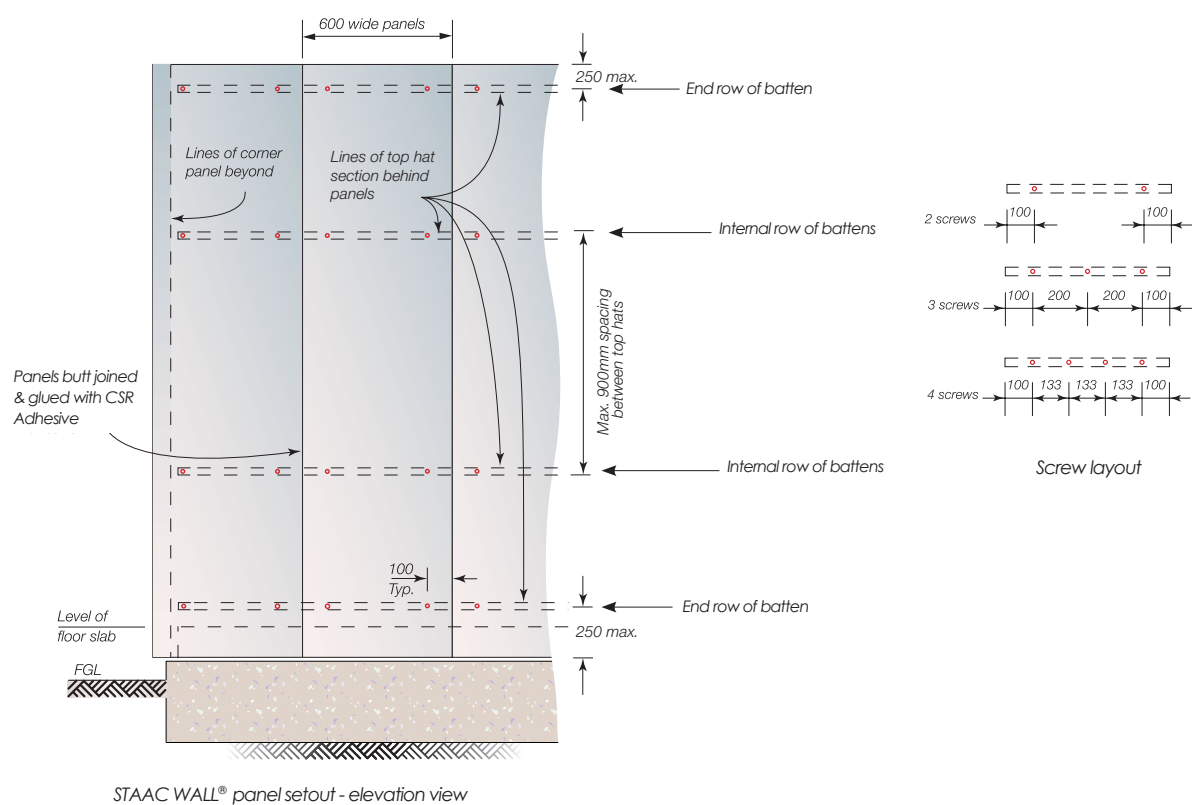
16.3 FIXING & INSTALLATION DETAILS

Figure 16.3.1 50mm STAAC WALL® External Wall System fixing detail
(Achieves FRL 90/90/90 when installed as part of the wall system. See section 10.2)



NOTE: When positioning the stud frames allow 5-7mm extra cavity width for the sheet bracing between top hat and timber stud.

Figure 16.3.2 Screw layout drawing



16.4 FOOTING JUNCTION DETAILS

Figure 16.4.1 Junction to shallow concrete footing

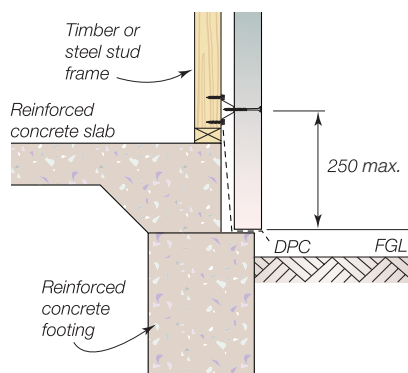


Figure 16.4.2 Junction to deep concrete edge beam

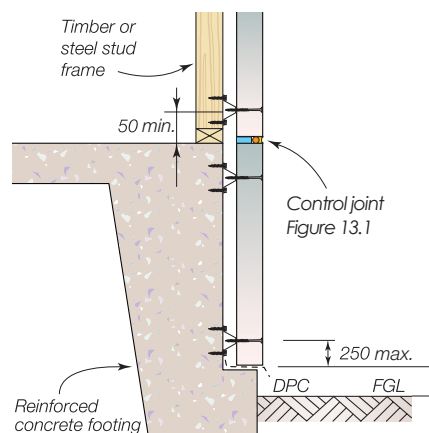


Figure 16.4.3 Junction to masonry earth retaining wall

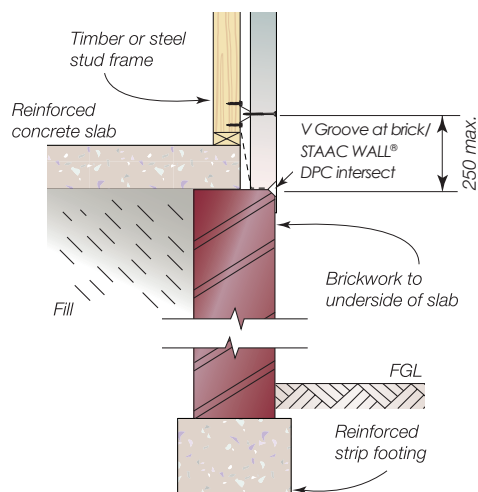
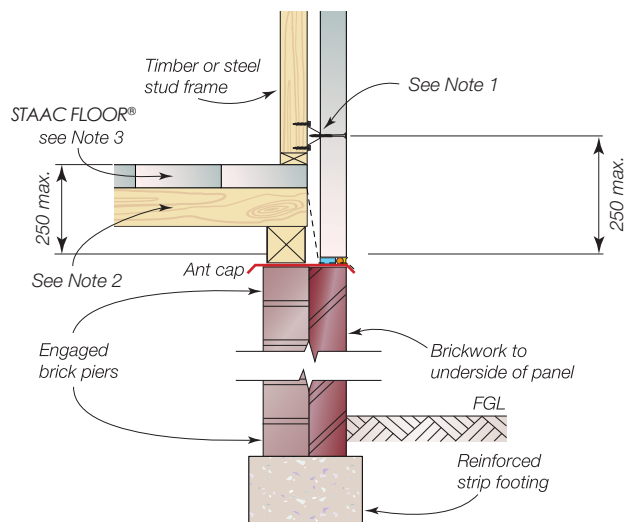


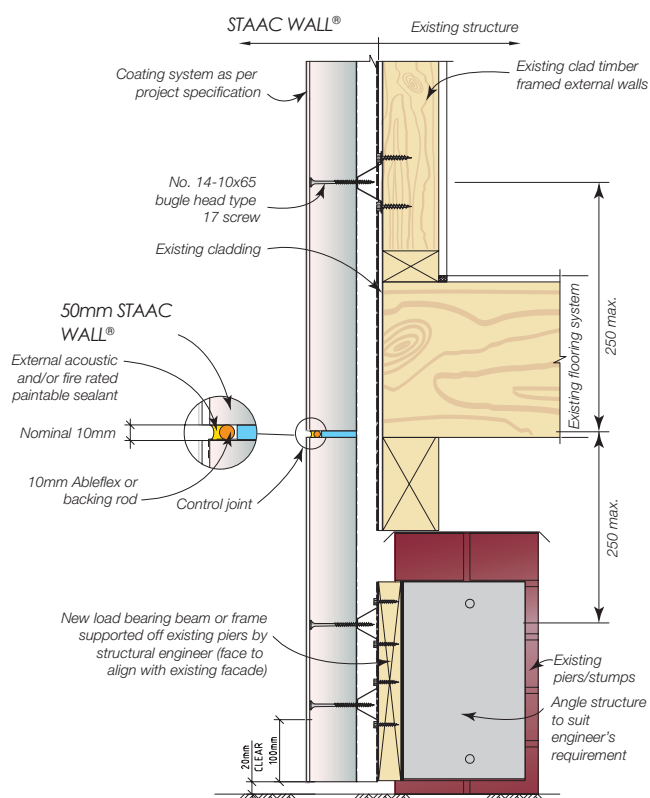
Figure 16.4.4 Junction to masonry dwarf wall



NOTE:

1. Do not fix top hat to floor joists.
2. If non-shrink floor joists are used, gap may be reduced or eliminated. Seek further technical advice from the framing manufacturer.
3. Refer to STAAC FLOOR® manual for floor details.
4. Refer AS 3660 for termite protection.
5. When fixing batten to concrete, contact the fixing manufacturer for details.

Figure 16.4.5 Junction to existing piers/stumps



NOTE

1. Refer to Tables 9.1 and 9.2 for wall batten requirement for suspended applications
2. This detail is not considered to achieve a fire rating level
3. This slab edge detail does not comply with the termite visible inspection zone requirements. Alternate termite management systems must be used when selection this detail. It is the responsibility of the builder to provide a suitable physical or chemical barrier in accordance with AS 3660.

Figure 16.4.7 Base detail suspended floor – pier connection

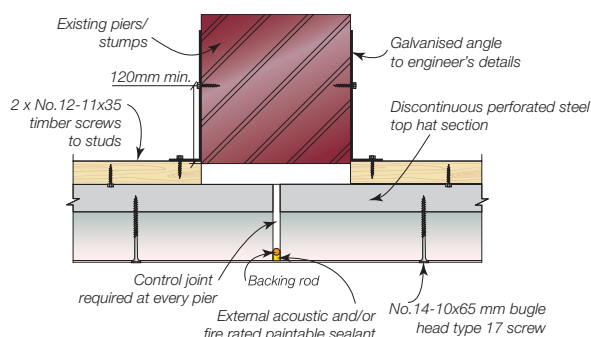
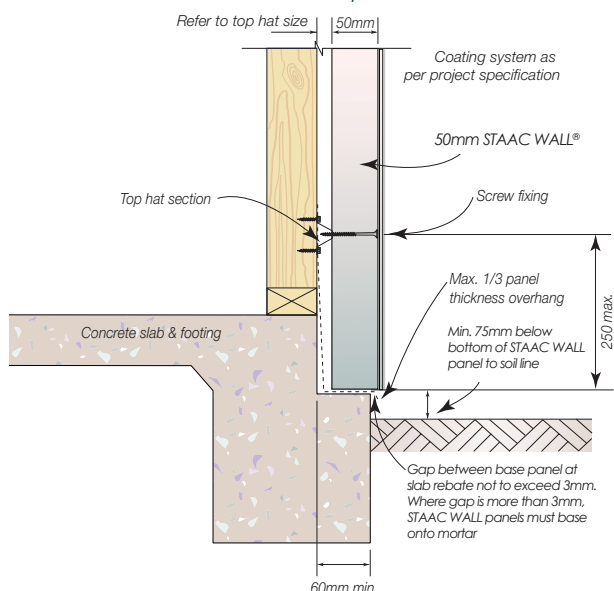


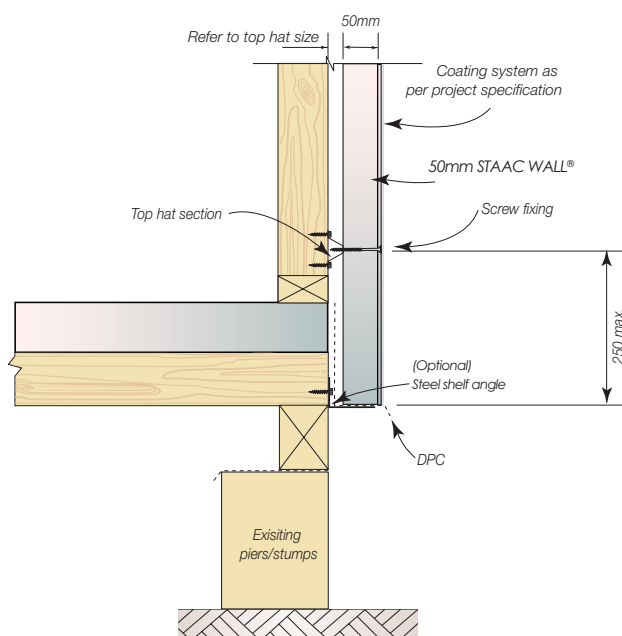
Figure 16.4.6 Junction to shallow concrete edge beam
(Achieves FRL 90/90/90 when installed as part of the wall system. See section 2.2)



NOTE:

1. All garden beds and /or finished soil line must remain a minimum of 75mm below the bottom of the finished rendered wall.
2. This slab edge detail does not comply with the termite visible inspection zone requirements. Alternate termite management systems must be used when selecting this detail. It is the responsibility of the builder to provide a suitable physical or chemical barrier in accordance with AS 3660.

Figure 16.4.8 Junction to steel angle



NOTE:

1. This detail is not considered to achieve a fire rating level.
2. The light gauge steel angle is for the purpose of closing the cavity at the base of the wall.

16.5 WALL JUNCTION DETAILS & SECTIONS

Figure 16.5.1 Typical roof eaves detail - Option 1

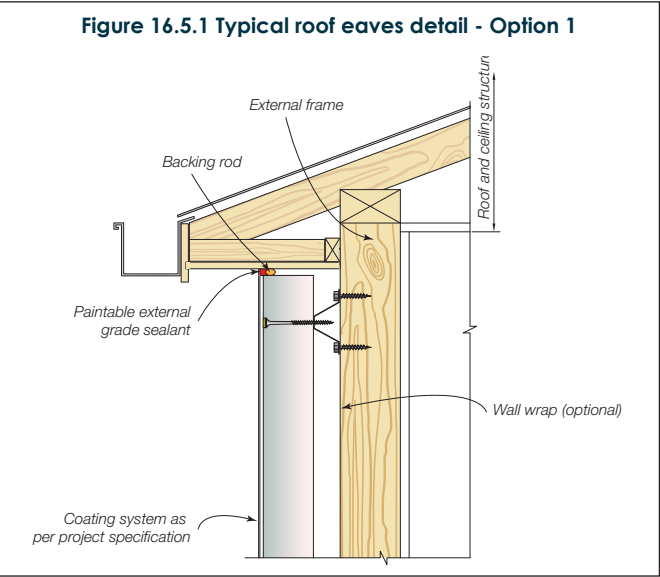


Figure 16.5.2 Typical roof eaves detail - Option 2

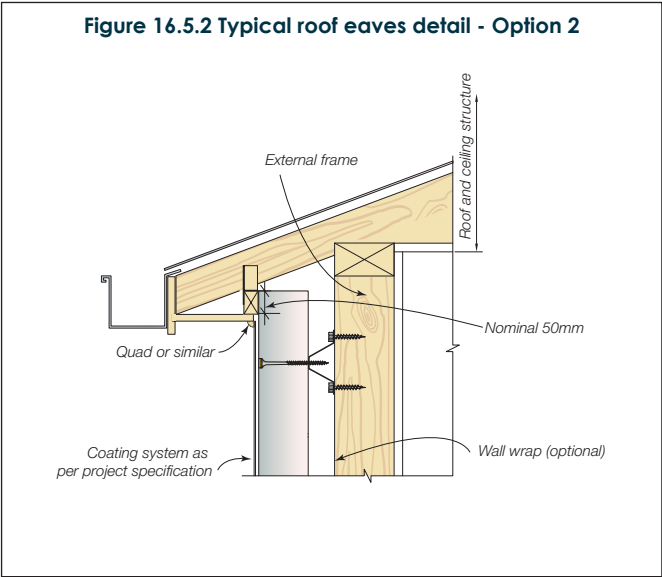


Figure 16.5.3 Roof to wall junction detail – Option 1

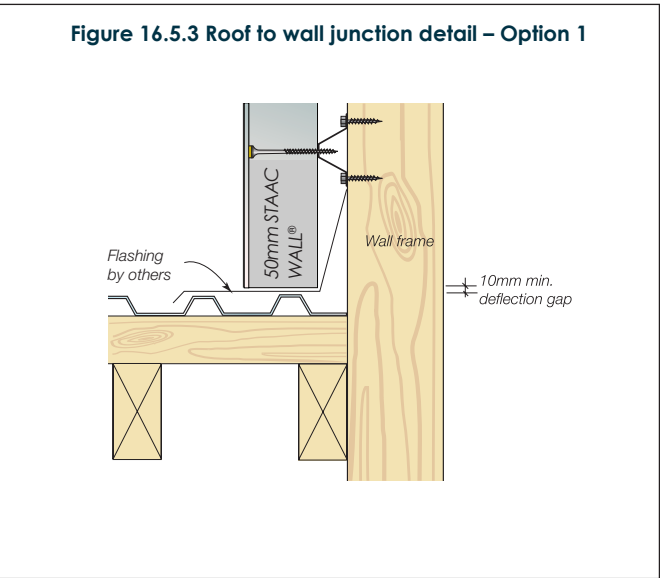


Figure 16.5.4 – Roof to wall junction detail – Option 2

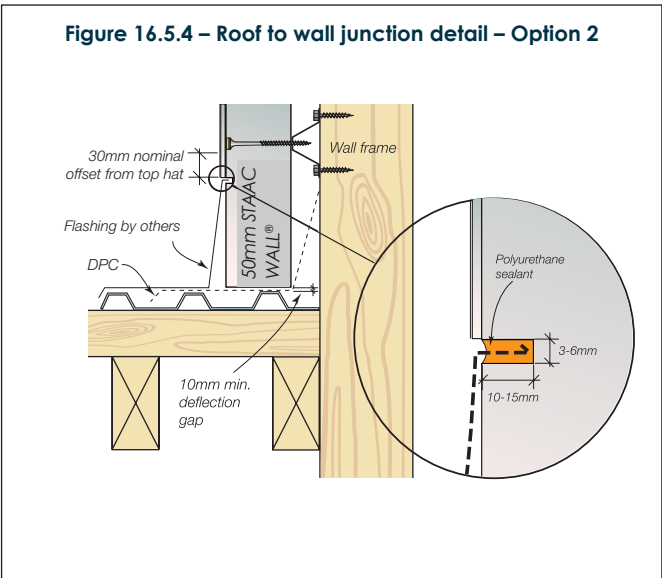


Figure 16.5.5 Balcony detail

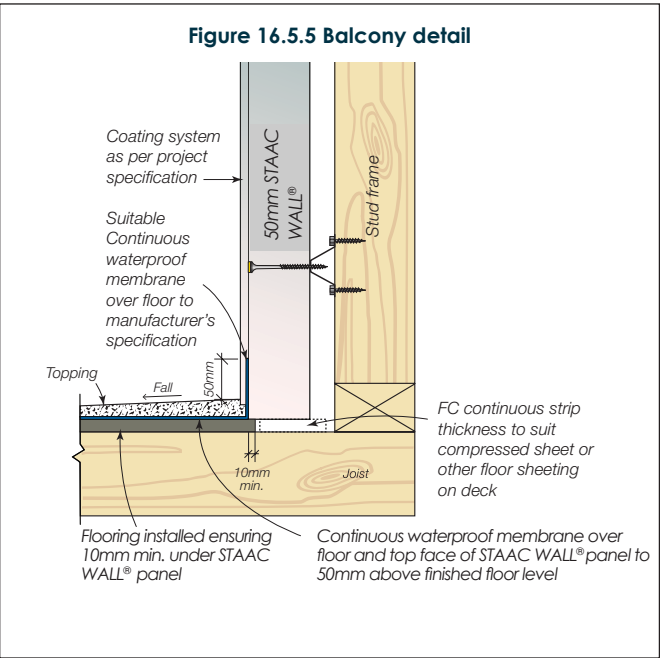
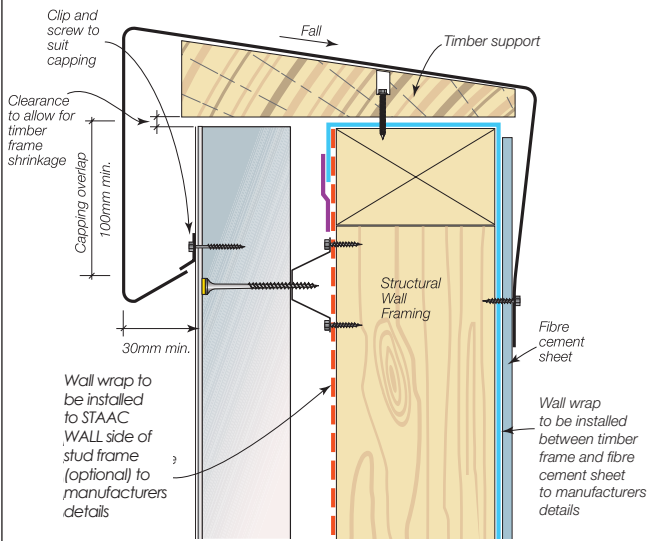
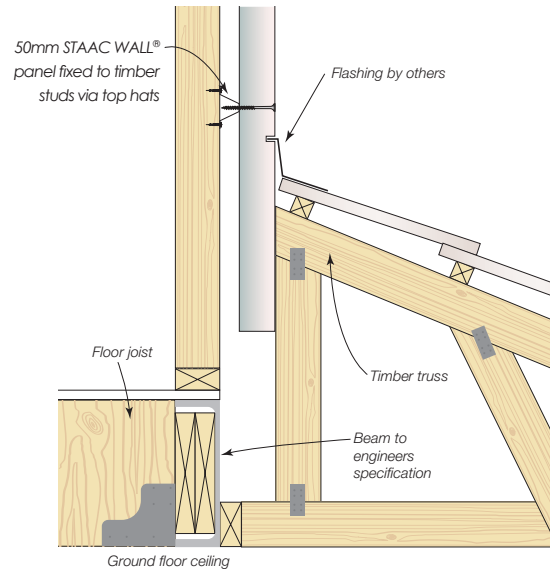


Figure 16.5.6 Parapet capping



NOTE: Parapet capping shall be designed and fastened in accordance with SA HB 39: 2015 – Installation Code for Metal Roofing and Wall Cladding. Stop ends shall be incorporated to all flashings.

Figure 16.5.7 STAAC WALL® panel to pitched roof junction



NOTE: 50mm STAAC WALL® panels are suspended from frame. Refer to tables 9.1 and 9.2 of this guide for design.

Figure 16.5.8 Gable end wall detail

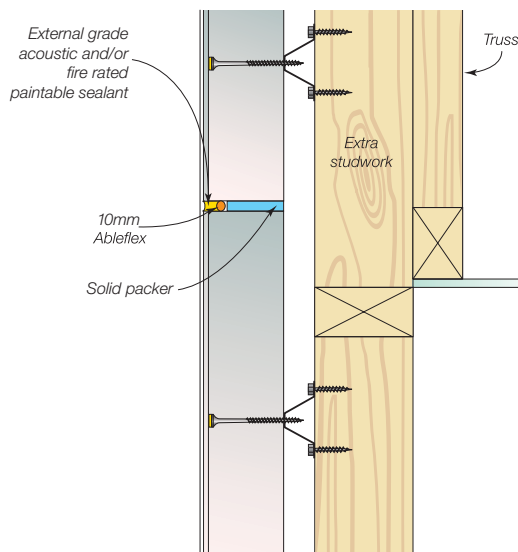


Figure 16.5.9 Gable end wall detail – lintel panel over window

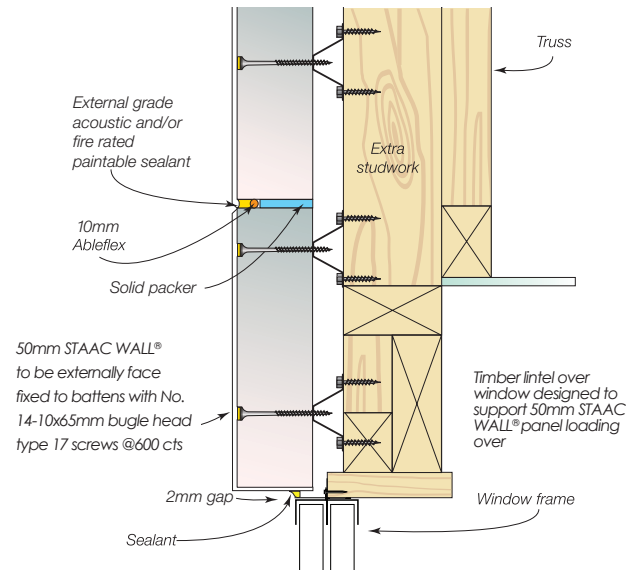


Figure 16.5.10 Beam penetration detail

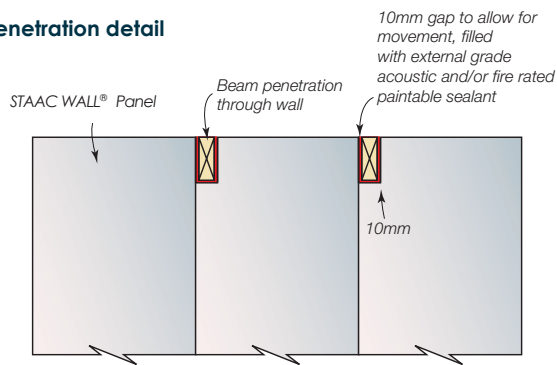
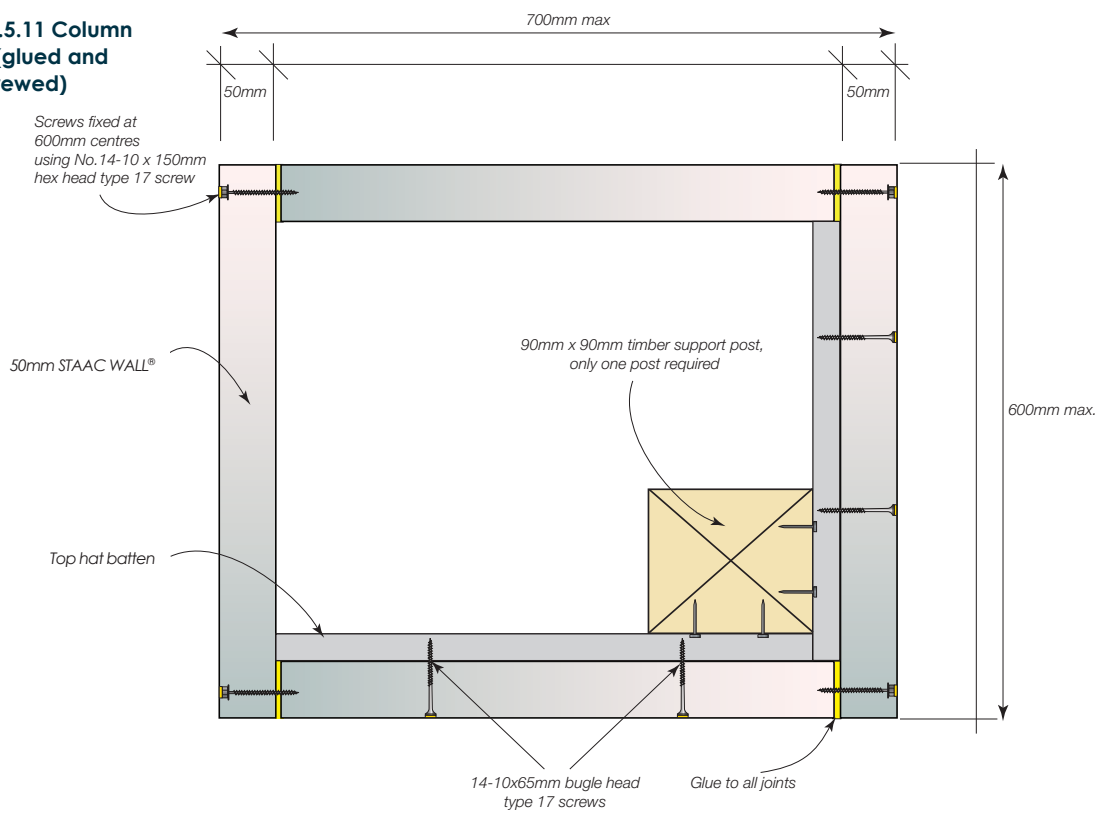


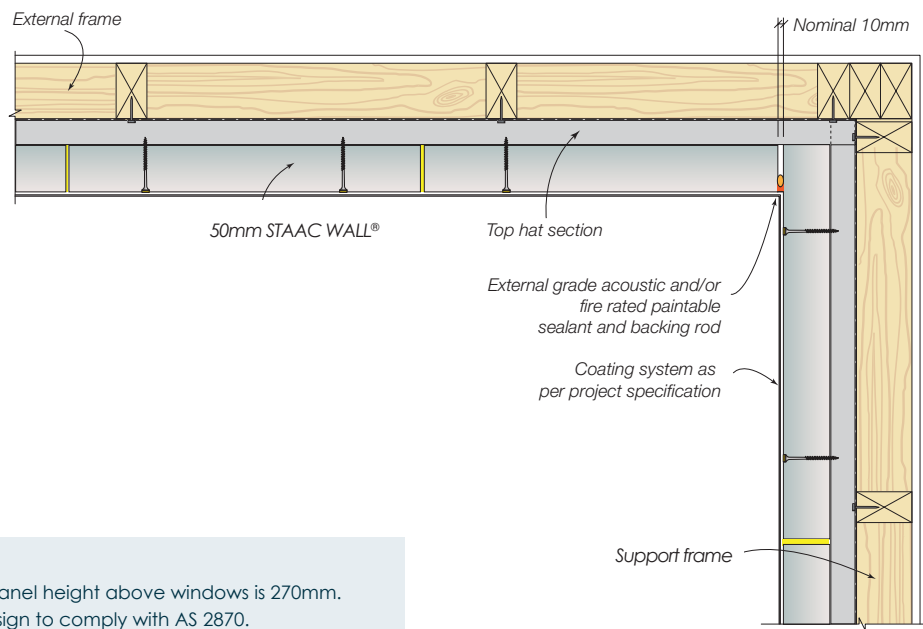
Figure 16.5.11 Column detail (glued and screwed)



NOTE: Additional framing is required for column dimensions exceeding 600mm x 700mm

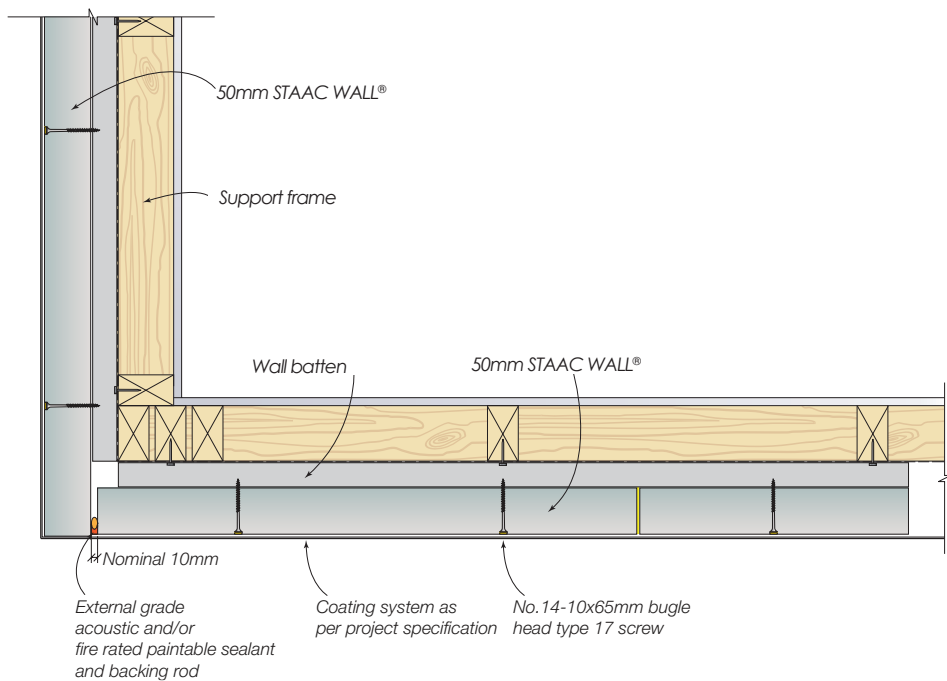
16.6 CONTROL JOINT DETAILS

Figure 16.6.1 Internal corner (Achieves FRL 90/90/90 when installed as part of the wall system.)



NOTE:
1. The minimum lintel panel height above windows is 270mm.
2. Footing and slab design to comply with AS 2870.

Figure 16.6.2 External corner (Achieves FRL 90/90/90 when installed as part of the wall system.)



50mm STAAC WALL®

200mm wide meshed in render

Nominal 10mm control joint

50mm STAAC WALL® panel

200mm wide meshed in render

Corner panels fully meshed in render 200mm either side of corner

50mm STAAC WALL® panel

Nominal 10mm control joint

1250mm max.

1200mm max.

Panel joint to be fully glued with CSR Adhesive

Corner panel joint to be fully glued with CSR Adhesive

No. 14-10x150mm hex head type 17 screws at 600mm centres

Figure 16.6.5 Typical horizontal control joint – engineered timber or steel frame (Achieves FRL 90/90/90 when installed as part of the wall system.)

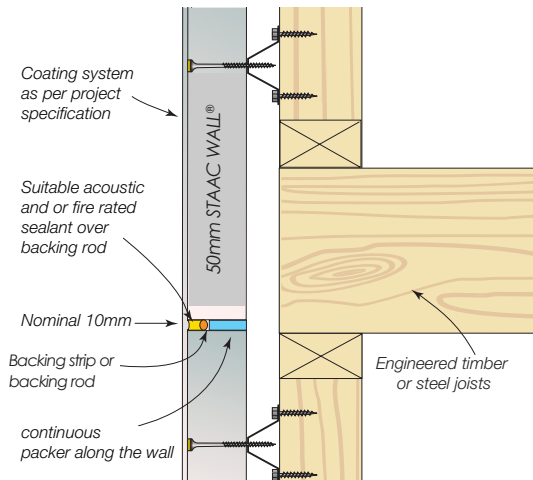


Figure 16.6.6 Horizontal control joint – Cavity brickwork to STAAC WALL®

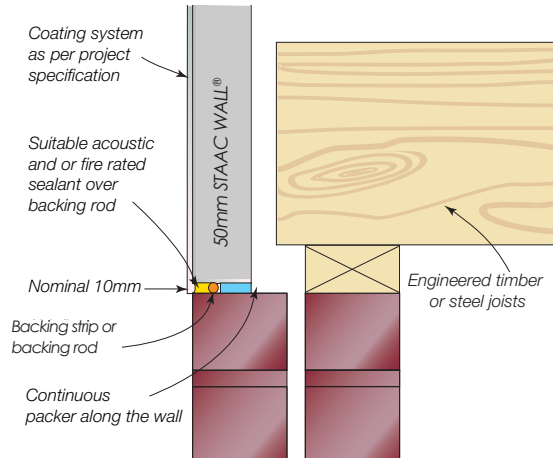


Figure 16.6.7 Horizontal control joint – Brick veneer to STAAC WALL® - Option 1

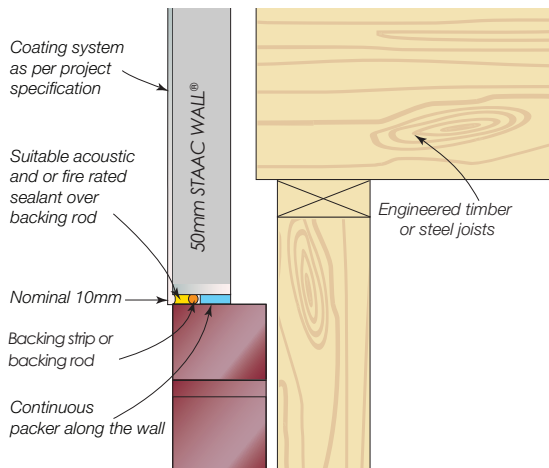


Figure 16.6.8 Horizontal control joint – Brick veneer to STAAC WALL® - Option 2

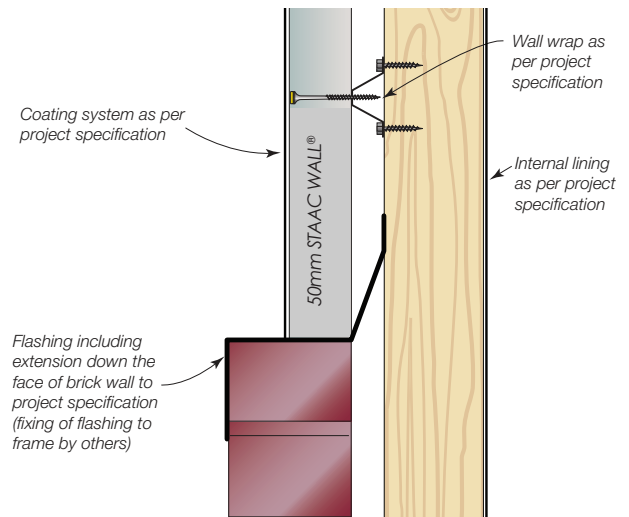


Figure 16.6.9 Typical vertical control joint (Achieves FRL 90/90/90 when installed as part of the wall system.)

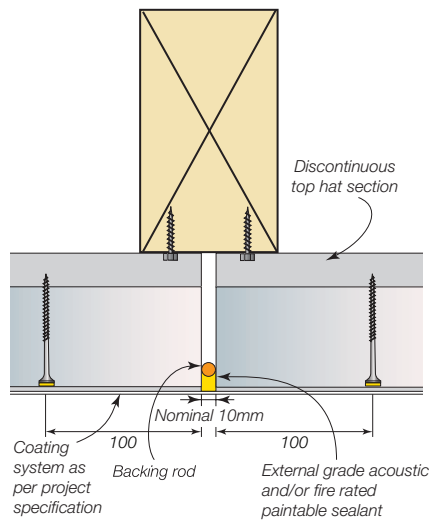


Figure 16.6.10 Typical vertical control joint with double studs (Achieves FRL 90/90/90 when installed as part of the wall system.)

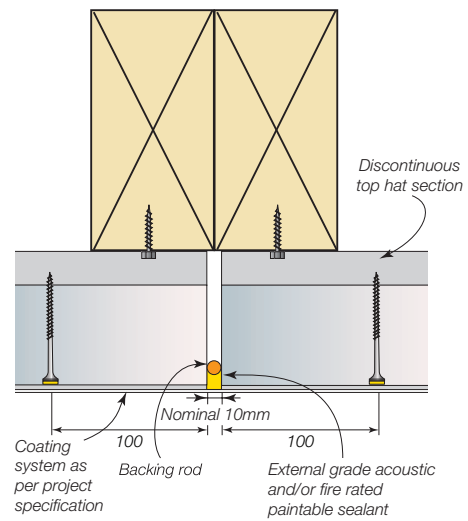


Figure 16.6.11 Control joint – discontinuous top hats on a single stud

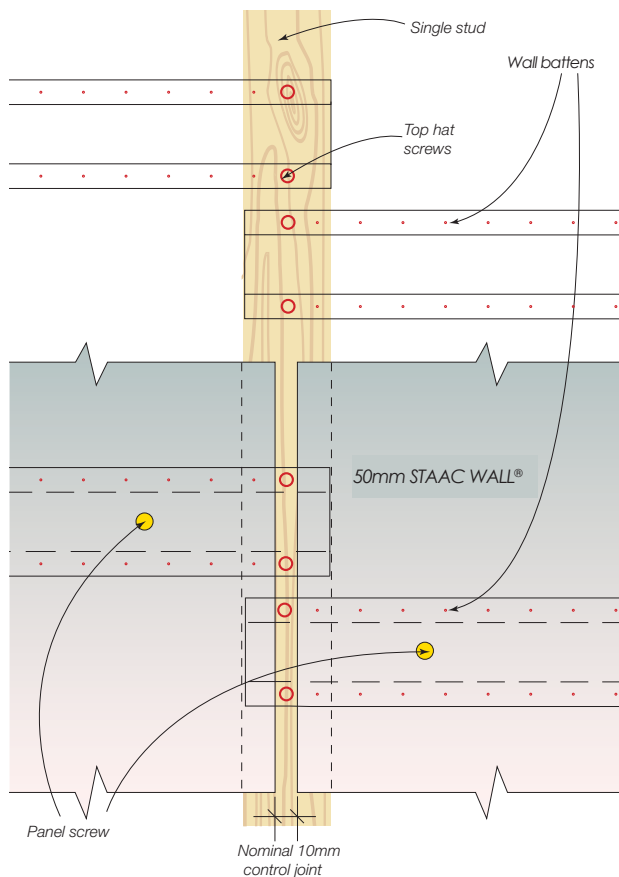
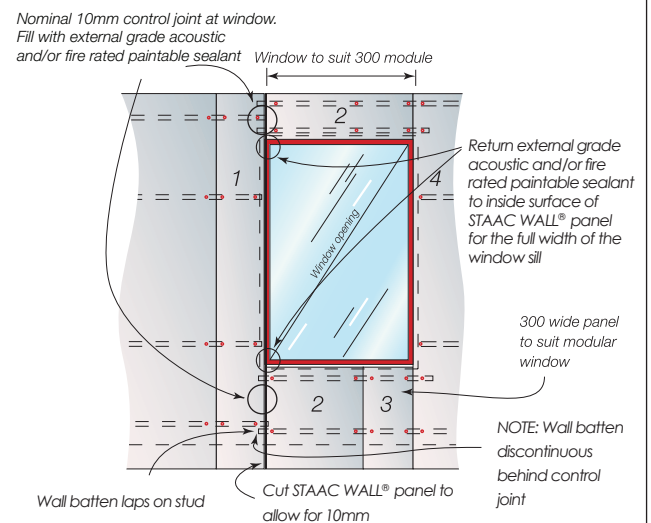


Figure 16.6.12 Typical window control joint detail – lintel over



NOTE: The installation sequence of the 50mm STAAC WALL® panels around the openings should be followed as numbered if there is no control joint at the opening, to maintain glue thickness on the edge of the panel.

16.7 DOOR & WINDOW DETAILS

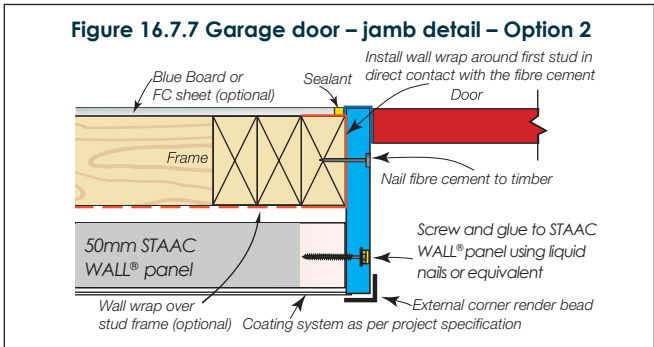
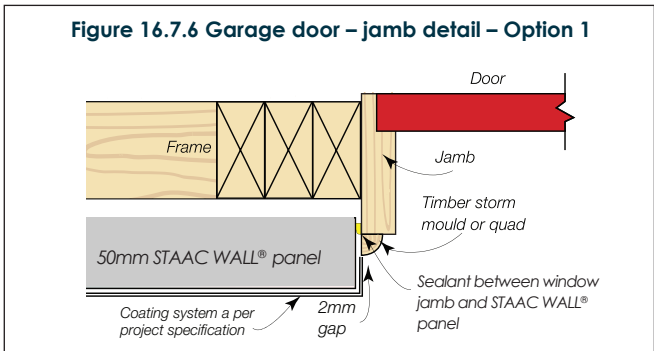
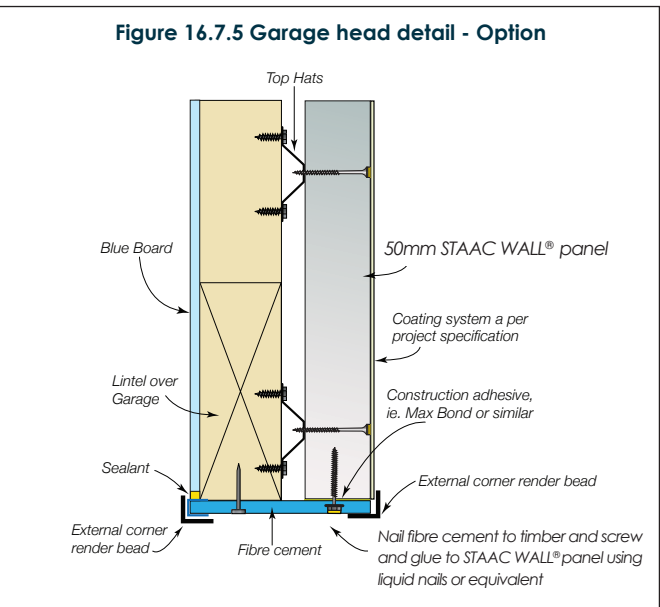
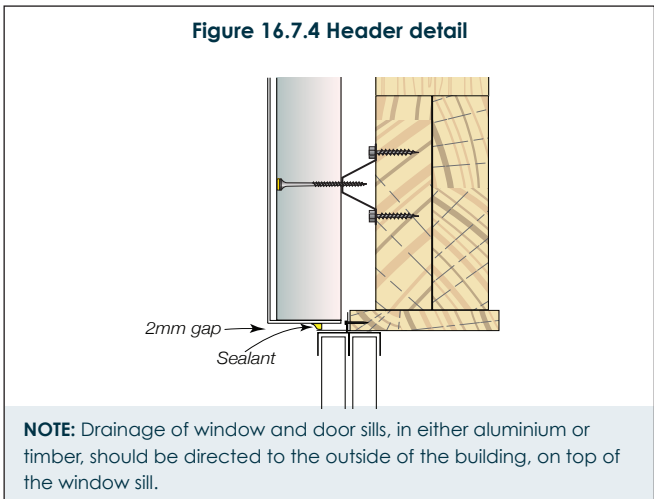
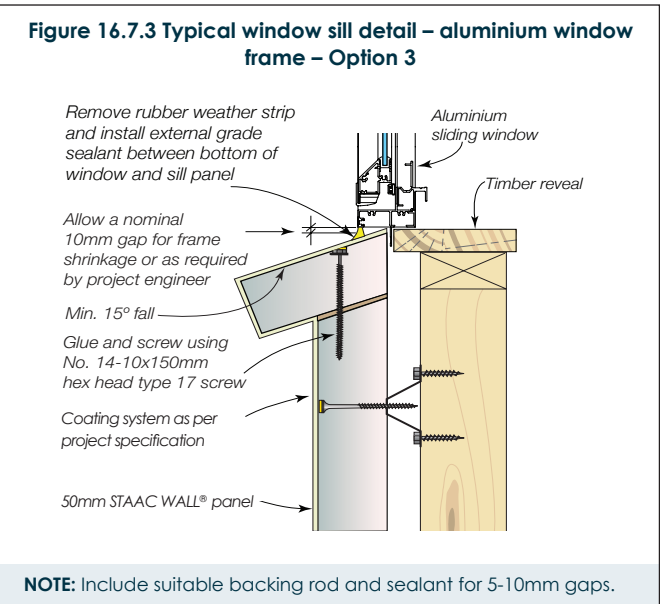
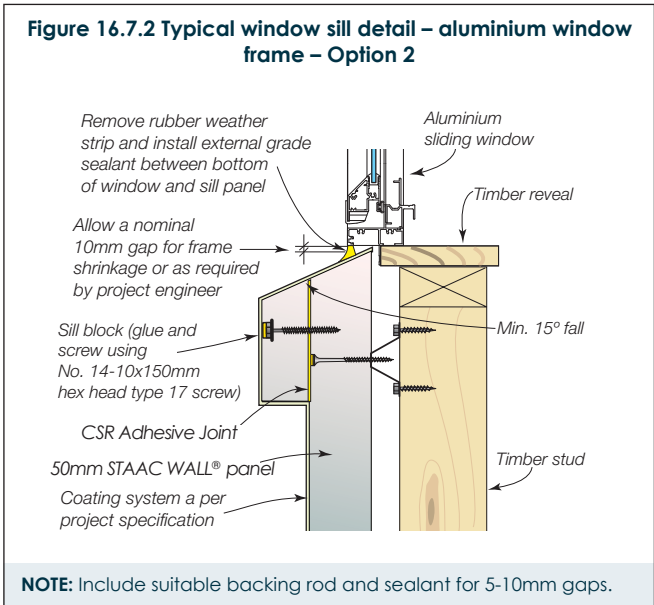
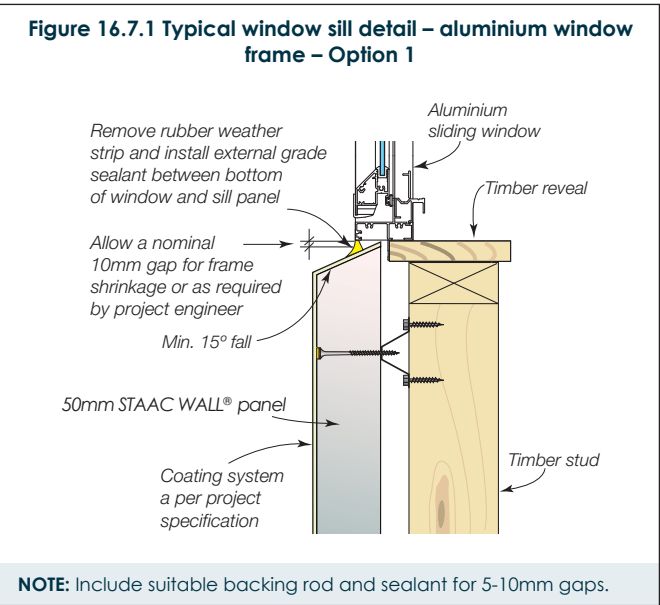


Figure 16.7.8 Sliding door sill detail – Concrete sill < 270mm

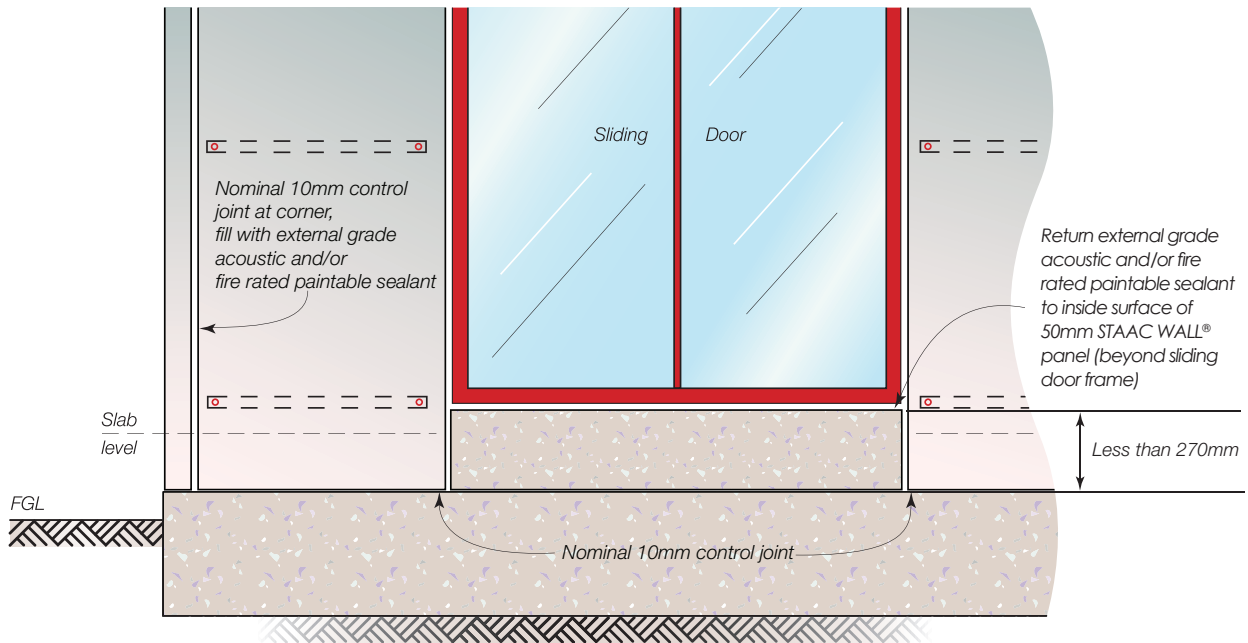
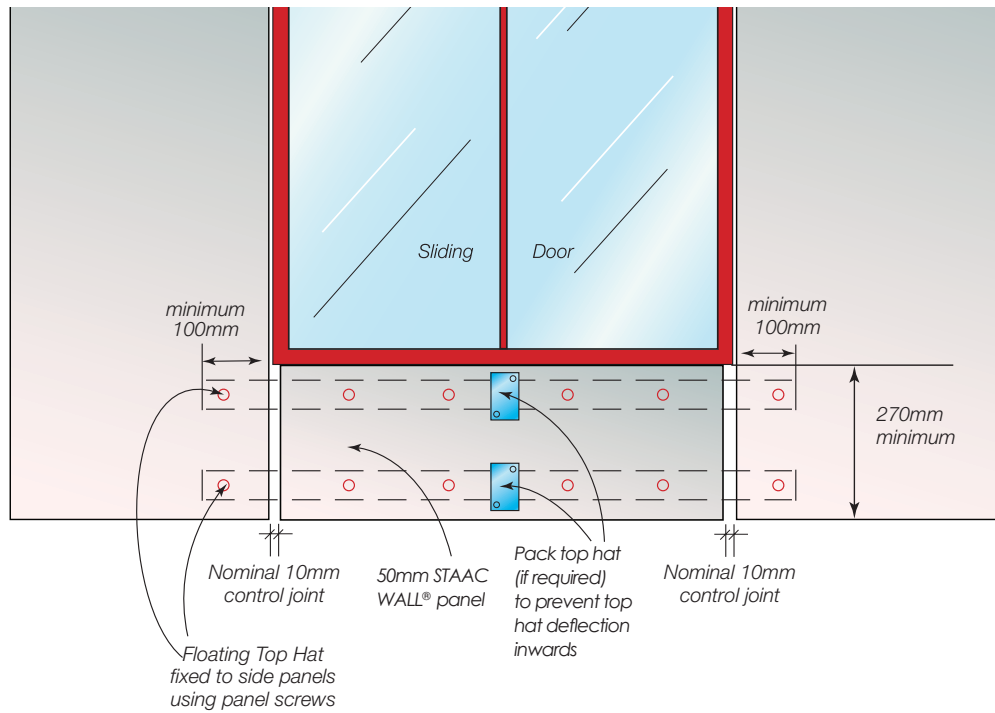
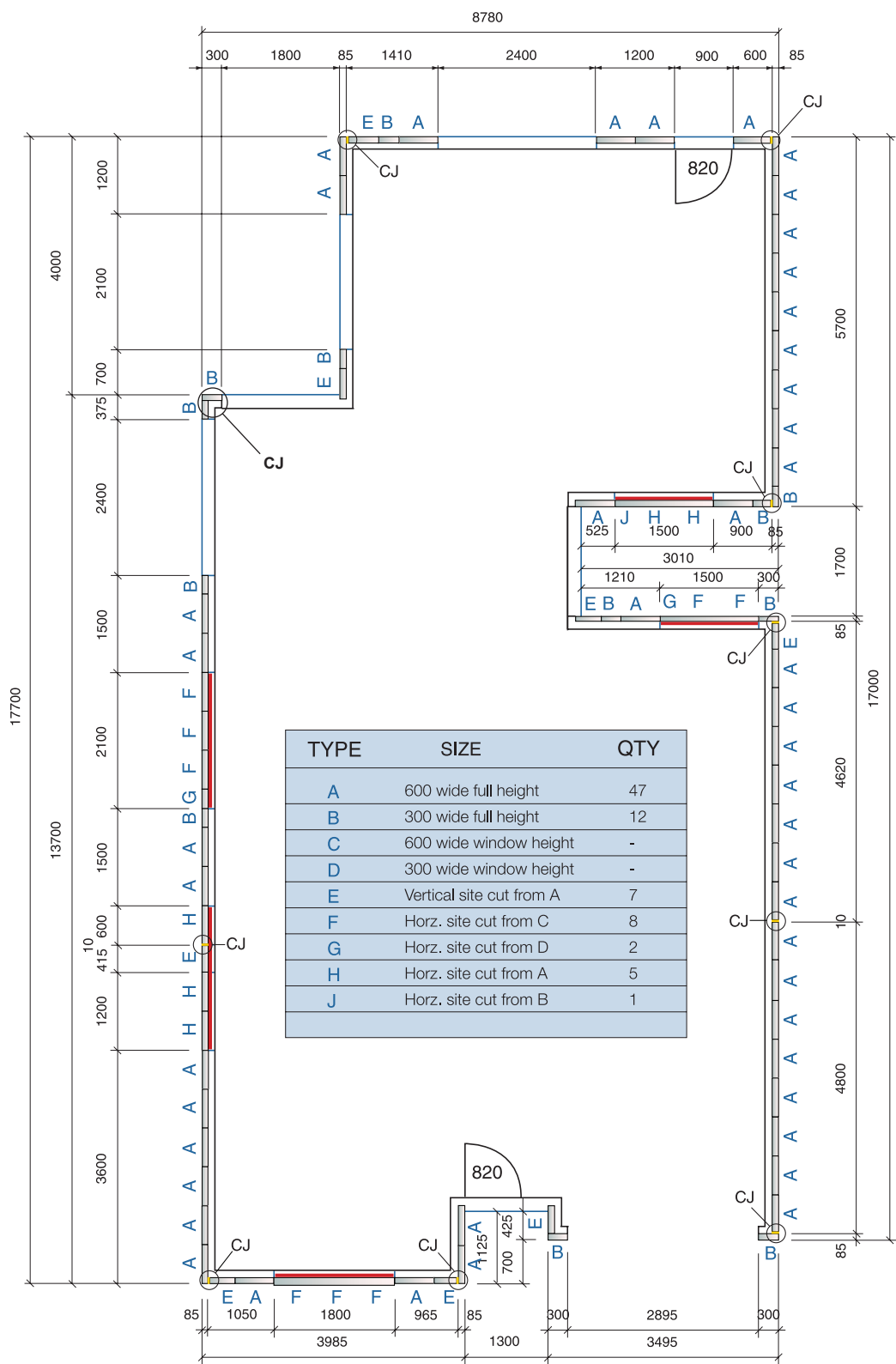


Figure 16.7.9 Sliding door sill detail – sill > 270mm



NOTE: Consider a min. 15° fall for door sill.

Figure 16.8.1 Panel layout drawing – Plan view



NOTE:

1. At corners, panels can be laid out at 300mm multiples in one direction and 300mm multiples + 85mm in the other direction
2. Width of panels may vary + or - 1.5mm

17. APPENDIX: REFERENCING CODES AND STANDARDS

- ▶ AS 2870 - 2011 Residential slabs and footings
- ▶ AS 3566.1 - 2002 - Self-drilling screws for the building and construction industries Part 1: General requirements and mechanical properties
- ▶ AS 3959:2018 Construction of buildings in bushfire-prone areas
- ▶ AS/NZS 4200.1:2017 Pliable building membranes and underlays Materials
- ▶ AS 4200.2:2017/Amdt 1:2018 Pliable building membranes and underlays Installation
- ▶ AS 5146.1: 2015 – Reinforced Autoclaved Aerated Concrete part 1: Structures (Incorporating Amendment No.1)
- ▶ AS 5146.2: 2018 – Reinforced Autoclaved Aerated Concrete part 2: Design
- ▶ AS 5146.3: 2018 – Reinforced Autoclaved Aerated Concrete part 3: Construction
- ▶ AS/NZS 1170.2: 2021 Structural design actions Wind actions
- ▶ AS/NZS 1336:2014 Eye and face protection – Guidelines
- ▶ AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment
- ▶ AS/NZS 1716:2012 Respiratory protective devices
- ▶ AS/NZS 3660 Termite Management
- ▶ AS/NZS 4600: 2018 Cold-formed steel structures
- ▶ AS/NZS 4859.1:2018 Thermal insulation materials for buildings General criteria and technical provisions
- ▶ ISO 9223:2012 Corrosion of metals and alloys - Corrosivity of atmospheres -- Classification, determination and estimation
- ▶ NASH Hand book – Design of residential & low-rise steel framing
- ▶ NASH Standard – Residential and low-rise steel framing Part 1: Design Criteria
- ▶ NASH Standard – Residential and low-rise steel framing Part 2: Design Solutions
- ▶ National Construction Code 2022 Volume One: Building Code of Australia - Class 2 to Class 9 Buildings
- ▶ National Construction Code 2022 Volume Two & Housing Provisions - Class 1 and 10 Buildings

37 Gravel Pit Rd, Darra QLD 4076
P. (07) 3725 5935 / stoddartgroup.com.au

DISCLAIMER

Information presented in this document is supplied in good faith and to the best of our knowledge was accurate at the time of preparation. The provision of this information should not be construed as a recommendation to use any of our products in violation of any patent rights or in breach of any statute or regulation. Users are advised to make their own determination as to the suitability of this information in relation to their particular purpose or specific circumstances. Since the information contained in this document may be applied under conditions beyond our control, no responsibility can be accepted by Stoddart Group, or its staff for any loss or damage caused by any person acting or refraining from action as a result of misuse of this information.

