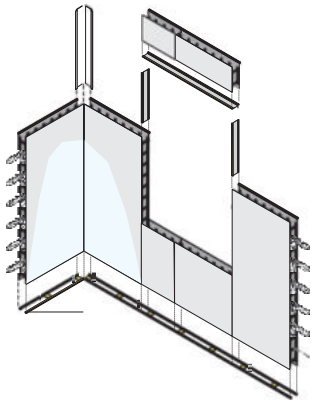
Design, Detailing & Installation Manual

Ritek® Wall Systems

Version Jan 2025



An innovative prefabricated permanent formwork wall solution: factory made to suit your building requirements.

25 YEAR WARRANTY*

ENVIRONMENTAL BENEFIT

BCA COMPLIANT FIRE RATED

HIGH RITEK XL THERMAL WALL® RATING

EXCELLENT ACOUSTIC RATING

STRUCTURAL STRENGTH

CodeMark CMI Certification Certificate CM40374

XL Wall Panel

CodeMark CMI Certification Certificate CM40375

X-Plus Wall Panel

Design, Detailing & Installation Manual

Ritek® Wall System

Version Jan 2025

Ritek®
Benefit from our knowledge.
Profit from our experience.

Always refer to local state building regulations and current safety requirements. Please Note: Diagrams not to scale Version Jan 2025

Design, Detailing & Installation Manual

Ritek® Wall System

Version Jan 2025

A INTRODUCTION

Ritek® Benefit from our knowledge. Profit from our experience.

Ritek® Wall Systems - Introduction

Introduction

Ritek Technology (Ritek®) is a leader in designing, manufacturing and supplying today's construction industry with cost effective, efficient and sustainable construction solutions.

Scope

This guide has been prepared to assist in the detailing of the Ritek® XL, XL Thermal & X-Plus Wall System. It provides a basis from which to work but does not replace the services of professional consultants on specific projects.

Product Description

Overview

Ritek® Wall Systems are prefabricated permanent formwork systems for concrete walls used for all types of external and internal walls. They consist of lightweight panels created by bonding high quality, hard-wearing and durable fibre cement sheets to a patented composite stud assembly. Ritek® Wall Systems are quickly and simply installed on site and then core-filled with reinforced structural concrete to achieve loadbearing walls that are fire and sound rated. The fibre cement sheeting remains in place as sacrificial formwork and provides an excellent substrate for applied finishes such as acrylic render, cladding, tiling and painting.

The Ritek® XL, XL Thermal & X-Plus Wall System panels consist of 6mm fibre-cement, recessed-edge facing sheets, bonded to vertical studs. The studs are made up from aluminium sections connected together with aluminium spacer pieces (for X-Plus) & with plastic spacer pieces (for XL & XL Thermal).

All aluminium components are protected with a chromate coating. The panels are stood in place, both vertical and horizontal reinforcement is placed as required and the wall completed by filling the panels with structural concrete. Once complete, the walls act as reinforced concrete and the actual design, detailing and construction of the walls must comply with AS 3600 Concrete Structures.

Panel Dimensions

Ritek® Wall System is manufactured with standard overall wall thicknesses of 115, 135, 150, 165, 200 & 265mm preferred heights up to 5.1m, and a standard panel width of 1.2m and minimum width of 50mm. Panel heights and widths can vary to suit the architectural and engineering design requirements.

The number in the Ritek® Wall type code refers to the overall thickness of the wall, including the 6mm fibre-cement facing sheets, i.e. a 135mm Ritek is 135mm thick overall. The corresponding concrete thickness would be 135mm less 12mm, i.e. 123mm thick.

Product Features & Benefits

The advantages of using Ritek® Wall Systems include reduced materials handling and cranage, faster build times and savings. With additional internal thermal mass and sustainability benefits.

High Quality, Durable & Low Maintenance

- High quality, resilient fibre cement faced wall panels.
- Fast erection speed – reduced need for cranes.
- Minimal waste, recyclable materials.
- BCA compliant – rated for structural fire, acoustic & thermal properties.

Superior Stud & Track System

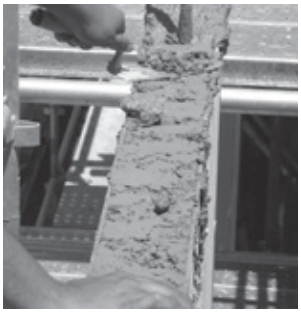
- Fully captured & aligned panels, top, bottom & corners, strong aluminium to aluminium connections.
- Straight wall faces, corners & edges.
- Reduced finishing trade requirements.

Engineering & Structural Capacity

- Walls can be designed as deep beams to span between columns, eliminating transfer beams.
- Structural elements can be easily reduced or increased to suit the building design.
- High load capacity allows wall thickness to be reduced to save on costs.

Ritek® Wall Systems - Introduction



Easy To Install

- Prefabricated panel packs are delivered to site to suit your construction program.
- No unnecessary materials on-site when not required.
- Prefabricated panels designed to suit the building.
- Panels create straight & true walls for easy installation.
- Increased build efficiencies as less weather reliant.

Range Of Accessories Available

- Standard express joint detail for external slab wall junctions.
- Built-in thermal insulation.
- Suite of architecturally modern compatible window & door frames.

A Rust-Free Wall Solution

- All aluminium components and accessories used are protected with a coating system to give superior protection.
- Corrosion resistance, stability, durability and longevity are just some of the key advantages that aluminium has over other metals that are used in construction.

Typical Ritek® XL® & XL Thermal® System Applications (Class 1 Buildings)

- Internal, external, party & boundary walls
- Columns, stairwells, lift shafts & retaining walls
- Sheer walls, blade walls & core walls
- Partition passage, intertenancy

Typical Ritek® Wall System Applications (Class 2-9 Buildings)

- Internal, external, party & boundary walls
- Columns, stairwells, lift shafts & retaining walls
- Sheer walls, blade walls & core walls
- Partition passage, intertenancy

Concrete

Ritek® Wall Systems are suitable for a range of concrete strengths from 20 MPa to 90 MPa.

Reinforcement

For crack control and shear resistance, AS3600 requires a nominal minimum amount of reinforcement and maximum spacing. Please consult with your design engineer for your project specific reinforcing requirements. Where higher racking resistance is required the quantity or size of reinforcement can be increased. Where connection to floors is required, starter rods of the same size and spacing as the vertical reinforcement are used.

Ritek® Wall Systems - Features Overview

Ritek® - an alternative, innovative & cost-effective building method

Prefabricated wall panel systems to suit your building requirements. The high quality innovative Ritek® Wall Systems provide speed of construction, structural, fire and acoustic properties, as well as safe building practices.

ACCURATE IN-HOUSE DRAFTING SERVICE to ensure your walls are accurate and delivered ready to install.

25 YEAR WARRANTY* for peace of mind, including coastal areas.

FAST TRACK YOUR CONSTRUCTION PROJECT by reducing the floor cycle times.

STRUCTURAL STRENGTH of reinforced concrete offers the ultimate outcome with minimal maintenance.

ENVIRONMENTAL BENEFIT from reduced waste and water use on building sites compared to traditional methods.

HIGH RITEK XL THERMAL WALL® RATING meets the requirements (section J) of BCA with built-in insulation.

EXCELLENT ACOUSTIC RATING meets and exceeds the BCA requirements of inter-tenancy sound transfer.

BCA COMPLIANT FIRE RATED wall system for up to 4 hours. Ritek Wall® systems.

CodeMark Compliant
XL Wall System

CodeMark Australia | CMI Certification Certificate CM40374

CodeMark Compliant
X-Plus Wall System

CodeMark Australia | CMI Certification Certificate CM40375

Ritek® Wall Systems - Features Overview

Benefit from our knowledge.
Profit from our experience.

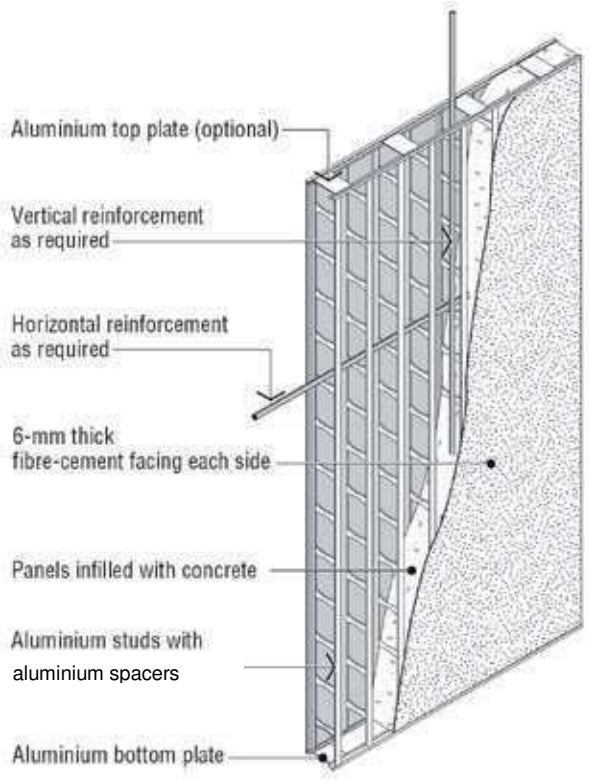
Ritek Technology is the manufacturer of the innovative Ritek® XL, XL Thermal & X-Plus Wall® systems. These insitu systems consist of prefabricated panels using a composite stud assembly, providing a permanent formwork for reinforced concrete walls.

- A cost-effective building method that achieves the benefits of fire rated, steel-reinforced concrete walls.
- Reduce material and handling costs.
- Provide a safer, cleaner workplace.
- Reduce site waste.

Wide range of wall thicknesses:

115mm, 135mm, 150mm, 165mm, 200mm & 265mm

- Walls can be tailored to building design requirements.
- 200mm + 265mm thick panels are available with double layer reinforcement capability.



Internal walls –
free of restrictive system components

- Allows free flow of concrete within wall and uniform concrete structure.
- Wall can be designed in accordance with 'Concrete Structures AS3600' and BCA.
- Easy access, placement and inspection of reinforcement steel.
- Services (power etc.) can be installed through walls easily, prior to concrete pour.

Easy to install

- Prefabricated panel packs are delivered to site to suit your construction program.
- No unnecessary materials on-site when not required.
- Prefabricated panels designed to suit the building.
- Panels create straight & true walls for easy installation.
- Increased construction efficiencies as less weather reliant.

Range of accessories available

- Standard express joint detail for external slab wall junctions.
- Built-in thermal insulation (XL Thermal).
- Suite of architecturally modern compatible window & door frames.

Dedicated Ritek service team

- Committed technical services team.
- Dependable customer service & sales support team.
- In-house drafting services.

Ritek® Wall Systems - Environmental & Green Star Benefits

The Ritek® XL & XL Thermal Wall® Systems are designed for use in Class 1 structures & the Ritek® Wall System is designed for use in Class 2-9 structures which are reinforced and concrete filled on site.

Structural walls, lift shafts, party walls, partition, passage, external, intertenancy and stairwells can all be constructed using the all-inclusive Ritek® Wall Systems. These systems can be used for all wall applications internally and externally. The response from the building industry regarding the Ritek® Wall Systems has been excellent, as it has proven to be a viable, price competitive alternative to traditional concrete and masonry-based methods such as precast, block and brick veneer, column and infill.

The XL Thermal Wall with its high-performance thermal insulation provides an innovative and cost-effective solution for Building Designers to meet or exceed the requirements for thermal building insulation and energy efficiency.

Minimize the contribution and levels of VOCs and Formaldehyde in the building:
The Ritek® Wall Systems use adhesives with no solvent or VOC content and no Formaldehyde content. There are no PVC plastics used in the panel finish or onsite wall construction.

The environmental benefits of the Ritek® Wall Systems include the areas of waste, water conservation and preservation of natural resources:
The Ritek® Wall Systems are manufactured to order and generate less wastage on the construction site than conventional methods.

The product is water-wise as minimal water is required during installation. Conventional block methods utilize a large amount of water on site to flush out contaminants. By eliminating this requirement, the Ritek® Wall Systems preserve a scarce resource and also eliminates the mess and safety issues related to this practice.

Reduction in Building Embodied Energy:
Prefabricated, made to order panels ensure quick and easy installation, with minimal on-site wastage and project costs are achieved by; reducing the construction time, crane costs, scaffold costs and site utilities.
The Ritek® Wall System is prefinished with a durable high-quality finish and does not require traditional battens and plasterboard linings.

Ritek's manufacturing facility uses minimal power (energy) and water resources during the manufacture of the Ritek® Wall System therefore adding minimal embodied energy to its products.

Ritek's products listed and assessed by Ecospecifier:
The Ritek® Wall Systems have been fully assessed and are listed on ecospecifier.org: a knowledge base of over 3500 eco-products, eco-materials, technologies and resources, the leading global source of sustainable development and life cycle assessed green product information.

Ritek® Wall Systems - Specification Sheet

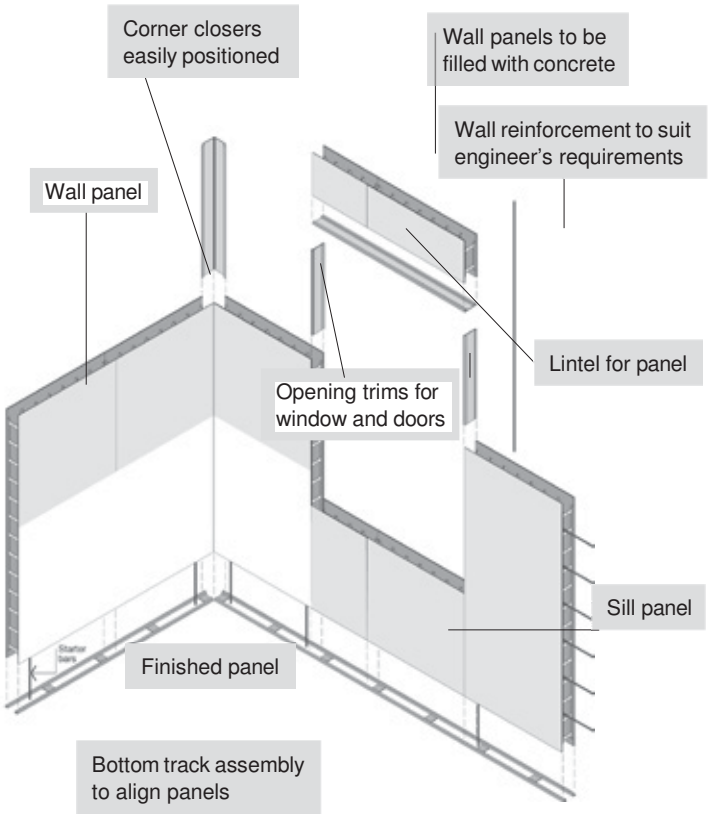
Product Description

The Ritek® Wall System, a prefabricated permanent formwork system, is a versatile structural walling system, which has been successfully used in an extensive range of building projects nationally and internationally.

The system is used for all internal and external walls and selectively for such areas as lift shafts, stairwell and party walls. The key benefits of the Ritek® Wall System are its structural integrity, speed of installation, reduced on site waste, fire and acoustic ratings.

The Ritek® Wall System is made up of prefabricated panels used to provide permanent formwork for in situ reinforced concrete walls. Ritek wall panels consist of 6mm fibre cement, recessed edge facing sheets, bonded to patented vertical composite studs.

All aluminium components and accessories used are protected by a chromate coating. Panels are stood in place, both vertical and horizontal reinforcement is placed as required and the wall completed by core filling the panels with structural concrete.



RITEK® XL & X-PLUS WALL® SYSTEM SPECIFICATION			TABLE 1.1			
Wall Panel Thickness	Concrete Core	Surface Density	Panel Components	Internal Finish	External Finish	Typical Panel Weight
115mm	103mm	>220 kg/m^2	6mm Fibre-cement sheeting bonded to a Patented Composite Stud (Aluminium & ABS - XL) (Aluminium – X-Plus)	Set joints and apply a standard paint finish	Set joints and apply a standard texture coating system finish	20 kg/m^2
135mm	123mm	>220 kg/m^2				21 kg/m^2
150mm	138mm	>220 kg/m^2				23 kg/m^2
165mm	153mm	>220 kg/m^2				24 kg/m^2
200mm	188mm	>220 kg/m^2				26 kg/m^2
265mm	253mm	>220 kg/m^2				28 kg/m^2

Note: For all fire, thermal and acoustic ratings - please refer to Section C - Design

Suitable for use in single residential, multi-storey residential and commercial buildings as load bearing/structural walls up to 25 storeys or higher in non-load-bearing capacities. Panels can be configured to include additional materials to increase thermal and acoustic properties. Refer to the Ritek Wall System Design and Detailing Guide - Section C for further information.

Referenced Australian Standards:
AS3600:2018 - Concrete structures
AS3610:1995 - Formwork for structures
AS 1530.4:2014 - Fire tests on building materials
NCC/BCA 2022: Vol1 & Vol2 - Building Code of Australia

Ritek® Wall Systems - Components Overview

Standard Track
Aluminium extrusions used in conjunction with Track Joiner to make a Standard Bottom Track Assembly. Also used as part of the assembly for Nib End Closers.

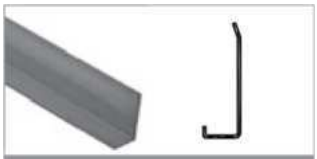
Track Joiner
Aluminium extrusion combined with two lengths of Standard Track to make a Standard Bottom Track Assembly.

Standard Bottom Track Assembly
Secures Wall Panels, Tees and End Closers to floor slabs and footings.


Standard Track


Track Joiner / Assembly

Panel Joiner
Aluminium Extrusion to secure Wall Panels to adjacent Wall Panels, Tees and Corners in the same plane.

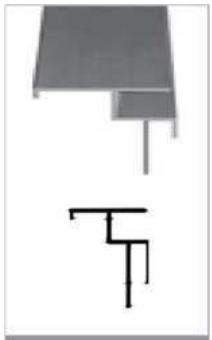

Panel Joiner

Rebated Top Track
Aluminium extrusion is used in conjunction with Rebated Bottom Track to form an articulated horizontal joint and weather seal.

Rebated Bottom Track
Aluminium extrusion is used in conjunction with Track Joiner and Rebated Top Track to make a Rebated Track Assembly. May also be used as an optional edge on a finished slab to perimeter walls when no step down in the slab is provided.

Rebated Track Assembly
Used to create a shadow joint at Panel to slab and footing connections.


Rebated Bottom Track


Rebated Top Track


Rebated Track Assembly

Two Part FC External Corner
Prefabricated FC and aluminium assembly installed at 90˚ external corners.

Internal Corner Closer
Prefabricated aluminium extrusion folded to suit required internal corner angle.

Aluminium Squint Closer
Prefabricated aluminium extrusion folded to suit required external corner angle other than 90˚.


X- Plus External Corners


Internal Corner Closer


Aluminium Squint Closer

Tee Closer
Custom sized FC sheet assembly installed at Wall Panel Tee Junctions.

Nib End Closer
FC and Standard Track assembly to close off wall ends, window and door openings without aluminium window adaptors or folded metal door frames. Nib End Closers for 265 Wall Panels use a different track.


XL Tee Closer


265 Nib End Closer

Ritek® Wall Systems - Legal Information

Legal Statements

All reasonable efforts have been made to ensure the accuracy of this publication; however, any information and data contained herein is subject to change without notice. To ensure the information you are using is correct, Ritek® recommends you review the latest technical information available on the Ritek® website www.ritek.com.au, or alternatively call 1300 152 857 to speak to a Technical Representative.

"Ritek® Wall Systems" refers to panels used as permanent formwork prior to being installed and core filled with concrete.

Disclaimer

i. This technical publication named Design, Detailing & Installation Manual together with the design tables and associated information related to Ritek® Wall Systems has been prepared to assist design professionals using Ritek® Wall Systems including without limitation, developers, builders, engineers, architects or quantity surveyors with the design of structural walls.

ii. It is the responsibility of the user to ensure that the use of this publication is appropriate and to exercise their own judgment when using this guide.

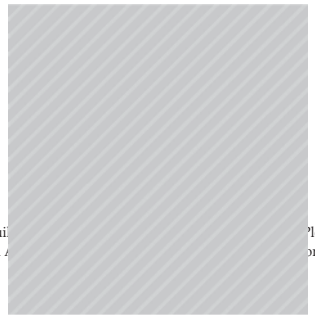
iii. Ritek Technology accept no responsibility (whether for negligence or otherwise) for any consequence arising from the use or application of this publication.

iv. The design and engineering of the structure of any building using Ritek® Wall Systems should only be undertaken by suitability qualified and experienced design professionals, engineers or consultants.

v. The full responsibility for the design, engineering and structural design, and certification of compliance with all relevant Australian Standards, NCC/BCA and any other statutory requirements at Local, State and Federal levels rests with the design professional, project engineer or project consultants including but not limited to the design engineer, acoustic consultant, energy efficiency consultant, fire engineer and any of their officers, employees, delegates, partners, agents and service providers of any nature.

vi. Ritek Technology reserve the right to change the specifications of this publication without notice.

vii. Please check with Ritek Technology that you have the latest version as this publication may be updated from time to time and certain details may change. This disclaimer applies to the extent permitted by law.



Ritek Systems Pty Ltd

www.ritek.com.au

1300 152 857

Design, Detailing & Installation Manual

Ritek® Wall Systems

Version Jan 2025

B PANEL SELECTION

Ritek® Benefit from our knowledge. Profit from our experience.

XL-Thermal Panel
(Class 1)

XL Wall Panel
(Class 1)

X-Plus Wall Panel
(Class 2-9)

Ritek® Wall Systems - Preliminary Wall Selection Guides

Table 2.1 and Table 2.2 gives guidance as to the wall type most likely to be required for various building applications based on the main fire resistance requirements. Note that there may be some specific situations where additional fire resistance requirements are required, therefore it is recommended to refer to the current BCA for details. In certain locations, to satisfy thermal or acoustic requirements the walls may need to be built up with additional material, refer to thermal and acoustic properties in this guide.

PRELIMINARY WALL SELECTION GUIDE - RITEK® XL & X-PLUS WALL® SYSTEMS **TABLE 2.1**

Wall Type	**115 XL 115 X-Plus**	**135 XL 135 X-Plus**	**150 XL 150 X-Plus**	**165 XL 165 X-Plus**	**200 XL 200 X-Plus**	**265 XL 265 X-Plus**
Wall Thickness (mm)	115	135	150	165	200	265
Concrete Core Thickness (mm)	103	123	138	153	188	253
Reinforcement Layers	Single	Single	Single	Single	Double	Double
Typical Application (BCA Class 2 - 9) (Refer To BCA FRL, Thermal, and Acoustics Requirements)	Balustrades	External & Internal walls; Load bearing walls	External & Internal walls; Load bearing walls; Party walls; Stair & lift shafts	External & Internal walls; Load bearing walls; Party walls; Blade walls; Stair & Lift shafts	Heavily loaded walls; Deep beams; Shear walls; Blade walls; Stair & Lift shafts	Heavily loaded walls; Deep beams; Shear walls; Columns; Stair & Lift shafts
Fire Resistance CSIRO Test (FRL)	See note #2 below		240/240/240[#3]			
Fire Resistance Level(AS3600 - 2018) - Fire One Side (FRL)[#1] - Fire Two Sides (FRL)[#1]	-/-/- -/-/-	90/90/90 60/-/-	90/90/90 60/-/-	120/120/120 90/-/-	180/180/180 120/-/-	240/240/240 240/-/-
Acoustic Rating - Rw Value - Rw + Ctr Value	48 43	50 45	51 47	50[#4] 50[#4]	54 50	57 52
Surface Density (kg/m2)	247	295	331	367	451	607
Axial Design Capacity 2.7M Wall - 32MPa; e=0.05; k=0.75 - (kN/m) - 40MPa; e=0.05; k=0.75 - (kN/m)	748 936	1025 1281	1221 1526	1410 1762	1835 2293	2590 3238

[#1] Based on Clause 5.7, AS 3600:2018 for $(N^*_f / \phi N_u) = 0.35$.

[#2] 115mm and 135mm panels not currently tested to AS1530.4

[#3] FRL determined by CSIRO fire test on a 150X-Plus Wall up to 3m high up to 266 kN/m loading. Applicable to 165, 200, and 265mm up to 3m high and 266kN/m loading with reinforcements similar to the 150X- Plus specimen (refer to Clause 3.9 in AS 1530.4:2014).

[#4] Equivalent to BCA Deemed-to-Satisfy 150mm Concrete Panel.

[#5] Impact insulation required if lift shaft is adjacent to a living or bedroom.

Ritek® Wall Systems - Wall Applications

The applications presented in the tables below are based on common applications for multi-residential buildings.

RITEK® WALL PANEL SELECTION — **TABLE 2.2**

Wall Type	115 XL 115 X-Plus	135 XL 135 X-Plus	150 XL 150 X-Plus	165 XL 165 X-Plus	200 XL 200 X-Plus	265 XL 265 X-Plus
Wall Thickness (mm)	115	135	150	165	200	265
Concrete Core Thickness (mm)	103	123	138	153	188	253
Reinforcement Layers	Single	Single	Single	Single	Double	Double

APPLICATION - BASEMENT & RETAINING WALLS

BCA Performance Requirements		Ritek XL & X-Plus Wall Panel Performance					
Requirement:	Value	**115**	**135**	**150**	**165**	**200**	**265**
Fire Resistance (FRL - AS3600) (minimum concrete core) [#1]	See BCA	N/A	90/90/90	90/90/90	120/120/120	180/180/180	240/240/240
Acoustic Rating							
Rw Value	N/A	48	50	51	50[#4]	54	57
Rw +Ctr Value	N/A	43	45	47	50[#4]	50	52
Thermal Rating (R Value)	N/A	0.28	0.29	0.30	0.31	0.34	0.39

APPLICATION - LIFT SHAFT & STAIR WELLS

BCA Performance Requirements		Ritek XL & X-Plus Wall Panel Performance					
Requirement:	Value	**115**	**135**	**150**	**165**	**200**	**265**
Fire Rating							
- FRL - AS3600[#1]	90/90/90 to 240/120/120	-	90/90/90	90/90/90	120/120/120	180/180/180	240/240/240
- FRL - AS1530.4 Test		See note #2 below		240/240/240[#3]			
Acoustic Rating							
- Rw Value	Rw50[#5]	48	50	51	50[#4]	54	57
Thermal Rating (R Value)	N/A	0.28	0.29	0.30	0.31	0.34	0.39

APPLICATION - SERVICE SHAFTS

BCA Performance Requirements		Ritek XL & X-Plus Wall Panel Performance					
Requirement:	Value	**115**	**135**	**150**	**165**	**200**	**265XL**
Fire Rating							
- FRL - AS3600[#1]	90/90/90 to 240/120/120	-	90/90/90	90/90/90	120/120/120	180/180/180	240/240/240
- FRL - AS1530.4 Test		See note #2 below		240/240/240[#3]			
Acoustic Rating							
- Rw +Ctr Value	Rw+Ctr 40	43	45	47	50[#4]	50	52
Thermal Rating (R Value)	N/A	0.28	0.29	0.30	0.31	0.34	0.39

[#1] Based on Clause 5.7, AS 3600:2018 for $(N^*_f / \phi N_u) = 0.35$.

[#2] 115mm and 135mm panels not currently tested to AS1530.4

[#3] FRL determined by CSIRO fire test on a 150X-Plus Wall up to 3m high up to 266 kN/m loading. Applicable to 165, 200, and 265 up to 3m high and 266kN/m loading with reinforcements similar to the 150X- Plus specimen (refer to Clause 3.9 in AS 1530.4:2014).

[#4] Equivalent to BCA Deemed-to-Satisfy 150mm Concrete Panel.

[#5] + Impact insulation required if lift shaft is adjacent to a living or bedroom.

Ritek® Wall Systems - Wall Applications

RITEK® WALL PANEL SELECTION **TABLE 2.2**

Wall Type	115 XL 115 X-Plus	135 XL 135 X-Plus	150 XL 150 X-Plus	165 XL 165 X-Plus	200 XL 200 X-Plus	265 XL 265 X-Plus
Wall Thickness (mm)	115	135	150	165	200	265
Concrete Core Thickness (mm)	103	123	138	153	188	253
Reinforcement Layers	Single	Single	Single	Single	Double	Double

APPLICATION - BLADE COLUMNS (XL & X-Plus)

BCA Performance Requirements		Ritek® XL & X-Plus Wall® Panel Performance					
Performance Requirement:	Value	115	135	150	165	200	265
Fire Resistance (FRL - AS3600) (minimum concrete core) #1	90/90/90 to 240/120/120	-	60/ - / -	60/ - / -	90/ - / -	120/ - / -	240/ - / -
Acoustic Rating							
- Rw value	N/A	48	50	51	50#5	54	57
- Rw + Ctr value	N/A	43	45	47	50#5	50	52
Thermal Rating (R Value)	N/A	0.28	0.29	0.30	0.31	0.34	0.39

APPLICATION - EXTERNAL FAÇADE WALLS

BCA Performance Requirements		Ritek® XL & X-Plus Wall® Panel Performance (Inc. 28mm furring channel on beta fix bracket, 15mm foil board and 10mm plaster board)					
Performance Requirement:	Value	115	135	150	165	200	265
Fire Rating							
- FRL - AS3600#1	90/90/90 to 240/120/120	-	90/90/90	90/90/90	120/120/120	180/180/180	240/240/240
- FRL - AS1530.4 Test		See Note #2 below		240/240/240#3			
Thermal Rating (R Value)							
-Climate Zone 1	2.4#4	-	-	-	-	-	-
-Climate Zone 2 to 8	1.4#4	1.6	1.7	1.7	1.7	1.7	1.7

#1 Based on Clause 5.7, AS 3600:2018 for $(N^*_f / \phi N_u) = 0.35$.

#2 115mm and 135mm panels not currently tested to AS1530.4

#3 FRL determined by CSIRO fire test on a 150X-Plus Wall up to 3m high up to 266 kN/m loading. Applicable to 165, 200, and 265 up to 3m high and 266kN/m loading with reinforcements similar to the 150X-Plus specimen. Refer to Clause 3.9 in AS 1530.4:2014.

#4 BCA Vol. 1 2022 Deemed-to-Satisfy Provisions J4D6J1. where the wall is 80% or more of the area of the wall-glazing construction for class 2 common area, 5, 6, 7, 8 Or 9b building or Class 9a building other than the ward area.

#5 Equivalent to BCA Deemed-to-Satisfy 150mm Concrete Panel.

Ritek® Wall Systems - Wall Applications

RITEK® XL & X-PLUS WALL PANEL SELECTION — TABLE 2.2

Wall Type	115	135	150	165	200	265
Wall Thickness (mm)	115	135	150	165	200	265
Concrete Core Thickness (mm)	103	123	138	153	188	253
Reinforcement Layers	Single	Single	Single	Single	Double	Double

APPLICATION - INTERNAL CORRIDOR WALLS

BCA Performance Requirements		Ritek® XL & X-Plus Wall® Panel Performance					
Requirement:	Value	115	135	150	165	200	265
Fire Rating							
- FRL - AS3600[#1]	90/90/90 to 240/120/120	-	90/90/90	90/90/90	120/120/120	180/180/180	240/240/240
- FRL - AS1530.4 Test		See Note #2 below		240/240/240[#3]			
Acoustic Rating							
- Rw value	Rw 50	48	50	51	50[#5]	54	57
Thermal Rating (R Value)	N/A	0.28	0.29	0.30	0.31	0.34	0.39

APPLICATION - INTERNAL PARTY WALLS

BCA Performance Requirements		Ritek® XL & X-Plus Wall® Panel Performance					
Requirement:	Value	115	135	150	165	200	265
Fire Rating							
- FRL - AS3600[#1]	90/90/90 to 240 / - / -	-	90/90/90	90/90/90	120/120/120	180/180/180	240/240/240
- FRL - AS1530.4 Test		See Note #2 below		240/240/240[#1]			
Acoustic Rating							
- Rw + Ctr value	Rw+Ctr50[#4]	43	45	47	50[#5]	50	52
Thermal Rating (R Value)	N/A	0.28	0.29	0.30	0.31	0.34	0.39

APPLICATION - OTHER INTERNAL WALLS

BCA Performance Requirements		Ritek® XL & X-Plus Wall® Panel Performance					
Requirement:	Value	115	135	150	165	200	265
Fire Resistance (FRL) AS3600[#1] (minimum concrete core)	90/ - / - to 240/ - / -	-	60/ - / -	60/ - / -	90/ - / -	120/ - / -	240/ - / -
Acoustic Rating							
- Rw value	N/A	48	50	51	50[#5]	54	57
- Rw + Ctr value	N/A	43	45	47	50[#5]	50	52
Thermal Rating (R Value)	N/A	0.28	0.29	0.30	0.31	0.34	0.39

[#1] Based on Clause 5.7, AS 3600:2018 for $(N^*_t / \phi N_u) = 0.35$.

[#2] 115mm and 135mm not currently rested to AS1530.4

[#3] FRL determined by CSIRO fire test on a 150X-Plus Wall up to 3m high up to 266 kN/m loading, applicable to 165, 200, and 265 up to 3m high and 266kN/m loading with reinforcements similar to the 150XL specimen. Refer to Clause 3.9 in AS 1530.4:2014.

[#4] Impact Insulation required if party wall is separating a kitchen or bathroom from a living or bedroom.

[#5] Equivalent to BCA Deemed-to-Satisfy 150mm Concrete Panel.

Ritek® Wall Systems - Typical Wall Applications

Ritek® Wall Systems are prefabricated permanent formwork for reinforced concrete walls and can be used for all applications for reinforced concrete walls from 103mm up to 253mm concrete core thickness.

External

Stairwells

Lift Shafts / Internal Walls

Party Walls

Balustrades

High Traffic Areas

Ritek® Wall Systems - Typical Wall Applications

Ritek wall systems are suitable for use in single residential (Ritek XL), multi-storey residential and commercial buildings as load bearing/structural, fire and acoustic rated walls up to 25 storeys or higher in non-load-bearing capacities (Ritek X-Plus). Panels can be configured to include additional materials to increase thermal and acoustic properties as specified by the building designer.

Retaining Walls

Blade Walls

Planter Boxes

Basements

Remote Housing

Footings & Boundaries

PANEL SELECTION B

Ritek Systems Pty Ltd

www.ritek.com.au

1300 152 857

Version Jan 2025

XL Wall Panel

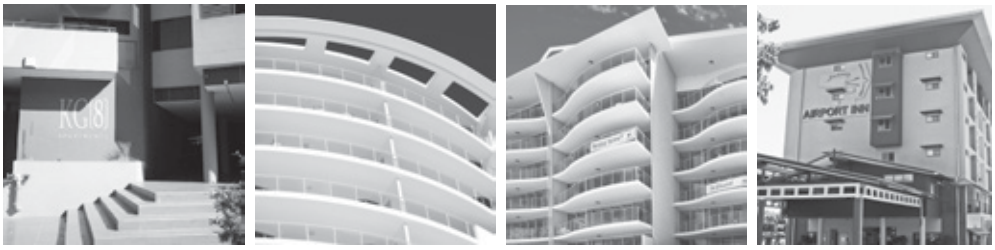
X-Plus Wall Panel

Design, Detailing & Installation Manual

Ritek® Wall System

Version Jan 2025

C DESIGN



Ritek® Benefit from our knowledge. Profit from our experience.

CodeMark CMI Certification Certificate CM40374

XL Wall Panel

CodeMark CMI Certification Certificate CM40375

X-Plus Wall Panel

Ritek®

Ritek® Wall Systems - **Vertical Load Capacity**

The vertical load design capacity (ϕN_u) for the various wall thicknesses, wall heights and support conditions are shown in the Design Axial Load Capacity Charts.

The design capacities have been calculated in accordance with AS 3600 Clause 11.5 SIMPLIFIED DESIGN METHOD FOR WALLS SUBJECT TO VERTICAL COMPRESSION FORCES, as follows:

Design axial compressive strength = $\varphi\phi N_u$ (kN/m)
where:

φ ϕ = 0.6

N_u = the ultimate strength (kN/m)
= $(t_w - 1.2e - 2e_a)0.6\, f'_c\, 10^3$

t_w = Wall concrete thickness (m)
= overall thickness – 0.012

e = the eccentricity of the load (m)
= 0 for continuous floor slab
(adopt 0.05 tw as minimum)
= 0.166 t_w for discontinuous floor slab

e_a = additional eccentricity (m)
= $H^2_{we}/(2500\, t_w)$

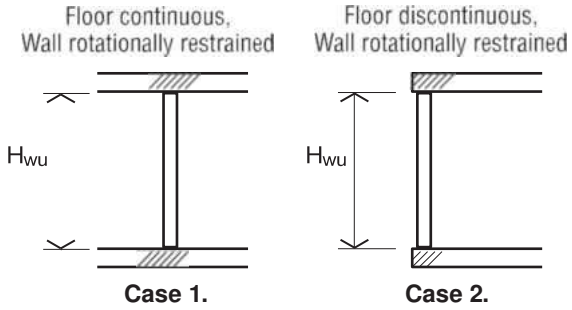
H_{we} = the effective height of wall (m)
= 0.75 H_{wu} where wall restrained against rotation top and bottom by floors
= 1.0 H_{wu} where wall not rotationally restrained top and bottom

$\frac{H_{we}}{t_w}$ = 30 max. when $N^* > 0.03\, f'_c\, A_g$
= 50 max. when $N^* \leq 0.03\, f'_c\, A_g$

H_{wu} = Unsupported height of wall (m)

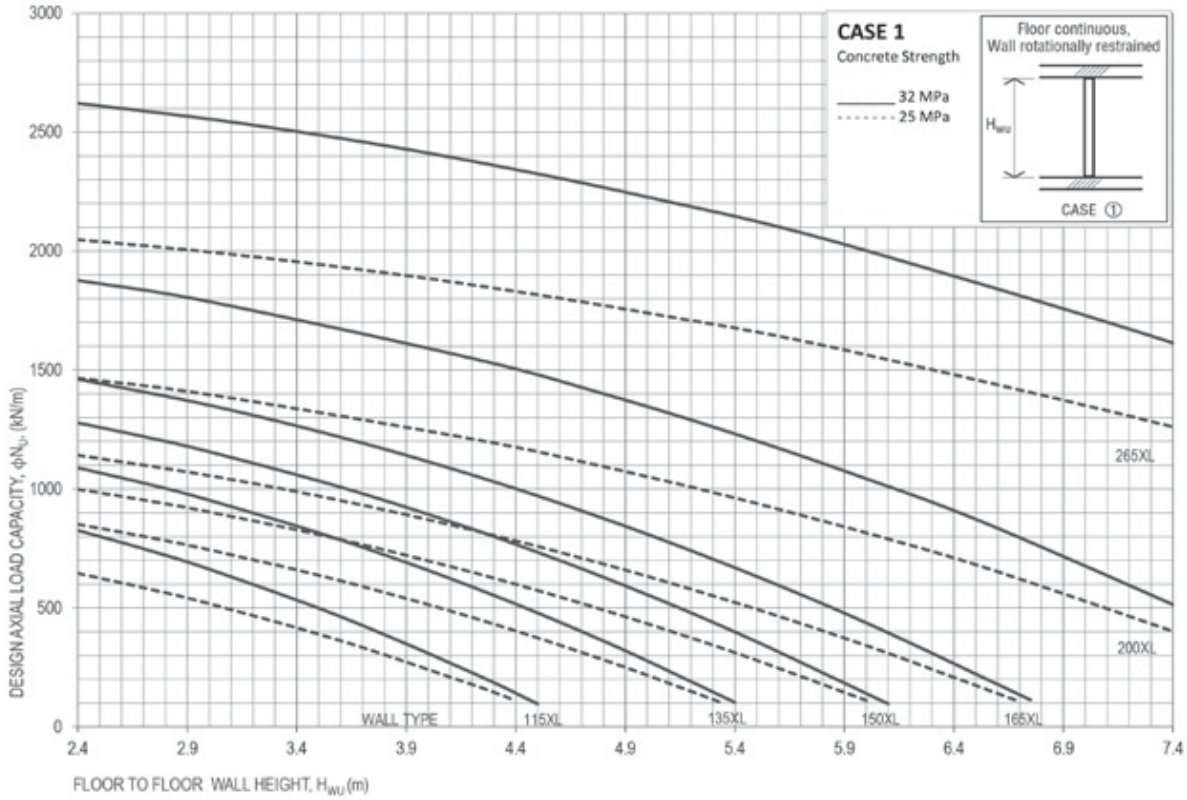
f'_c = Concrete compressive strength (MPa)

CONTINUITY & RESTRAINT CONDITIONS **FIGURE 3.1**

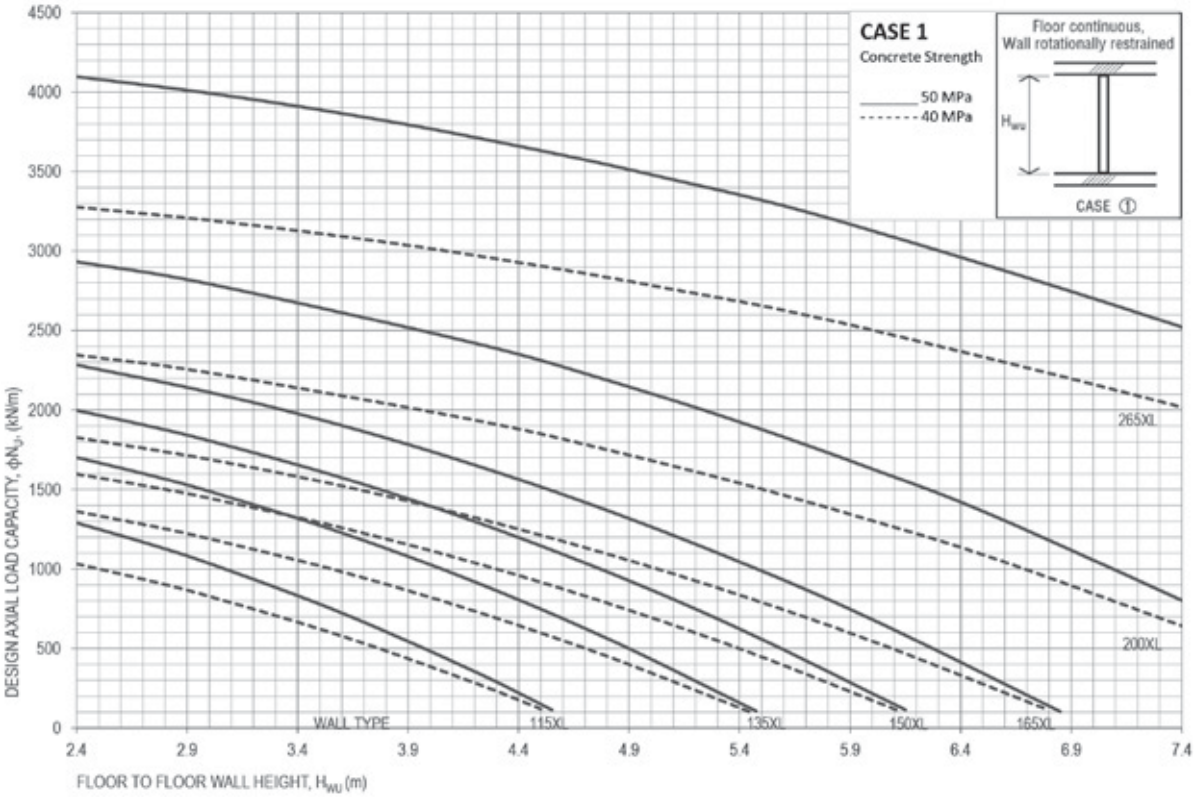


Ritek® Wall Systems - **Vertical Load Capacity**

VERTICAL LOAD CAPACITY **CHART 3.1**

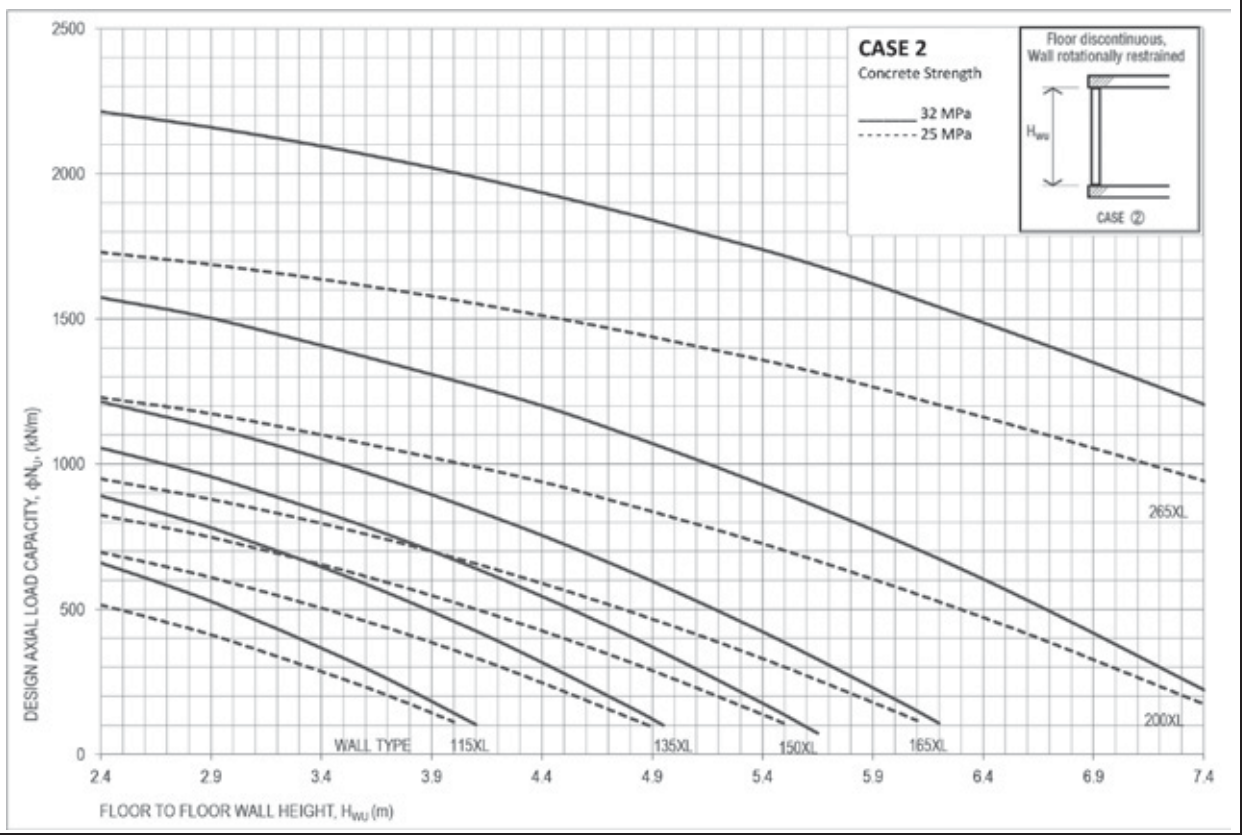


VERTICAL LOAD CAPACITY **CHART 3.2**

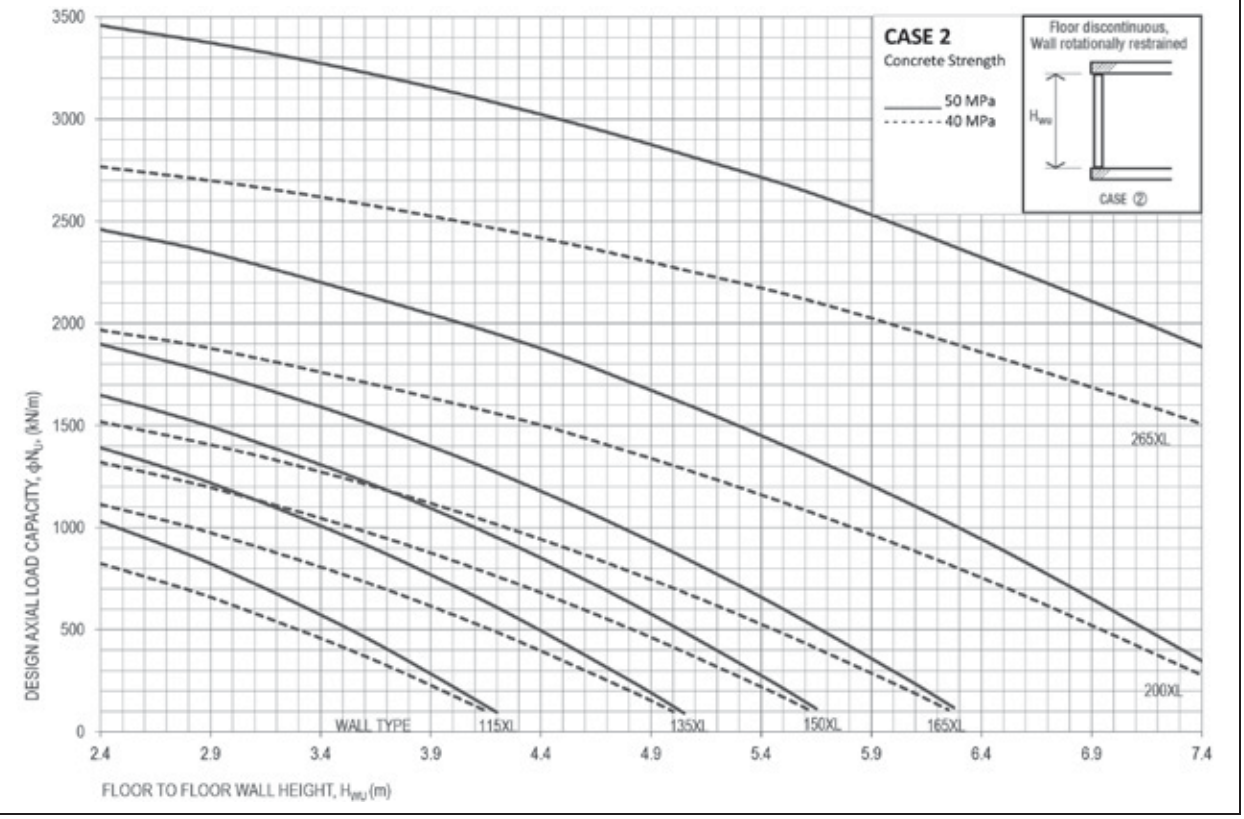


Ritek® Wall Systems - **Vertical Load Capacity**

VERTICAL LOAD CAPACITY **CHART 3.3**



VERTICAL LOAD CAPACITY **CHART 3.4**



Ritek® Wall Systems - **Lateral Load Capacity**

The capacity of a wall subjected to a lateral load (wind or earthquake) is given in Chart 3.5.

It has been calculated on the basis of a simply supported beam spanning vertically between floor supports, with central reinforcement @ 400 mm centres and concrete strength 25 MPa, refer Figure 3.2.

Capacities are given for N12 and N16 vertical reinforcement. Higher capacities can be achieved by increasing the size of the vertical reinforcement.

The capacity is given by the formula:

Design Capacity, $w = 8 \phi M_u / L^2$ (kPa)

where:

$$M_u = f_{sy}\, d\, A_{st} \left[1 - \frac{0.6\, A_{st}\, f_{sy}\, 10^{-6}}{f'_c\, b\, d\, 10^{-3}} \right] \quad \text{(kN.m/m)}$$

ϕ = 0.8

L = Design span for bending (m)
= Height between centre of floor slabs

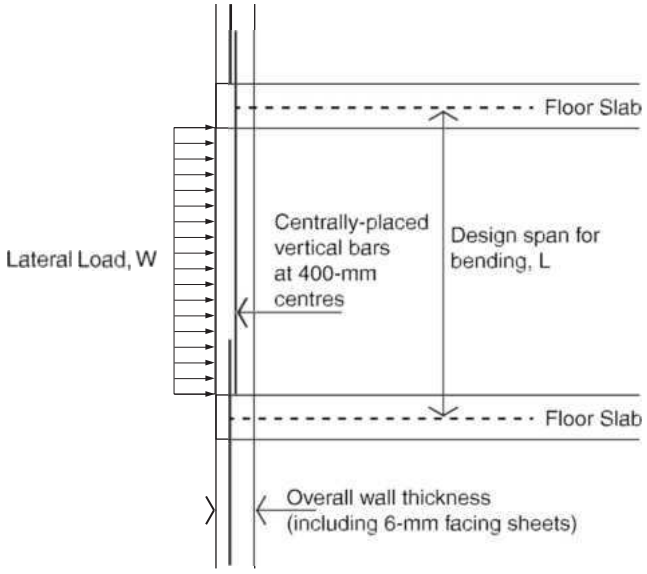
b = Design width (m)
= 1.0

d = Depth to tensile reinforcement (m)
= $t_w/2$

t_w = Wall concrete thickness (m)
= Overall wall thickness - 0.012

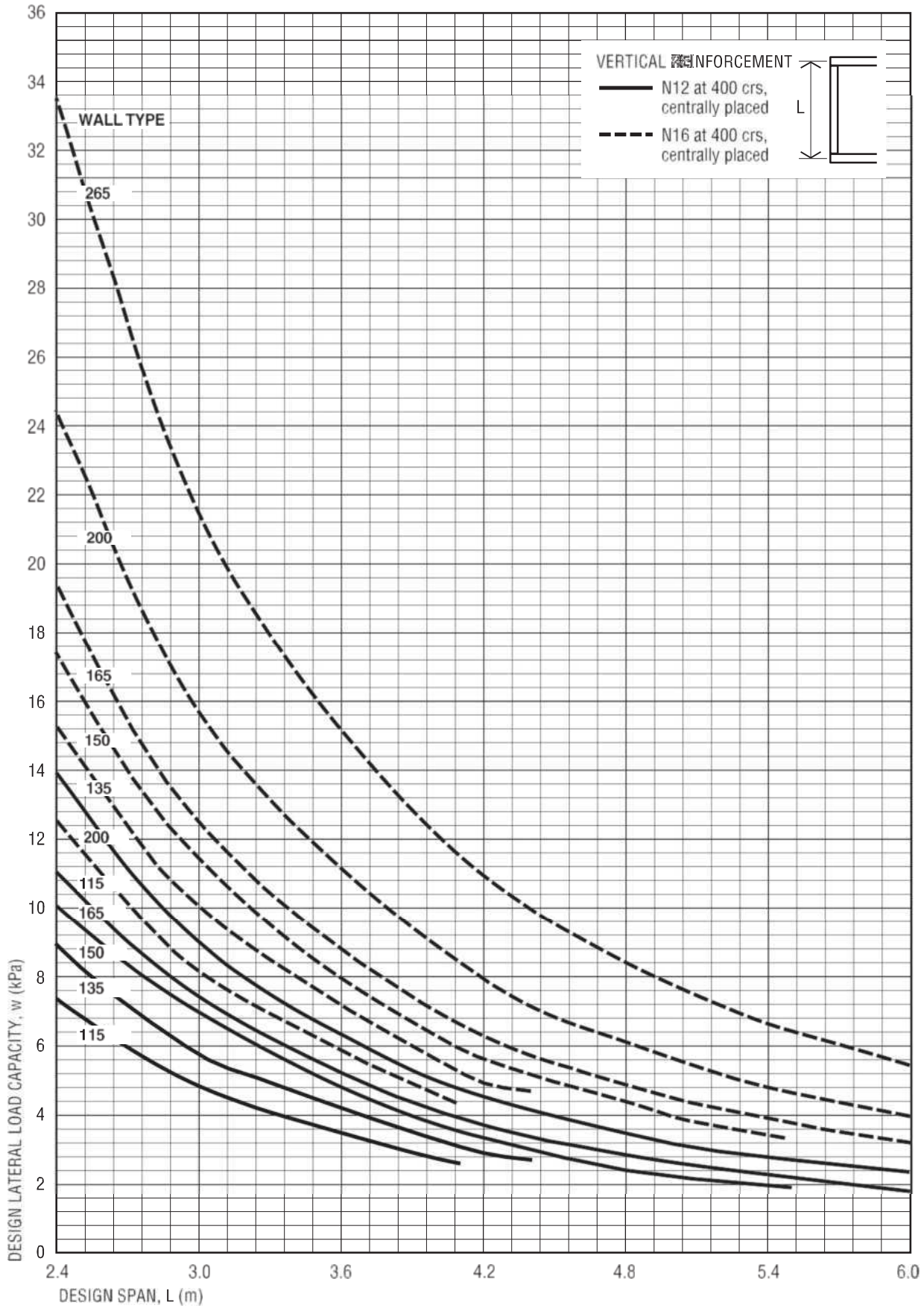
A_{st} = Area of vertical reinforcement (mm^2/m) f'_c = Concrete compressive strength (MPa) f_{sy} = Yield strength of reinforcement (MPa)

ASSUMPTIONS FOR LATERAL LOAD CAPACITY **FIGURE 3.2**



Ritek® Wall Systems - **Lateral Load Capacity**

DESIGN LATERAL LOAD CAPACITY **CHART 3.5**



Ritek® Wall Systems - **Racking Resistance**

Racking Resistance

When a wall is subjected to racking forces, it can fail by either overturning of the wall or shear through the length of the wall. The wall capacity is therefore limited by the lesser value of overturning or shear.

Wall Overturning

The resistance to overturning of the wall is controlled by wall thickness and length, concrete strength and the amount and strength of tiedown reinforcement. In addition, weight of the wall as well as any other applied loads will help to resist overturning. The overturning is calculated in accordance with the assumptions contained in AS 3600 Clause 8.1.2.1 Combined bending and axial force. The following formula has been used:

$$V = \frac{\phi\phi\left[(f_{sy} A_{st}\, 10^{-3} + w\, L_w)\, d\left(1 - \frac{0.6(f_{sy} A_{st}\, 10^{-3} + w\, L_w)}{t_w\, d\, f'_c\, 10^{3}}\right) - w\, L_w \left(d - \frac{L_w}{2}\right)\right]}{H_w}$$

where:

V	= Design overturning resistance	(kN)
ϕ	= Strength reduction factor for shear = 0.7 (adopt shear value)	
f_{sy}	= Yield strength of reinforcement	(MPa)
f'_c	= Concrete compressive strength	(MPa)
A_{st}	= Area of tiedown reinf. in tension = Reinf. area over half wall length	(mm^2)
w	= Total Vertical load on wall = $w_s + w_{sw}$	(kN/m)
w_s	= Superimposed permanent load (PL)	(kN/m)
w_{sw}	= Self-weight of wall (SW)	(kN/m)
d	= Distance from the compression face (end of wall) to the centroid of tensile reinforcement	(m)
H_w	= Wall height	(m)
L_w	= Wall length	(m)
t_w	= Concrete thickness = Overall wall thickness – 0.012	(m)

The overturning capacities shown in Chart 3.6 have been calculated for the 115 (XL & X-Plus) Walls with concrete strength 25 MPa and tiedown rods N12@ 400 mm centres. Two sets of design curves are given covering two load cases. One set of curves is for a UPL of 0 kN/m and the second set is for a UPL of 100 kN/m. Where a UPL is between these values, the overturning capacity can be obtained by interpolation. Increases in wall size or concrete strength will only give marginally higher strength.

Ritek® Wall Systems - **Racking Resistance**

Wall Shear

The shear strength through the wall is controlled by wall thickness and length, concrete strength and amount and strength of reinforcement. The shear capacity is calculated in accordance with AS 3600 Clause 11.6.3 **Strength in shear**, as follows:

$V_u = \varphi\phi\ (V_{uc} + V_{us})$

When $H_w/L_w < 1.3$

$$V_{uc} = \left[0.66\sqrt{f'_c} - 0.21\frac{H_w}{L_w}\sqrt{f'_c}\right] 0.8\ L_w\ t_w\ 10^3$$

When $1.3 \le H_w/L_w < 1.83$

$$V_{uc} = \left[0.05\sqrt{f'_c} + \frac{0.1\ f'_c}{\left[\frac{H_w}{L_w} - 1\right]}\right] 0.8\ L_w\ t_w\ 10^3$$

When $H_w/L_w \ge 1.83$

$$V_{uc} = [0.17\sqrt{f'_c}]\ 0.8\ L_w\ t_w\ 10^3$$

$$V_{us} = \frac{A_s}{s} f_{sy}\ 0.8\ L_w\ 10^3$$

where:

V_u	=	Design strength in shear	(kN)
V_{uc}	=	Shear strength without reinf.	(kN)
V_{us}	=	Contribution to shear strength by reinforcement	(kN)
ϕ	=	Strength reduction factor for shear	
	=	0.7	
f'_c	=	Concrete compressive strength	(MPa)
f_{sy}	=	Yield strength of reinforcement	(MPa)
A_s	=	Area of vertical and horizontal reinforcing bars	(mm^2)
s	=	Spacing of vertical and horizontal reinforcing bars	(mm)
H_w	=	Wall height	(m)
L_w	=	Wall length	(m)
t_w	=	Wall concrete thickness	(m)
	=	Overall thickness – 0.012	

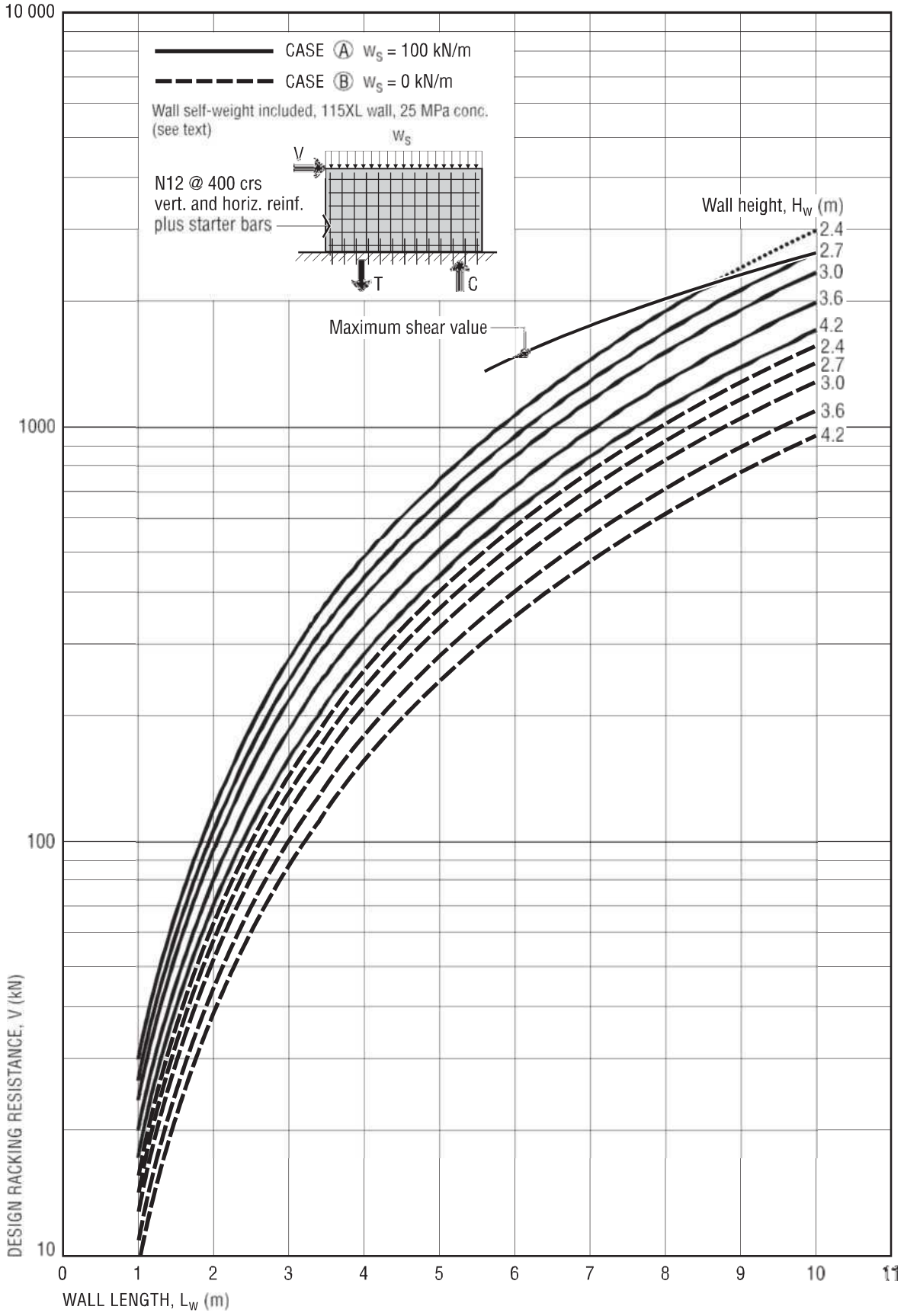
The shear capacity given in Chart 3.6 has been calculated for the 115 (XL & X-Plus) Wall with concrete strength 25 MPa and N12 bars@ 400 mm centres. Increases in wall size, concrete strength or reinforcement will give proportion- ally higher shear strength.

Racking Resistance

The racking resistance given in Chart 3.6 is the lesser of the shear and overturning values. Except for long and heavily loaded walls, the value of racking resistance is limited by overturning.

Ritek® Wall Systems - **Racking Resistance**

RACKING RESISTANCE - VERTICAL BARS, N12 AT 400 CRS — CHART 3.6



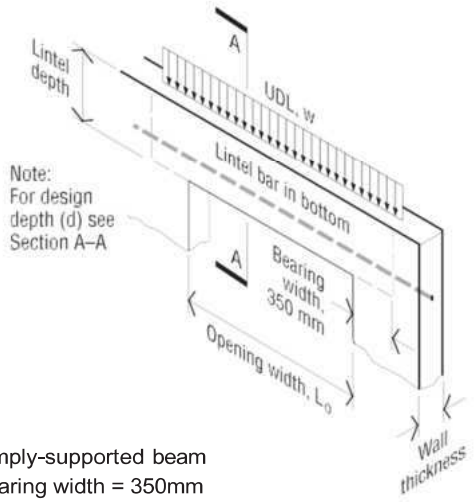
Ritek® Wall Systems - **Lintel Capacity**

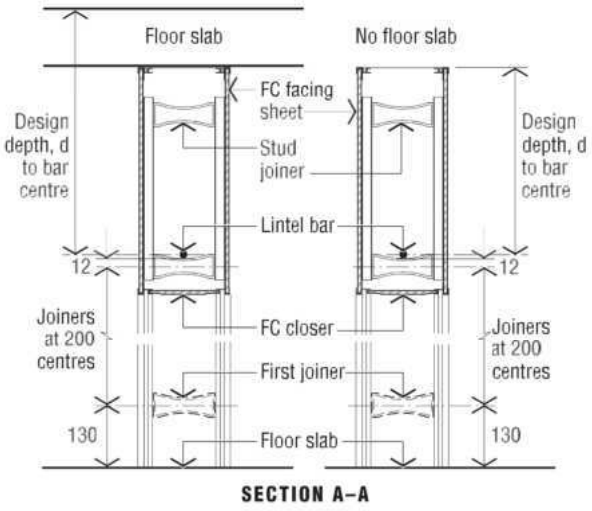
Lintel Capacity

The design lintel capacity is the lesser of the strength in flexure or in shear. Deflection must also be checked to ensure that serviceability limits are not exceeded.

The design capacities given in Charts 3.7 to 3.12 have been calculated on the basis of simply supported beams using concrete strength of 25 MPa and the details shown in Figure 3.3

ASSUMED DETAILS FOR LINTEL CAPACITIES **FIGURE 3.3**





- Simply-supported beam
- Bearing width = 350mm
- Design span for flexure, L = Opening width +0.35 (m)
- Design span for deflection, L = Opening width (m)
- Design span for shear, L = Opening width - 2d (m)
- No vertical shear reinforcement

Flexural Capacity

The capacity in flexure is calculated for a simply supported beam using the following formula:

Design Capacity, $w = 8 \phi M_u / L^2$ (kN/m)

where:

$$M_u = f_{sy}\, d\, A_{st} \left[1 - \frac{0.6\, A_{st}\, f_{sy}\, 10^{-6}}{f'_c\, b\, d}\right] 10^{-3} \quad \text{(kN.m)}$$

$\phi = 0.8$

L = Design span for flexure (m)
= $L_o + 0.35$
L_o = Opening width (m)
b = Thickness (m)
= Overall wall thickness – 0.012
d = Depth to tensile reinforcement (m)
A_{st} = Area of tensile reinforcement (mm^2)

NOTE: AS3600 requires the minimum area of tensile reinforcement to be such that:

$$A_{st} \geq [\varphi_b (D/d)^2 \; f'_{ct.f}/f_{sy}] b_w d$$

The cases where the reinforcement does not reach this minimum have not been included in the charts.

f'_c = Concrete compressive strength (MPa)
f'_{ct} = Concrete flexural tensile strength
= $0.6 \sqrt{f'_c}$ (MPa)
f_{sy} = Yield strength of reinforcement (MPa)

Ritek® Wall Systems - **Lintel Capacity**

Shear Capacity

The shear capacity shown in Charts 3.7 to 3.12 has been calculated on the basis of simply supported beams without vertical shear reinforcement, using the following formula. For lintels with depths greater than 750 mm, shear reinforcement must be used. Where capacity, greater than shown in Charts 3.7 to 3.12 is needed, it may be increased by using either shear reinforcement or higher strength concrete.

Design capacity, $w = 2V^*/L$ (kN/m)

where:

$V^* = \phi (V_{uc} + V_{us})$ (kN)
when $A_{sv} \geq 0.35\, b_v\, s/f_{sy.f}$

$V^* = 0.5\, \phi\, V_{uc}$ (kN)
when A_{sv} = none

$\phi = 0.7$

$V_{uc} = \beta_1\, \beta_2\, \beta_3\, b_v\, d_o\, (A_{st}\, f'_c/b_v\, d_o)^{1/3} 10^{-3}$ (kN)

$V_{us} = (A_{sv}\, f_{sv.f}\, d_o/s) \cot \theta_v\, 10^{-3}$ (kN)

L = Design span for shear
$= L_o - 2\, d$ (m)

L_o = Opening width (m)

d = Depth to tensile reinforcement (m)

$\beta_1 = 1.1(1.6 - d) \geq 1.1$

$\beta_2 = 1.0$

$\beta_3 = 1.0$

A_{st} = Area of tensile reinforcement (mm^2)

A_{sv} = Area of shear reinforcement (mm^2)

s = Spacing of shear reinforcement (m)

$\cot \theta_v = 0.707$ for vertical shear reinforcement

f'_c = Concrete compressive strength (MPa) $f_{sy.f}$ = Yield strength of shear reinforcement (MPa) b_v = Web thickness (m)
= Overall wall thickness - 0.012

Deflection

The amount of deflection has been calculated on the basis of simply supported beams. The maximum deflection was checked not to exceed span over deflection ratio of 500 for a serviceability load of 70% of ultimate strength design load. The following formula has been used.

$$\text{Deflection, } \Delta = \frac{5}{384} \times \frac{w_d L^4}{E_{cj}\, I_{ef}} \quad \text{(m)}$$
$$\leq L/500$$

where:

w_d = Design load for deflection (kN/m)
$= 0.7\, w\, (1.0 + k_{cs})$

w = Ultimate strength design capacity

k_{cs} = Long-term factor
$= 0.8$

L = Design span for deflection (m)
$= L_o$

L_o = Opening width (m)

Υ = Concrete density (kN/m^3)
$= 25$

f_{cm} = Mean concrete compressive strength (MPa)

E_{cj} = Concrete modulus of elasticity (MPa)
$= \Upsilon^{1.5}(0.043\sqrt{f_{cm}})$
$= 30{,}400$

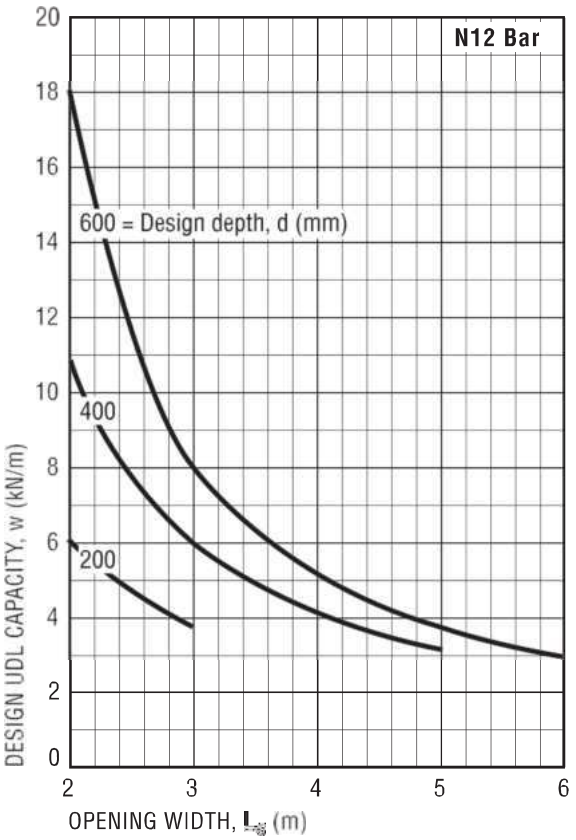
I_{ef} = Effective second moment of inertia (m^4)
$= 0.045\, b\, d^3$

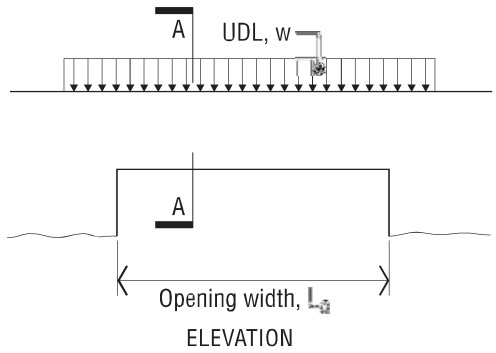
b = Thickness (m)
= Overall wall thickness - 0.012

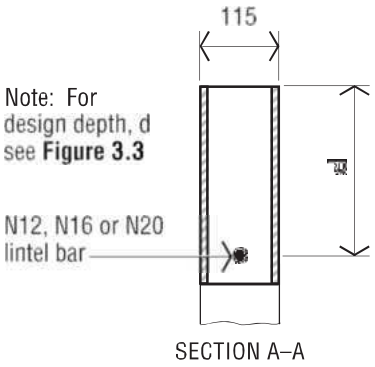
d = Depth to tensile reinforcement (m)

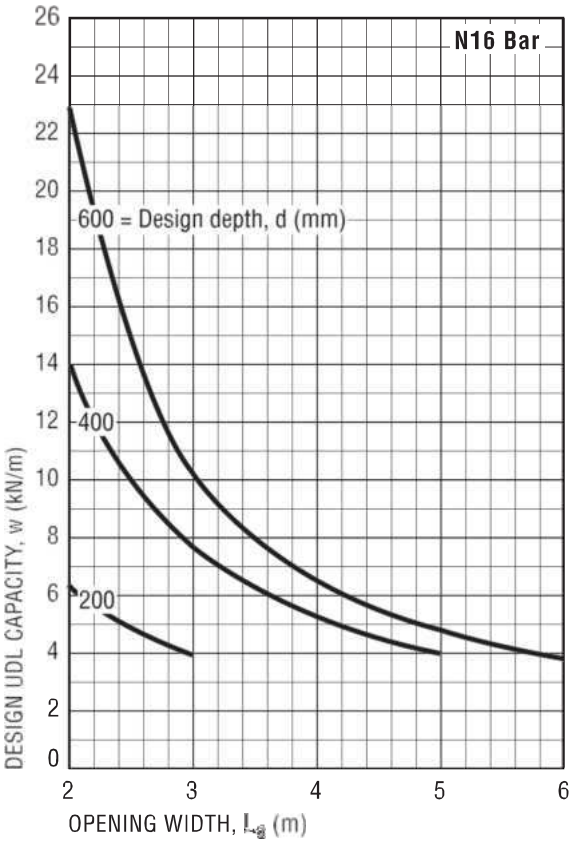
Ritek® Wall Systems - **Lintel Capacity**

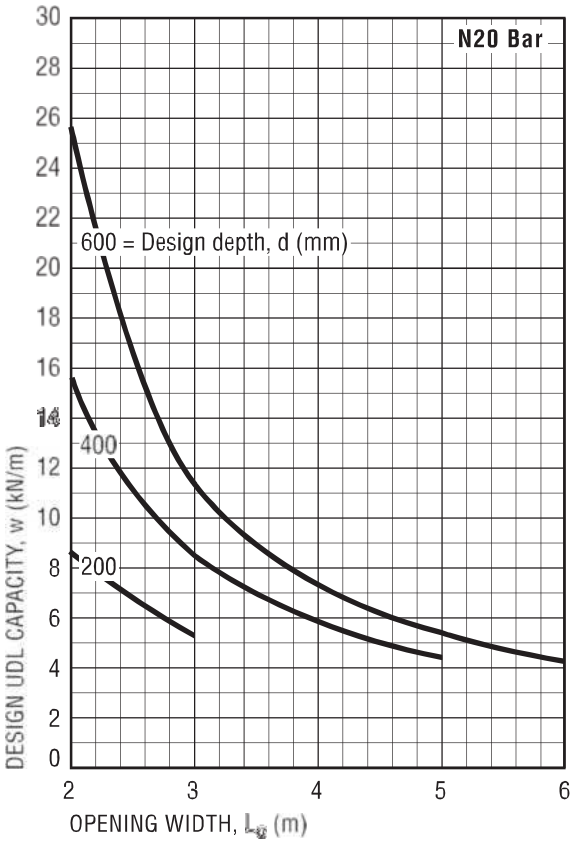
115 XL & X-PLUS LINTEL DESIGN LOAD CAPACITY — CHART 3.7





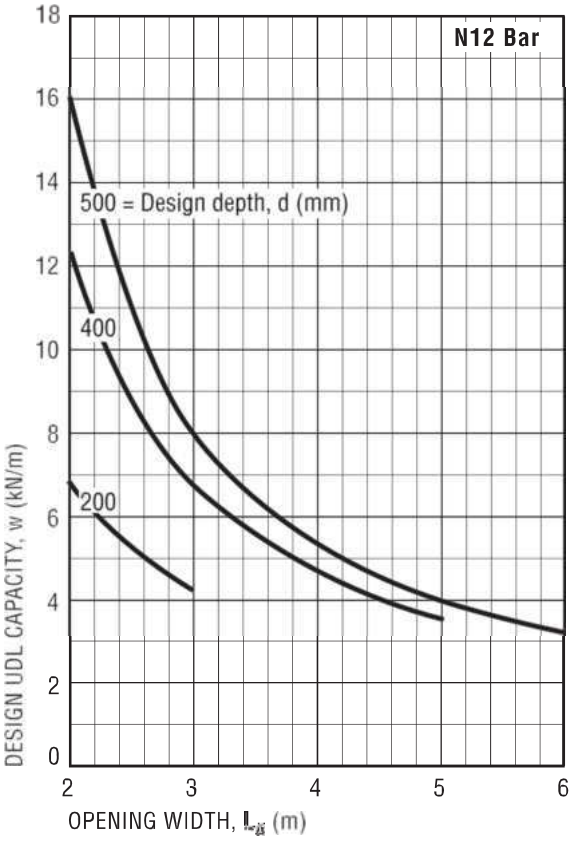


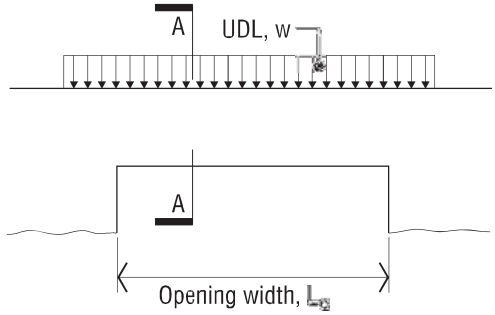


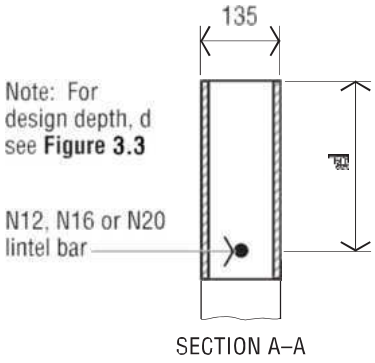


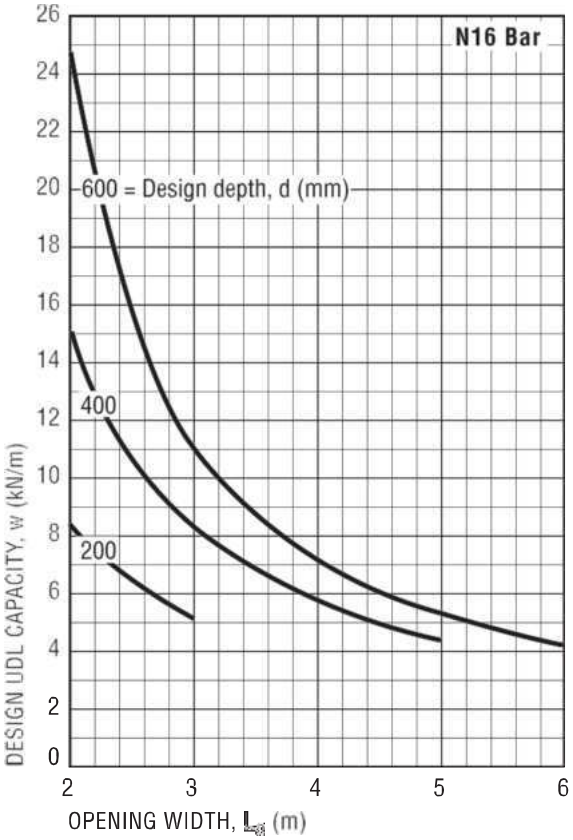
Ritek® Wall Systems - **Lintel Capacity**

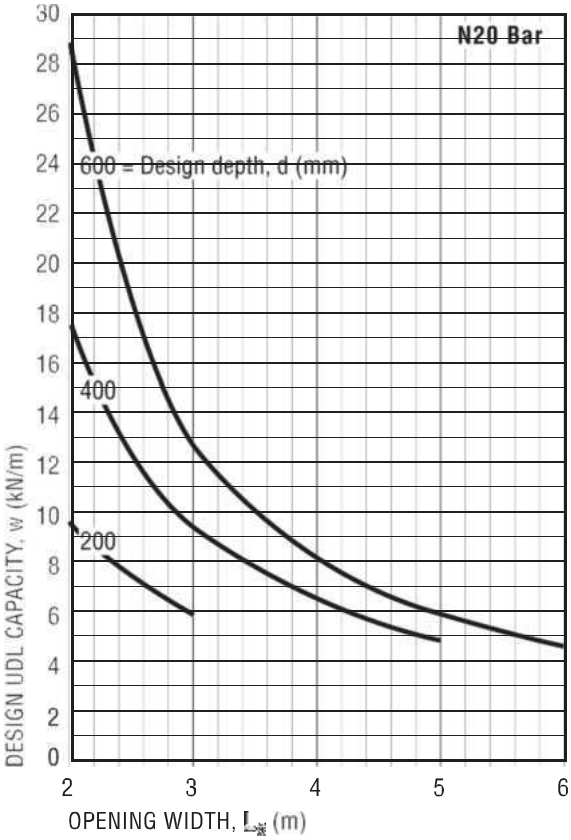
135 XL & X-PLUS LINTEL DESIGN LOAD CAPACITY — CHART 3.8





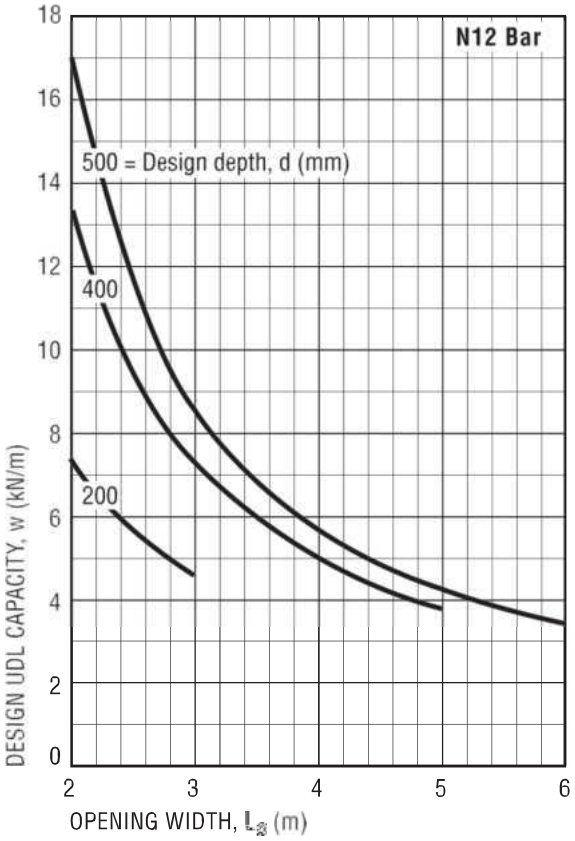


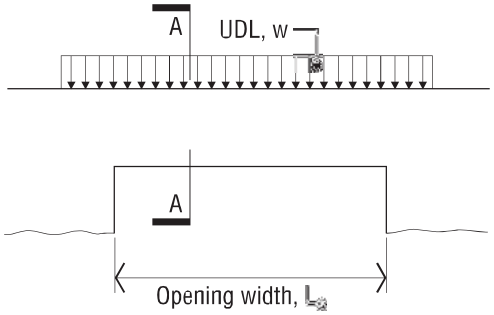


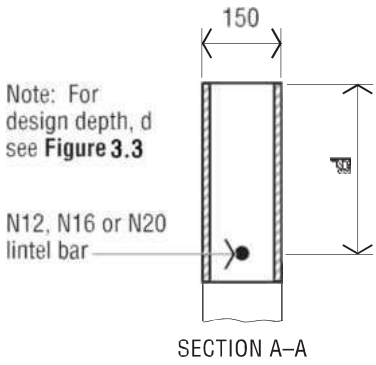


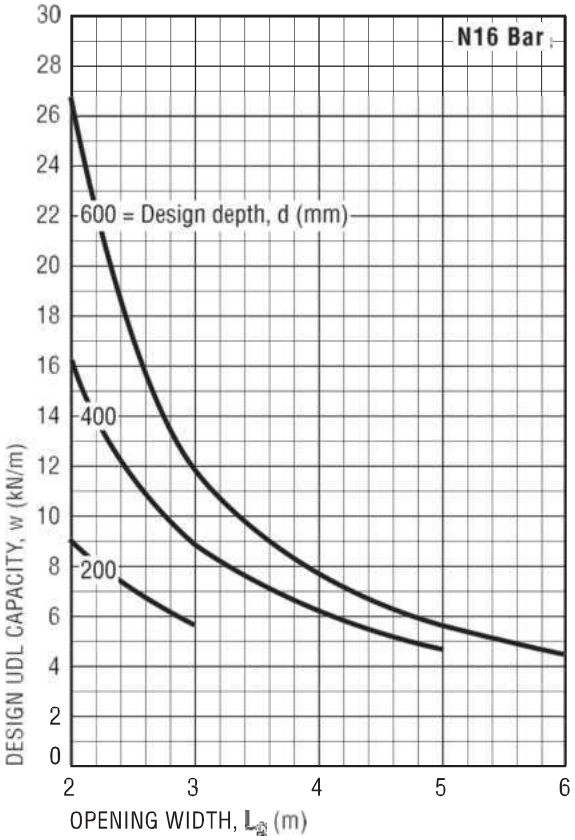
Ritek® Wall Systems - **Lintel Capacity**

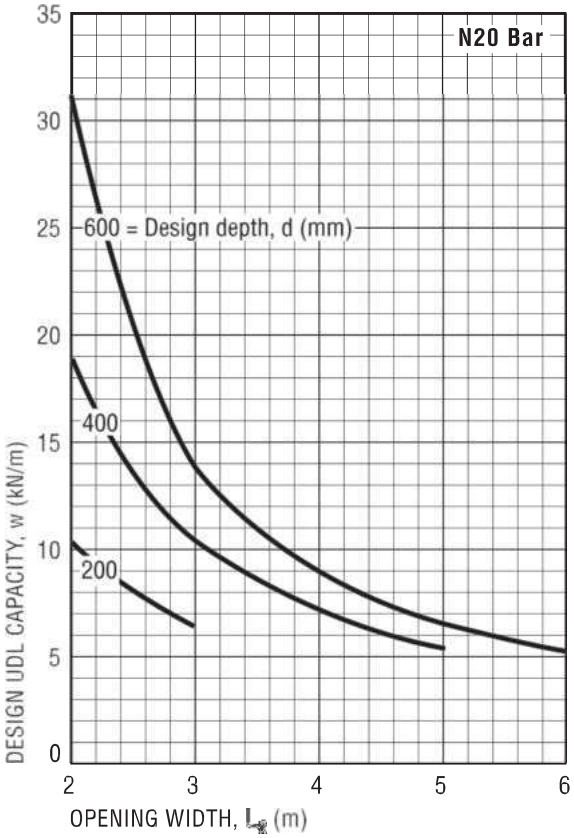
150 XL & X-PLUS LINTEL DESIGN LOAD CAPACITY	CHART 3.9





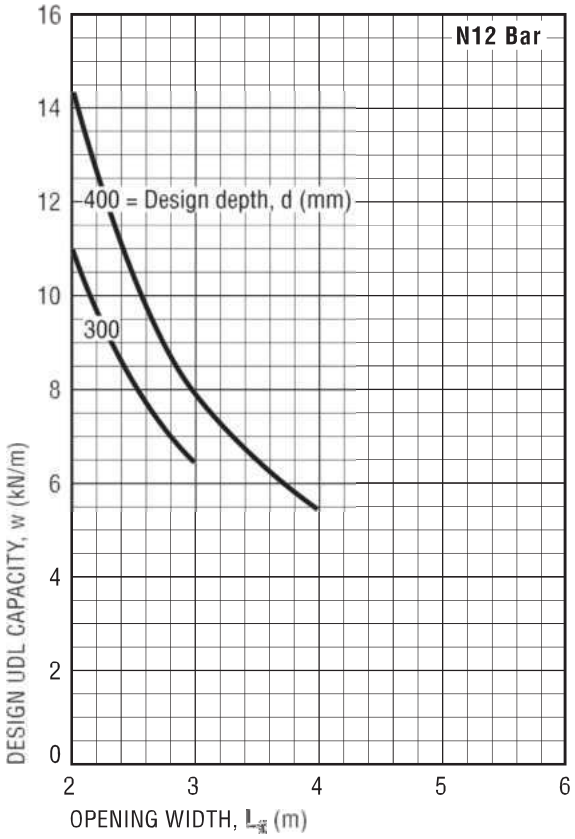


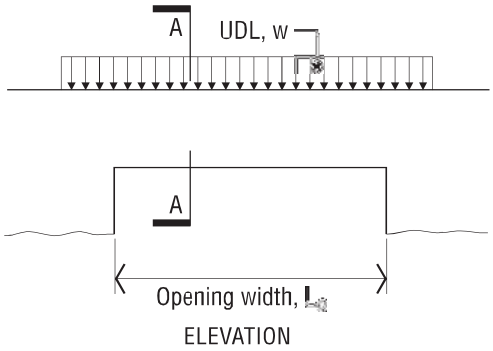


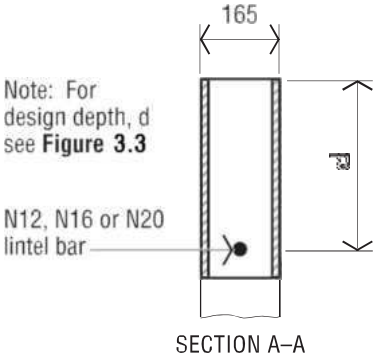


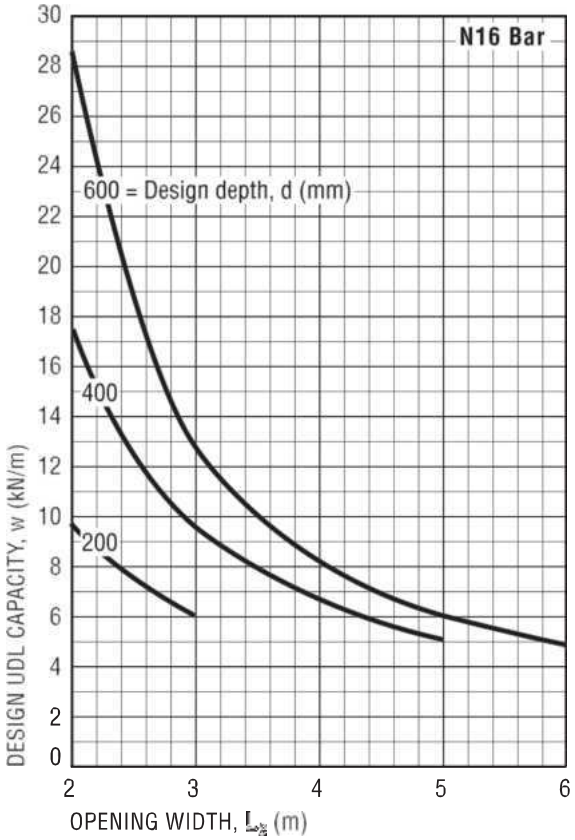
Ritek® Wall Systems - **Lintel Capacity**

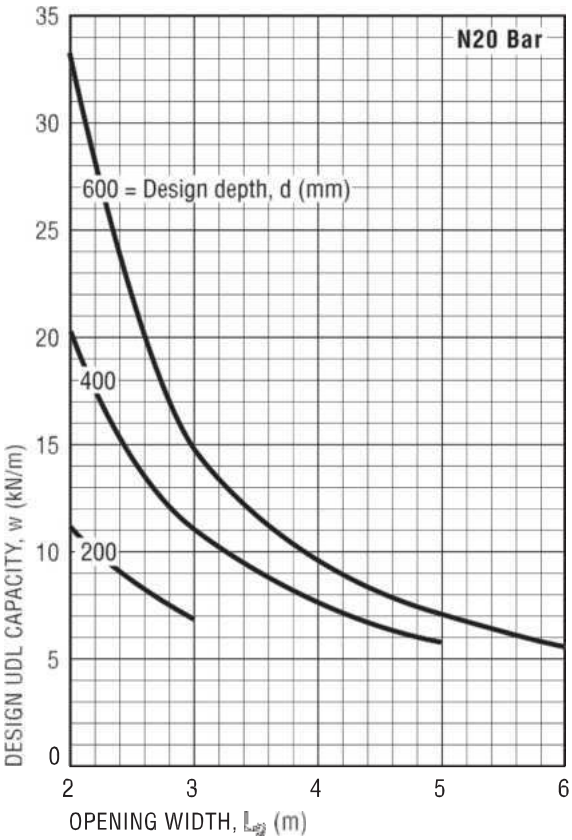
165 XL & X-PLUS LINTEL DESIGN LOAD CAPACITY — CHART 3.10





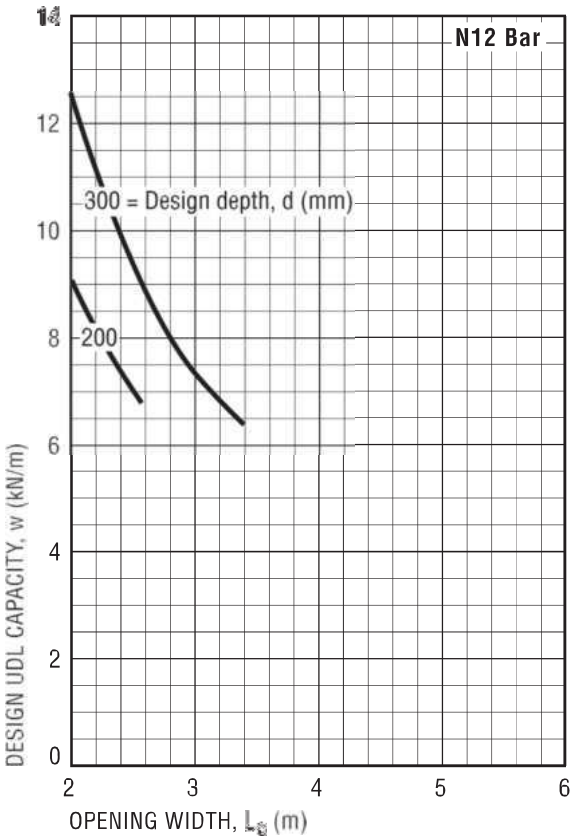


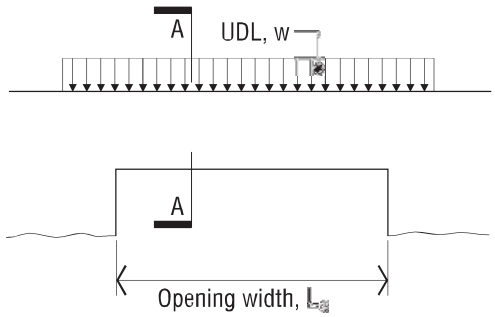


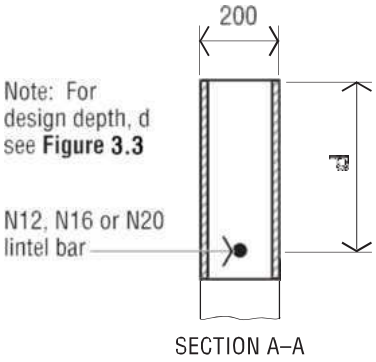


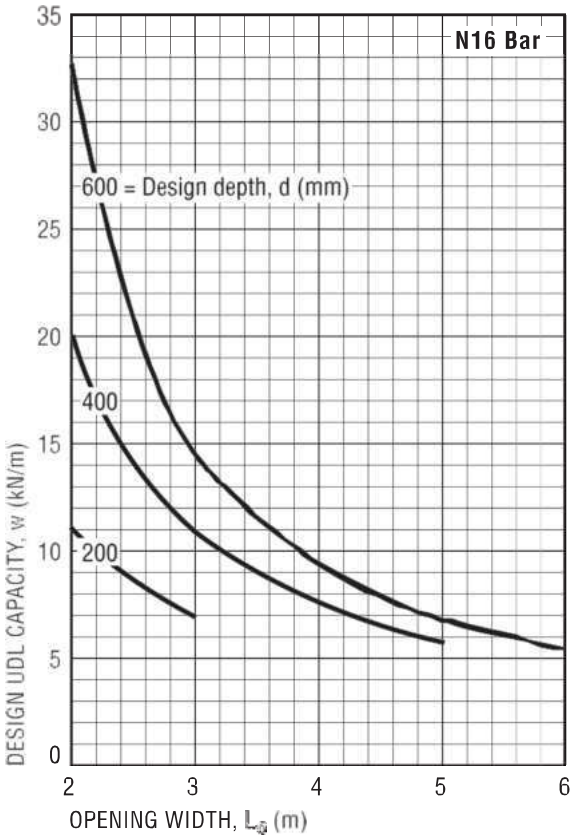
Ritek® Wall Systems - **Lintel Capacity**

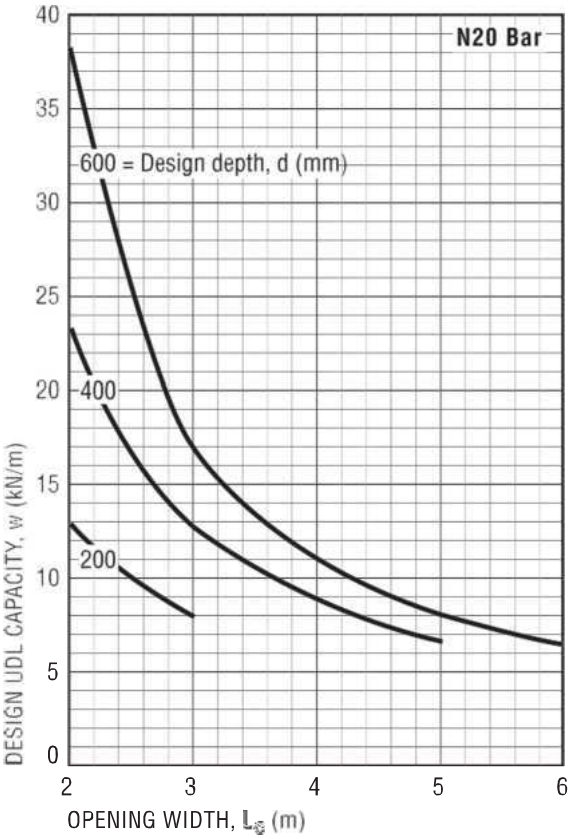
200 XL & X-PLUS LINTEL DESIGN LOAD CAPACITY	CHART 3.11





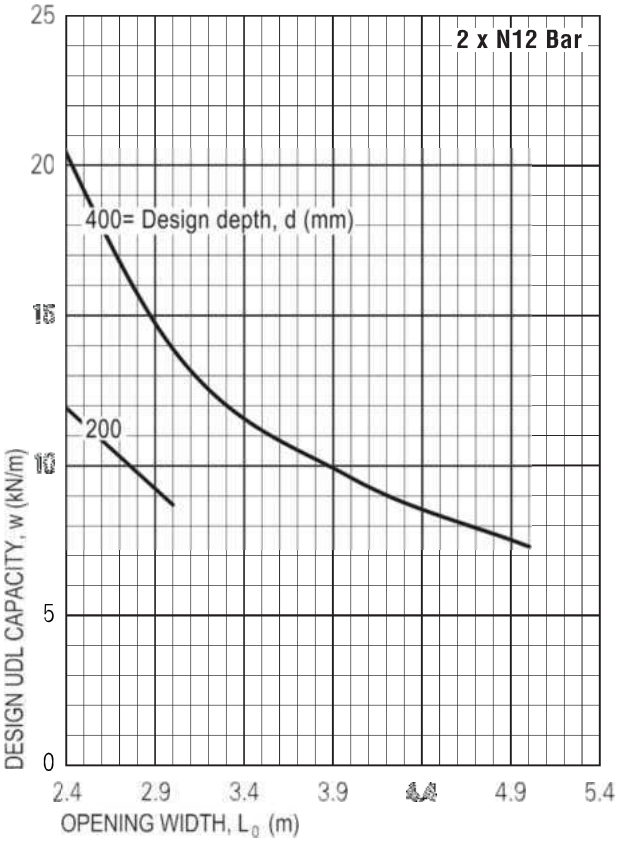


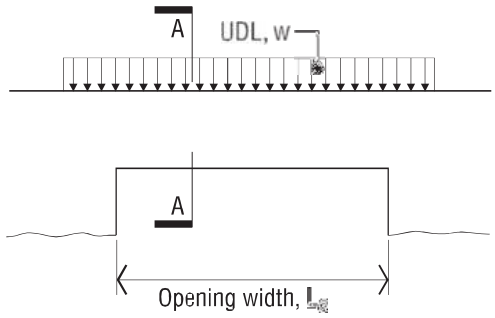


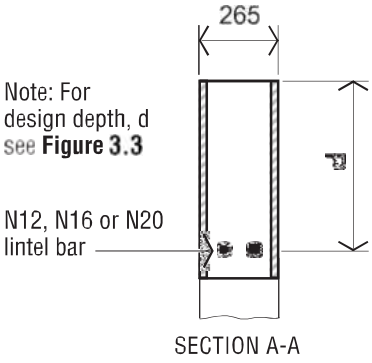


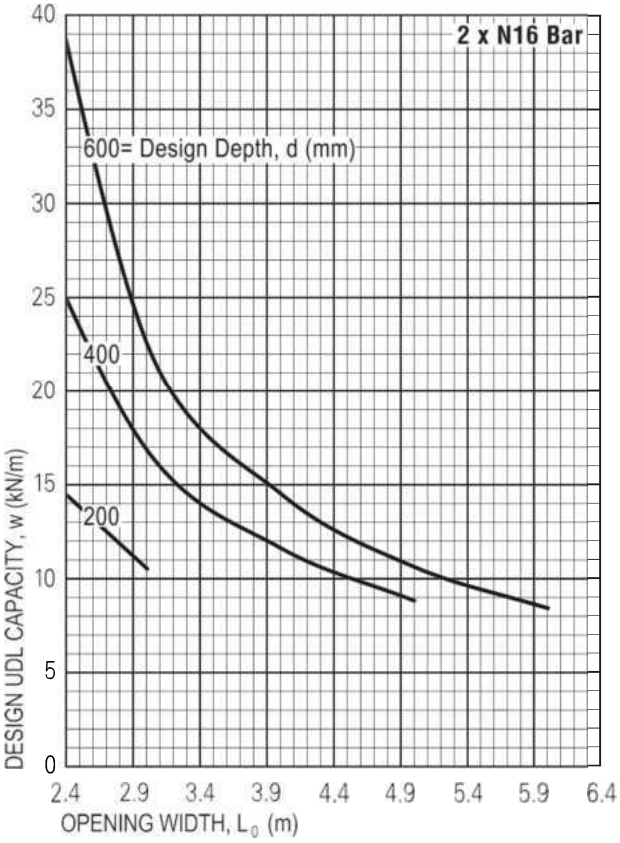
Ritek® Wall Systems - **Lintel Capacity**

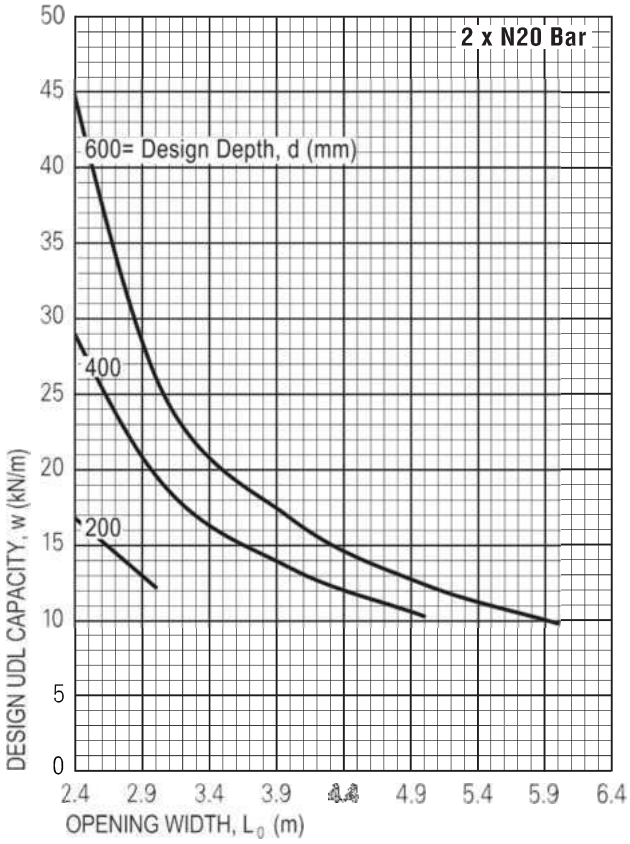
265 XL & X-Plus LINTEL DESIGN LOAD CAPACITY — CHART 3.12











Ritek® Wall Systems - **Fire Design**

Requirements

The requirements for fire resistance are contained within the BCA. These requirements are summarized in Table 3.1, however designers should refer to the BCA for specific details or variations. Note: The BCA does not specify which walls are to be designed for fire on both sides. When designing in accordance with AS3600 it is reasonable to assume that only “other loadbearing walls” should be designed for fire on both sides as all “bounding walls” have a fire separating function.

For compliance, the wall must be designed to achieve each of three actions i.e. Structural Adequacy, Integrity and Insulation.

GROUP 1 - CLASS 1 BUILDING (XL Wall System)	**TABLE 3.1**
CLASS 1 - Single dwelling (house) or group with common wall (town houses)	
External wall less than 900mm from boundary	60/60/60
Separating wall between class 1 buildings	60/60/60

GROUP 2 - CLASS 2, 3 OR 4 PART BUILDINGS (X-Plus Wall System)				
CLASS 2 - Building with separate dwellings (units) CLASS 3 - Residential building for unrelated people (boarding house/motel) CLASS 4 - A dwelling in a building that is Class 5, 6, 7, 8 or 9 if it is the only dwelling in the building.				
	NUMBER OF STORIES	1	2	3 or more
	TYPE OF CONSTRUCTION	C	B	A
External walls with a distance from fire source feature of:	Less than 1.5m	90/90/90	90/90/90	90/90/90
	1.5m to less than 3m	-/-/-	90/60/30	90/60/60
	3m or more	-/-/-	90/30/30	90/60/30
Internal Walls	Common and fire walls	90/90/90	90/90/90	90/90/90
	Fire - resisting lift shaft		90/90/90	90/90/90
	Fire - resisting stair shaft	60/60/60	90/90/90	90/90/90
	Bounding public corridors and similar	60/60/60	60/60/60	90/90/90
	Bounding or between sole-occupancy	60/60/60	60/60/60	90/90/90
	Bounding shafts			90/90/90
	Other loadbearing internal walls		60/-/-	90/-/-

GROUP 3 - CLASS 5, 7A OR 9 BUILDINGS (X-Plus Wall System)				
CLASS 5 - Office building CLASS 7a - Carpark CLASS 9 - Public Building				
	NUMBER OF STORIES class 5 or 7a buildings	1 or 2	3	4 or more
	NUMBER OF STORIES class 9 buildings	1	2	3 or more
	TYPE OF CONSTRUCTION	C	B	A
External walls with a distance from fire source feature of:	Less than 1.5m	90/90/90	120/120/120	120/120/120
	1.5m to less than 3m	60/60/60	120/90/60	120/90/90
	3m or more	-/-/-	120/30/30	120/60/30
Internal Walls	Common and fire walls	90/90/90	120/120/120	120/120/120
	Fire - resisting lift shaft		120/120/120	120/120/120
	Fire - resisting stair shaft	60/60/60	120/120/120	120/120/120
	Bounding public corridors and similar	-/-/-	120/-/-	120/-/-
	Bounding or between sole-occupancy	-/-/-	120/-/-	120/-/-
	Bounding shafts			120/90/90
	Other loadbearing internal walls		120/-/-	120/-/-

Ritek® Wall Systems - **Fire Design**

Summary of Fire Resistance Level requirements for loadbearing walls

GROUP 4 - CLASS 6 BUILDINGS (X-Plus Wall System)				
CLASS 6 - Shop or restaurant				
	NUMBER OF STORIES	1 or 2	3	4 or more
	TYPE OF CONSTRUCTION	C	B	A
External walls with a distance from fire source feature of:	Less than 1.5m	90/90/90	180/180/180	180/180/180
	1.5m to less than 3m	60/60/60	180/120/90	180/180/120
	3m or more	-/-/-	180/90/60	180/120/90
Internal Walls	Common and fire walls	90/90/90	180/180/180	180/180/180
	Fire - resisting lift shaft		180/120/120	180/120/120
	Fire - resisting stair shaft	60/60/60	180/120/120	180/120/120
	Bounding public corridors and similar	-/-/-	180/-/-	180/-/-
	Bounding or between sole-occupancy	-/-/-	180/-/-	180/-/-
	Bounding shafts			180/120/120
	Other loadbearing internal walls		180/-/-	180/-/-

GROUP 5 - CLASS 7B OR 8 BUILDINGS (X-Plus Wall System)				
CLASS 7b - Wholesale warehouse CLASS 8 - Factory building				
	NUMBER OF STORIES	1 or 2	3	4 or more
	TYPE OF CONSTRUCTION	C	B	A
External walls with a distance from fire source feature of:	Less than 1.5m	90/90/90	240/240/240	240/240/240
	1.5m to less than 3m	60/60/60	240/180/120	240/240/180
	3m or more	-/-/-	240/90/60	240/180/90
Internal Walls	Common and fire walls	90/90/90	240/240/240	240/240/240
	Fire - resisting lift shaft		240/120/120	240/120/120
	Fire - resisting stair shaft	60/60/60	240/120/120	240/120/120
	Bounding public corridors and similar	-/-/-	240/-/-	240/-/-
	Bounding or between sole-occupancy	-/-/-	240/-/-	240/-/-
	Bounding shafts			240/120/120
	Other loadbearing internal walls		240/-/-	240/-/-

In addition to the FRL's, the NCC 2022 Volume 1has a special requirement for electrical switches in specification S13C6

If an electrical switch, outlet, socket or the like is accommodated in an opening or recess in a wall, floor or ceiling -
(a) the opening or recess must not -
(i) be located opposite any point within 300mm horizontally or 600mm vertically of any opening or recess on the opposite side of the wall; or
(ii) extend beyond half the thickness of the wall; and
(b) the gap between the service and the wall, floor or ceiling must be fire-stopped in accordance with clause 7.

Ritek® Wall Systems - **Fire Design**

Compliance

A concrete wall meets the RFL requirements of the BCA if;

(A) A prototype has been submitted to the Standard Fire Test; or
(B) It is designed to achieve the FRL in accordance with AS3600

Prototype Test

A Ritek® 150X-Plus Wall was submitted to the Standard Fire Test and achieved a FRL of 240/240/240 at a height of 3.0m.

Design in Accordance with AS3600

AS3600 gives two alternative methods to establish the FRL for a concrete member;

(A) Determine from the tabulated data and figures given
(B) Predict by methods of calculation. Clause 5.3.1 of AS3600 nominates Eurocode 2, Part 1.2 as providing a method of calculation to predict the FRL's

FRL from Tabular Values

Clause 5.7.1 of AS3600 gives minimum wall thickness required to achieve the fire-resistance levels for insulation and integrity. Table 3.2 shows the AS3600 tabular values as well as the Ritek® wall type needed to achieve those thicknesses. **NOTE;** for loadbearing walls the minimum thickness required in the tabular value for structural adequacy is always greater than that required for insulation and integrity.

AS3600 - MINIMUM THICKNESSES FOR INSULATION AND INTEGRITY		**TABLE 3.2**
Fire-resistance period for insulation and integrity (minutes)	**Minimum wall thickness (mm)**	**Minimum Ritek® wall type (XL & X-Plus)**
60	80	115 - 265
90	100	115 - 265
120	120	135 - 265
180	150	165 - 265
240	175	200 - 265

Clause 5.7.2 of AS3600 gives tabular values of minimum cover to reinforcement and the minimum wall thickness required to achieve the fire-resistance levels for structural adequacy, with an upper limit on the fire design load (expressed as a ratio to the structural load capacity). Table 3.3 shows the AS3600 tabular values, as well as the Ritek® wall type needed to achieve those values.

Clause 5.7.3 of AS3600 limits the maximum wall heights for walls requiring a FRL by limiting the ratio of the effective height to thickness not exceeding 40. However, this is overridden by the requirement that this ratio not exceed 30 when the wall is designed as load bearing.

Ritek® Wall Systems - **Fire Design**

AS3600 - MINIMUM DIMENSIONS FOR STRUCTURAL ADEQUACY						TABLE 3.3
$\frac{\text{Design Load for Fire, } N_f^*}{\text{Design Axial Load Capacity, } \theta N_u}$ = 0.35						
	Wall Exposed on One Side			Wall Exposed on Two Sides		
Fire Resistance Period for Structural Adequacy (minutes)	**Minimum Thickness (mm)**	**Minimal Axial Distance * (mm)**	**Ritek® Wall Type (XL & X-Plus)**	**Minimum Thickness (mm)**	**Minimum Axial Distance* (mm)**	**Ritek® Wall Type (XL & X-Plus)**
60	110	10	135 - 265	120	10	135 - 265
90	120	20	135 - 265	140	20	165 - 265
120	150	25	165 - 265	160	25	200 - 265
180	180	40	200 - 265	200	45	265
240	230	55	265	250	55	265

* Distance from surface of concrete to center of reinforcement

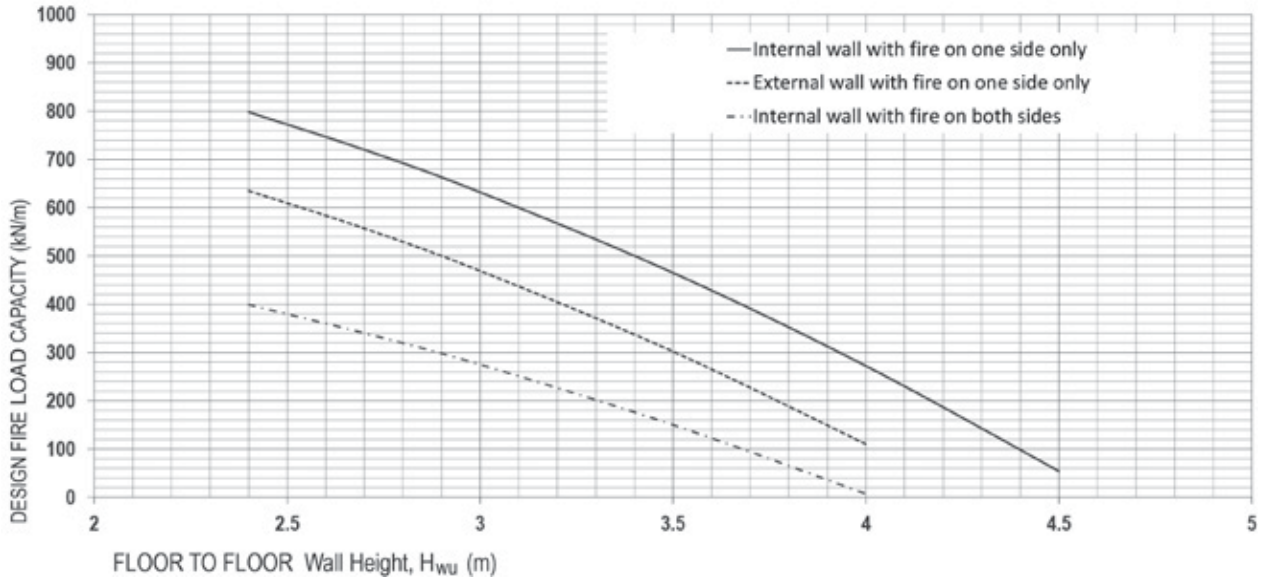
FRP by Method of Calculation

The FRP for integrity and insulation in Eurocode 2 - Part 1-2 are the same as tabulated in Table 3.2.

For FRL for structural Adequacy, Eurocode 2 - Part 1-2 provides two simplified methods of calculation, the one is the *"500°C isotherm method"* (outlined in Clause B.1) and the other is the *"Zone method"* (outlined in Clause B.2). Although more laborious, the Zone method provides a more accurate method and for this reason has been chosen to calculate the FRP's for Ritek® walls. Essentially this method involves reducing the section thickness by the amount of concrete that would be damaged by the fire (using graphs provided in the code) and then calculating the capacity of the reduced section taking into account the compressive strength reduction due to heating (again using graphs provided in the code). From this the Load Capacity for a particular FRL can be calculated, dependent on wall thickness, wall height, restraint conditions and concrete strength. The minimum wall thickness is limited only by the load capacity.

Typical load capacities, obtained by calculation using this method, are shown in Charts 3.13 for the case of 150 XL & X-Plus Walls that require 90 minutes Fire Resistance. Charts for other walls and fire levels are available on request from Ritek Technology.

TYPICAL LOAD CAPACITIES BY CALCULATION METHOD - 32 MPa
RITEK® 150XL & X-Plus - FRL 90 MINUTES FIRE RESISTANCE **CHART 3.13**



Ritek® Wall Systems - **Fire Design**

Recesses & Chases

The inclusion of recesses and chases in a wall for services can affect the wall's ability to satisfy the required performance. However, depending on their size and position in the wall, the effect of recesses and chases may not be significant and can be ignored. AS 3600 set out the conditions upon which the effect of recesses and chases are to be ignored. The following are the conditions from AS 3600: -

RECESSES & CHASES CONDITIONS (*EXTRACT FROM AS 3600*)

5.7.4.1 RECESSES FOR SERVICES IN WALLS

The effect of recesses for services, on the fire-resistance periods for structural adequacy, integrity and insulation of a wall, shall be ignored if the thickness of wall remaining under the bottom of the recess is not less than half the wall thickness and the total recessed area, within any 5 m^2 of wall face, is not more than 10 000 mm^2 on one or both faces of the wall. If the above limits are exceeded, the wall thickness (*t*) used to determine fire-resistance periods shall be taken as the overall thickness less than the depth of the deepest recess.

CHASES

General

In concrete members subject to fire, chases shall be kept to a minimum. The effect of chases on the fire-resistance periods of walls shall be considered in accordance with the provisions of Clauses 5.7.4.2 and 5.7.4.3. The effects of chases in other members shall be considered using rational methods of analysis.

5.7.4.2 Effect of chases on structural adequacy of walls

The effect of chases, on the fire-resistance period for structural adequacy of walls, shall be considered as follows:

(a) For walls spanning one way, where —

(i) the chase direction is parallel to the span direction — ignored.

(ii) the chase direction is perpendicular to the span direction and of length not greater than four times the wall thickness
or 0.4 times the overall length of the wall, whichever is greater — ignored; or

(iii) the chase is perpendicular to the span direction and of length greater than four times the wall thickness or 0.4 times the overall length of the wall—accounted for by using a slenderness ratio for the wall based on the reduced wall thickness.

(b) For walls spanning two ways (panel action), where —

(i) there is either a vertical chase with a length not greater than half the wall height *(H)*, or a horizontal chase with a length not greater than half the wall length *(L)*— ignored.

(ii) the length of a vertical chase is greater than half the wall height *(H)*, or the length of a horizontal chase is greater than half the wall length *(L)*—accounted for by using a slenderness ratio for the wall based on the reduced wall thickness,
or the chase may be regarded as an unsupported edge and the panel designed as two sub-panels.

5.7.4.3 Effect of chases on integrity and insulation of walls

The effect of chases, on the fire-resistance periods for integrity and insulation of walls, shall be considered as follows:

(a) Where —

(i) the depth of the chase is not greater than 30mm.

(ii) the cross-sectional area of the chase, on a plane perpendicular to the plane of the wall face and at right angles to the centerline of the chase, is not greater than 1000mm^2; and

(iii) the total face area of chases within any 5m^2 of wall face is not greater than 100,000mm^2 on one or both wall faces,
the effect shall be ignored.

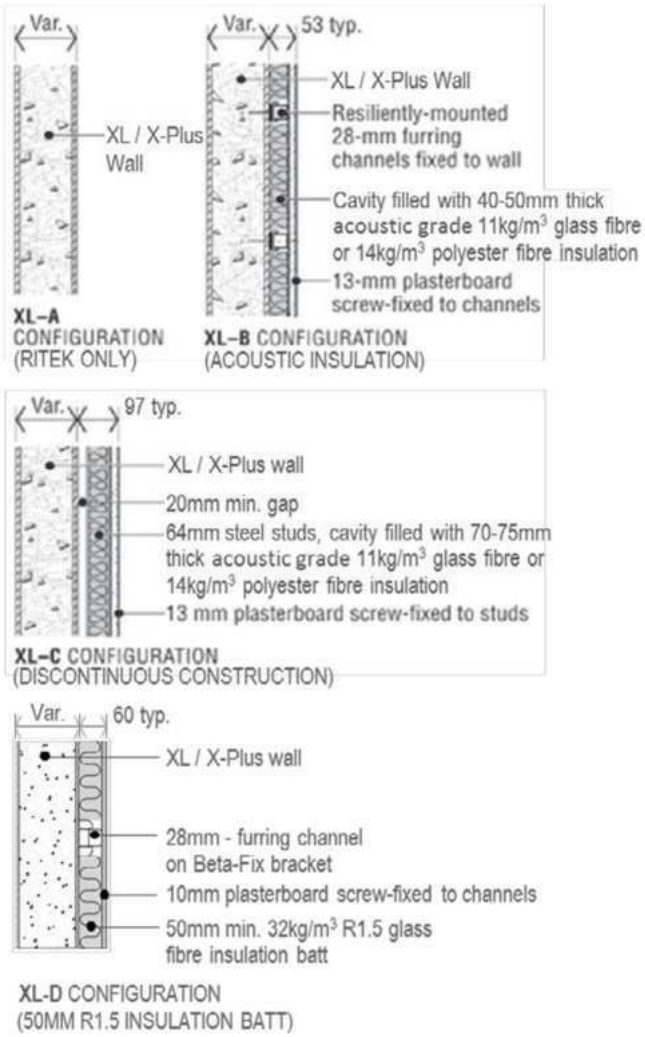
Ritek® Wall Systems - **Acoustic Performance**

XL & X-Plus Wall System Using Insulation Cladding

The BCA requires walls in various Classes of building to have a minimum acoustic insulation to avoid the airborne transmission of sound through walls. The acoustic insulation rating is expressed as either a minimum R_w value or $R_w + C_{tr}$ value in the Deemed-to-Satisfy provisions of the BCA. In addition, certain walls require impact sound isolation rating. Refer to the BCA for more details on the requirements.

Table 3.4 shows the acoustic performance of Ritek® Wall Systems in different configurations as shown in Figure 3.4. The acoustic ratings in this table are based on expert opinion with consideration of laboratory tests of similar systems and from theoretical predictions. As a guide, compliance of these wall configurations to satisfy some of the requirements of Class 2 and 3 buildings in given in Table 3.5.

RITEK® WALL CONFIGURATIONS FIGURE 3.4



ACOUSTIC PERFORMANCE OF RITEK® WALL CONFIGURATIONS[1] TABLE 3.4

Ritek® XL & X-Plus Wall® System configuration[2]	Value of R_w	Value of $R_w + C_{tr}$
115-A	48	43
135-A	50	45
150-A	51	47
165-A	50*	50*
200-A	54	50
265-A	57	52
115-B	54	44
135-B	54	47
150-B	55	48
165-B	56	49
200-B	57	51
265-B	59	52
115-C	62	54
135-C	62	56
150-C	63	57
165-C	64	57
200-C	66	59
265-C	67	60
115-D	53	43
135-D	53	47
150-D	54	47
165-D	55	48
200-D	56	50
265-D	58	51

[1] SLR Consulting Acoustic Opinion – REF023. The expected tolerance is ±2dB for Rw and ±3dB for Rw + Ctr. Refer to the full acoustic opinion document for further details.

[2] Note that the XL and X-Plus wall systems are acoustically equivalent.

[3] Refer Section I Technical Updates for new acoustic solutions

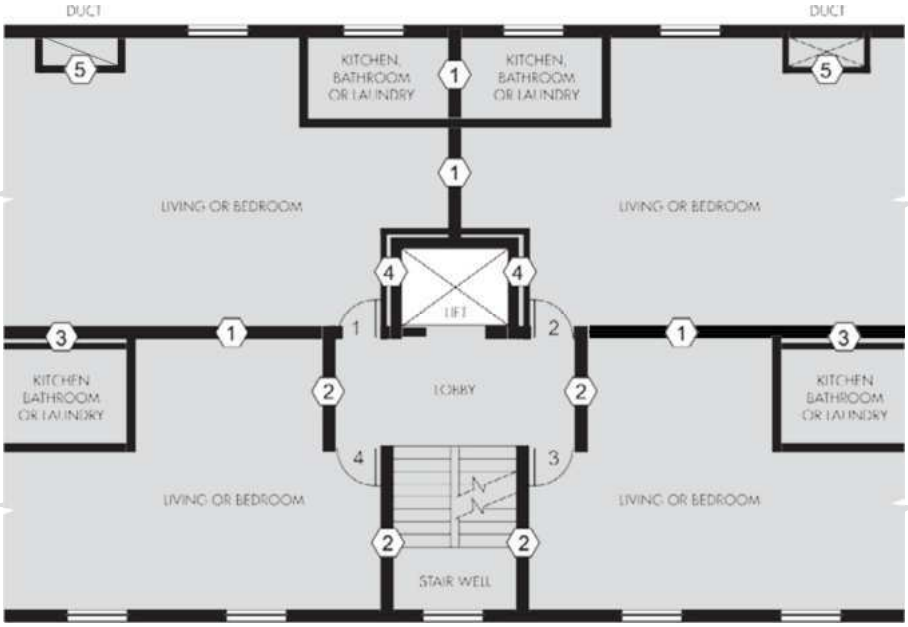
* Rating not determined; system is considered equivalent to BCA Deemed-to-Satisfy 150mm concrete panel.

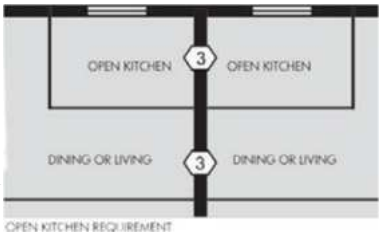
The BCA also allows field testing as a performance solution verification method. The acoustic insulation rating requirement as determined by field testing is expressed as either $D_{nT,w} + C_{tr}$ value or $D_{nT,w}$. As a guide, site specific verification in the past showed that it is possible for a 150mm Wall to achieve $D_{nT,w} + C_{tr}$ value of 45 to 47 when there is no influence of sound flanking. The report is available on request for comparison purposes.

Please refer to Technical Update Section I9 For additional Acoustic Performance Configurations

Ritek® Wall Systems - **Acoustic Performance**

ACOUSTIC PERFORMANCE **FIGURE 3.5**





COMPLIANCE GUIDE OF RITEK® X-Plus (XP) WALL CONFIGURATIONS FOR CLASS 2 AND 3 BUILDINGS

TABLE 3.5

Compliance with BCA - for walls shown in Figure 3.5										
	Wall 1		Wall 2		Wall 3		Wall 4		Wall 5	
Wall Configuration	NT	Other States	NT	Other States	NT	Other States	NT	Other States	NT	Other States
115 XP -A	✓	-	✓	-	-	-	-	-	✓	✓
135 XP -A	✓	-	✓	✓	-	-	-	-	✓	✓
150 XP -A	✓	-	✓	✓	-	-	-	-	✓	✓
165 XP -A*	✓	✓	✓	✓	-	-	-	-	✓	✓
200 XP -A	✓	✓	✓	✓	-	-	-	-	✓	✓
265 XP -A	✓	✓	✓	✓	-	-	-	-	✓	✓
115 XP -B	✓	-	✓	✓	✓	-	✓	-	✓	✓
135 XP -B	✓	-	✓	✓	✓	-	✓	-	✓	✓
150 XP -B	✓	-	✓	✓	✓	-	✓	-	✓	✓
165 XP -B	✓	-	✓	✓	✓	-	✓	-	✓	✓
200 XP -B	✓	✓	✓	✓	✓	-	✓	-	✓	✓
265 XP -B	✓	✓	✓	✓	✓	-	✓	-	✓	✓
115 XP -C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
135 XP -C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
150 XP -C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
165 XP -C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
200 XP -C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
265 XP -C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
115 XP -D	✓	-	✓	✓	-	-	-	-	✓	✓
135 XP -D	✓	-	✓	✓	-	-	-	-	✓	✓
150 XP -D	✓	-	✓	✓	-	-	-	-	✓	✓
165 XP -D	✓	-	✓	✓	-	-	-	-	✓	✓
200 XP -D	✓	✓	✓	✓	-	-	-	-	✓	✓
265 XP -D	✓	✓	✓	✓	-	-	-	-	✓	✓

✓ = Complies

*Considered equivalent to BCA Deemed-to-Satisfy 150mm concrete panel

Ritek® Wall Systems - **Thermal Performance**

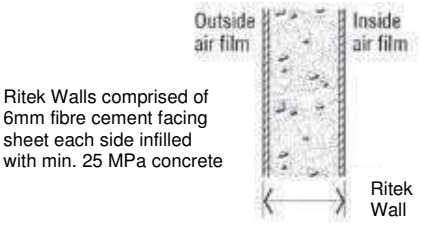
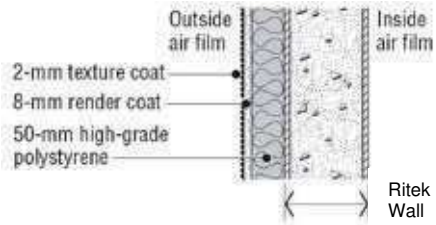
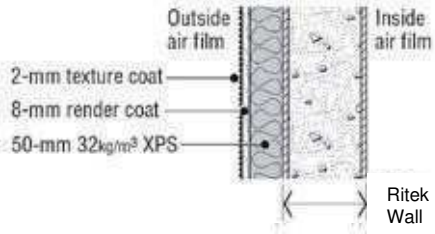
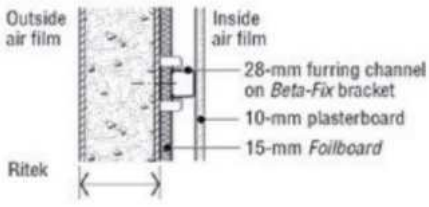
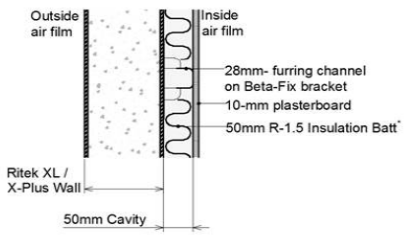
There are two insulation options for the Ritek® Wall System
Insulation can be applied post erection to wall panels.

XL & X-Plus Wall System Using Insulation Cladding

The thermal performance of a building envelope depends on interrelation of the thermal mass and insulation values of its components relative to the influence of local climate.

Ritek® Wall System can be combined with a variety of insulation materials to produce a large range of R- values to satisfy energy-efficiency requirements. See Table 3.6 for thermal performance of some typical Ritek® Wall System configurations using insulation cladding.

THERMAL PERFORMANCE OF RITEK® XL & X-PLUS WALL® SYSTEM USING INSULATION CLADDING
TABLE 3.6

Ritek® XL & X-Plus Wall® configuration	Wall Type	Total wall thickness (mm)	Total R-value*	
			Winter	Summer
1  Ritek Walls comprised of 6mm fibre cement facing sheet each side infilled with min. 25 MPa concrete	115	115	0.28	0.28
	135	135	0.29	0.29
	150	150	0.30	0.30
	165	165	0.31	0.31
	200	200	0.34	0.34
	265	265	0.38	0.38
2 	115	175	1.71	1.63
	135	195	1.72	1.65
	150	210	1.73	1.66
	165	225	1.74	1.67
	200	260	1.77	1.69
	265	320	1.81	1.74
3 	115	175	2.12	2.03
	135	195	2.14	2.05
	150	210	2.15	2.06
	165	225	2.16	2.07
	200	260	2.18	2.09
	265	320	2.23	2.14
4 	115	168	1.43	1.36
	135	188	1.44	1.37
	150	203	1.45	1.38
	165	218	1.46	1.39
	200	253	1.49	1.42
	265	318	1.53	1.46
5** 	115X-Plus only	175	1.54	1.45
	135X-Plus only	195	1.56	1.46
	150X-Plus only	210	1.57	1.47
	165X-Plus only	225	1.58	1.48
	200X-Plus only	260	1.60	1.51
	265X-Plus only	320	1.65	1.55

*Source: Worst case R-values of Ritek XL & X-Plus from James M Fricker Report i215i, i215h, and i215hrb.

**Configuration 5: R-values based on vertical furring channels @400mm horizontal centres mounted on beta-fix bracket @1200mm vertical centres. Refer to the insulation batt, furring channel, and bracket supplier for other requirements.

Ritek® Wall Systems - **Reinforcement Detailing**

Panel Reinforcement

For walls not subject to racking (shear) forces, N12 starter bars should be provided at the ends of walls, the side of openings and at not more than 2.0 m spacing along the wall.

For walls subject to racking (shear) forces, starter bars of the same size and spacing as the vertical reinforcement should be provided.

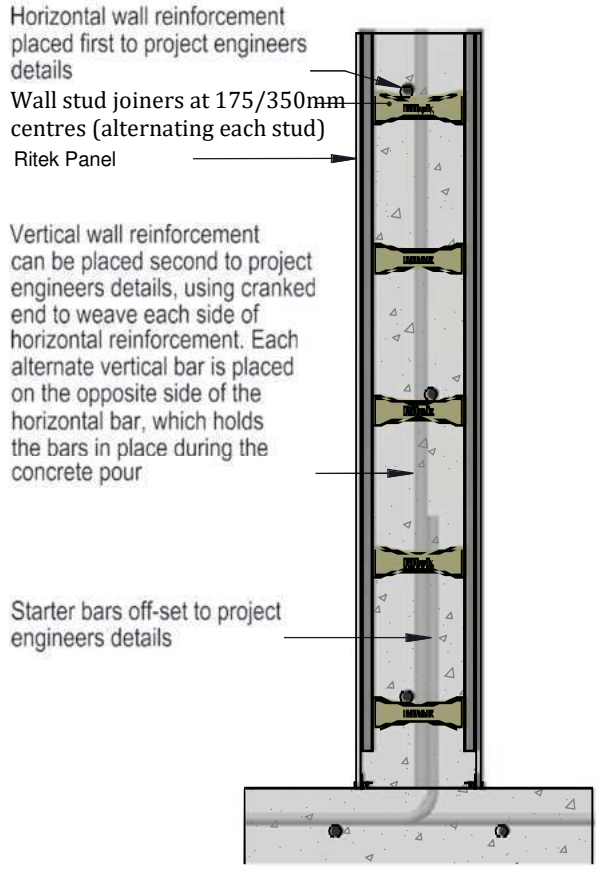
Starter bars may be either cast in the slab or added later by drilling the slab and chem-setting the starter bars in place. The starter bars should be off set to avoid interfering with the placing of the main wall reinforcement.

All walls are to have a single layer of reinforcement, however if required, the 200 & 265mm panels may have two layers of reinforcement.

For single-layer reinforcement, the horizontal bars are placed first by sliding from an end or corner on the aluminium stud joiners (which are at 175mm centres). The vertical bars, assisted by a slight crank on the end, are threaded from the top such that they weave in and out of the horizontal reinforcement, as shown in Figure 3.6. Each alternate vertical bar is placed on the opposite side of the horizontal bar to form a 'basket-weave' when possible, which holds the bars in place during concreting.

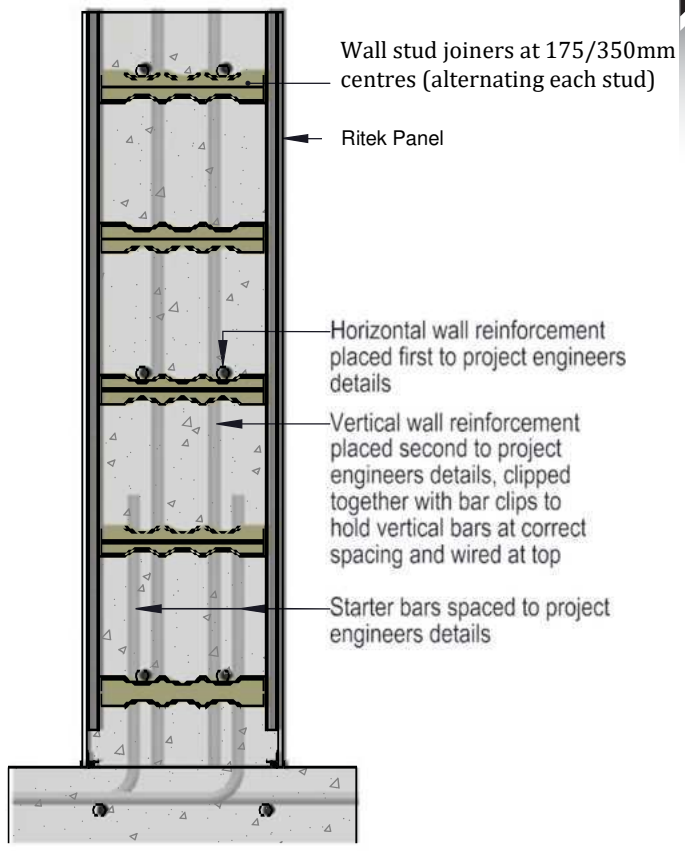
In the case of two-layer reinforcement, the horizontal bars are again placed first, sitting on the outer indents of the stud joiner, Figure 3.7.

SINGLE LAYER REINFORCEMENT FIGURE 3.6



SINGLE LAYER REINFORCEMENT

DOUBLE LAYER REINFORCEMENT FIGURE 3.7



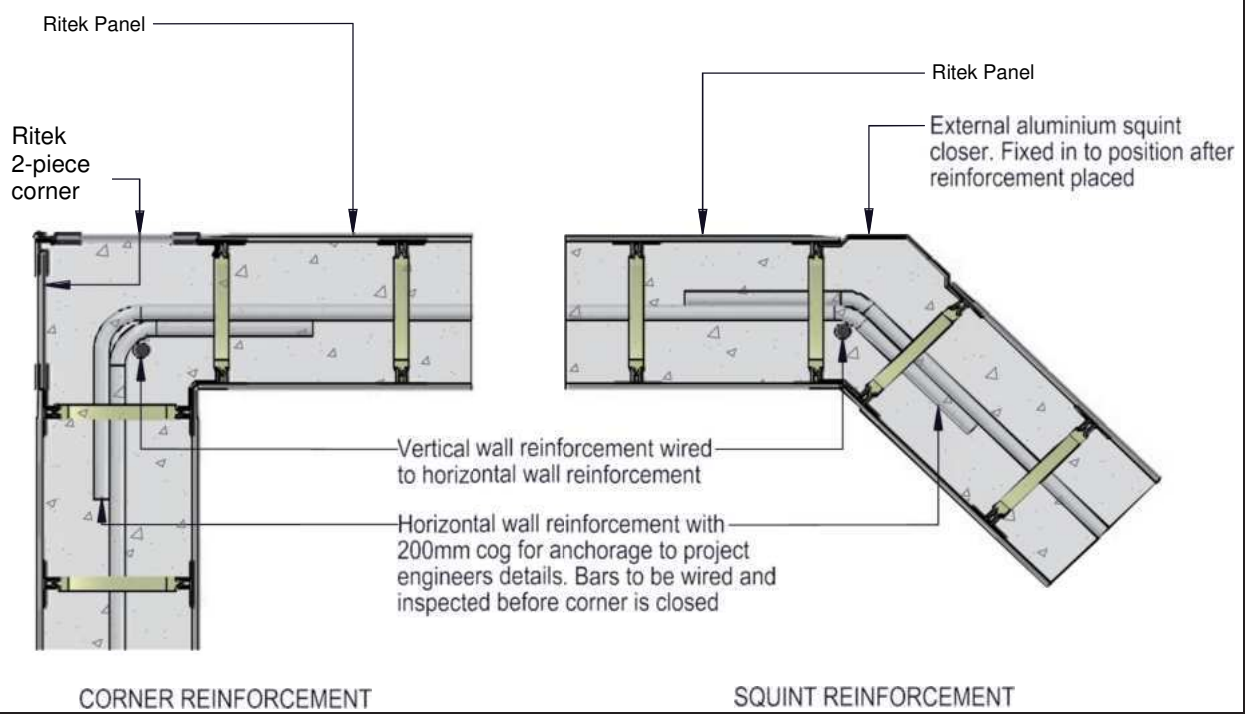
DOUBLE LAYER REINFORCEMENT

Ritek® Wall Systems - **Reinforcement Detailing**

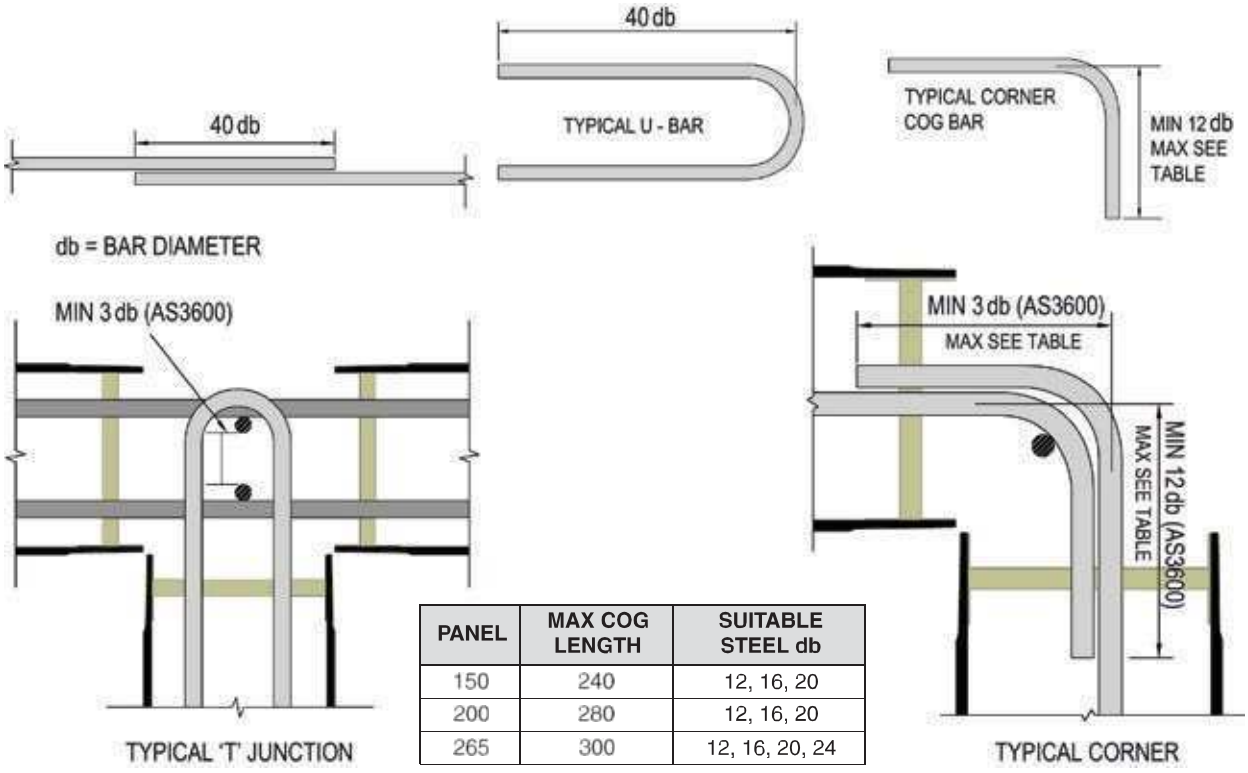
Corners & Squints

Corners are left open until the horizontal reinforcement is placed. This also allows the bars to be wired and inspected. Both bars are typically anchored with 200mm cogs to achieve the required anchorage lengths, as shown in Figure 3.8. Squints are treated the same as corners.

CORNERS & SQUINT REINFORCEMENT SECTIONAL PLAN **FIGURE 3.8**



TYPICAL 'T' JUNCTION & TYPICAL CORNER **FIGURE 3.9A**



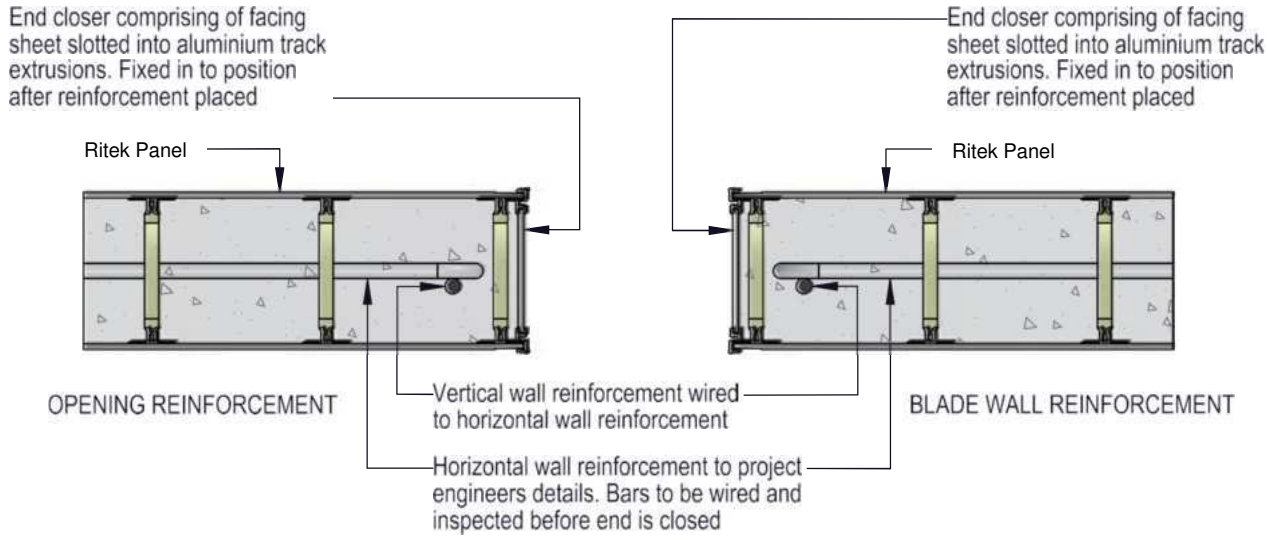
PANEL	MAX COG LENGTH	SUITABLE STEEL db
150	240	12, 16, 20
200	280	12, 16, 20
265	300	12, 16, 20, 24

Ritek® Wall Systems - **Reinforcement Detailing**

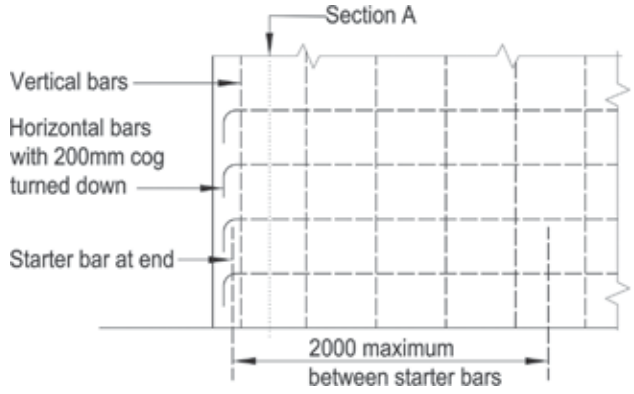
Blade Wall Ends & Wall Openings

Ends of blade walls usually require the horizontal bars to be turned down with a cog. If the wall is not a shear wall, a starter bar should be provided at the end and at not more than 2.0 m centres along the wall, as shown in Figure 3.10. For walls that are not shear walls, a starter bar should be located each side of the opening.

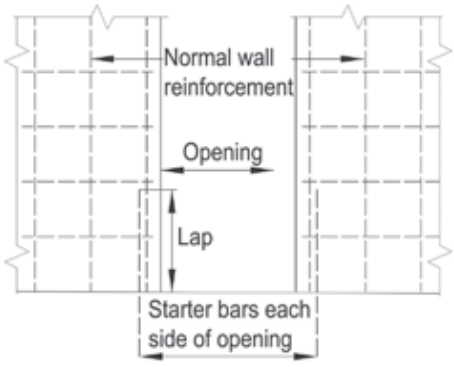
BLADE WALL ENDS & WALL OPENING REINFORCEMENT SECTIONAL PLAN **FIGURE 3.10**



BLADE WALL ELEVATION **FIGURE 3.11A**



WALL OPENING ELEVATION **FIGURE 3.11B**

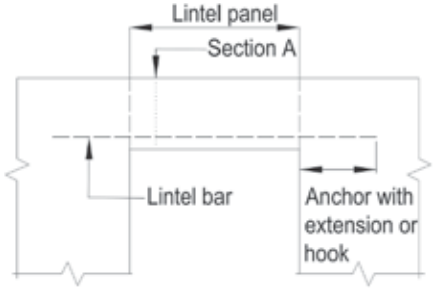


Lintels

Lintels are usually designed requiring only a single bottom bar. If the lintels are required to be designed as continuous, they will then require a top bar and stirrups.

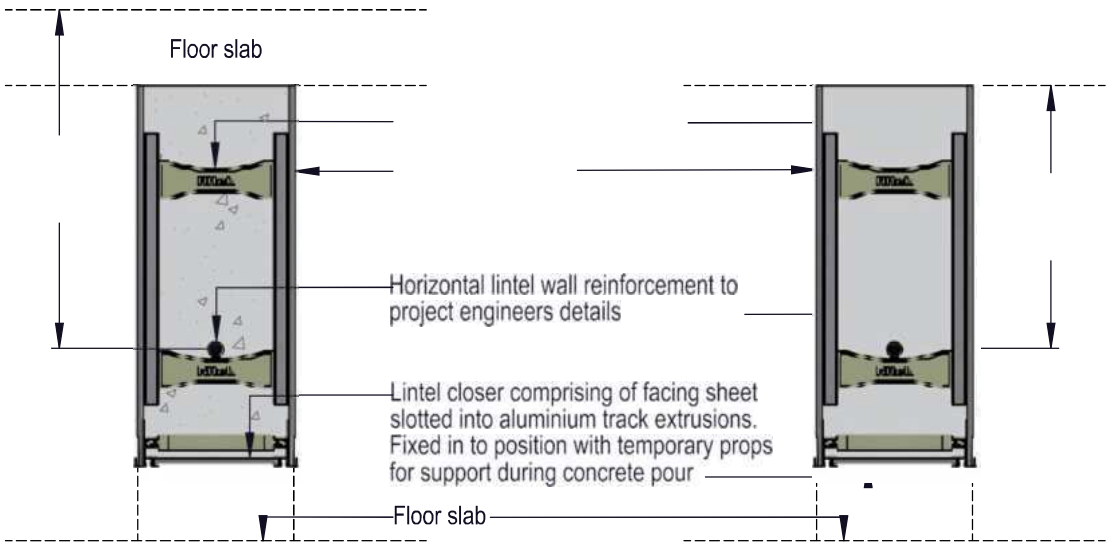
The relative wall to opening height will determine the position of the stud joiner, in turn the position of the lintel bar and consequently the design depth of the lintel. If the bar does not continue as horizontal reinforcement in the wall then it will need to be anchored.

LINTEL PANEL ELEVATION **FIGURE 3.12**



Ritek® Wall Systems - **Reinforcement Detailing**

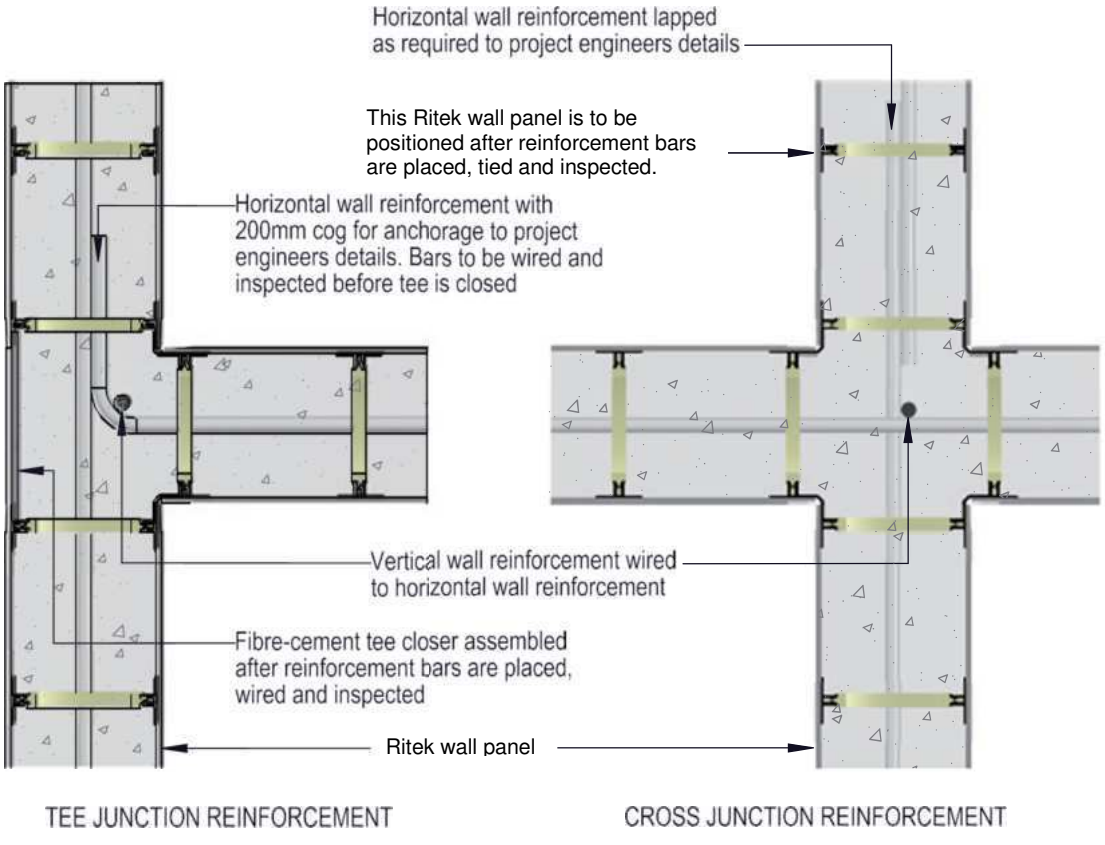
LINTEL REINFORCEMENT SECTIONAL ELEVATION **FIGURE 3.13**



Tee Junctions & Cross Junctions

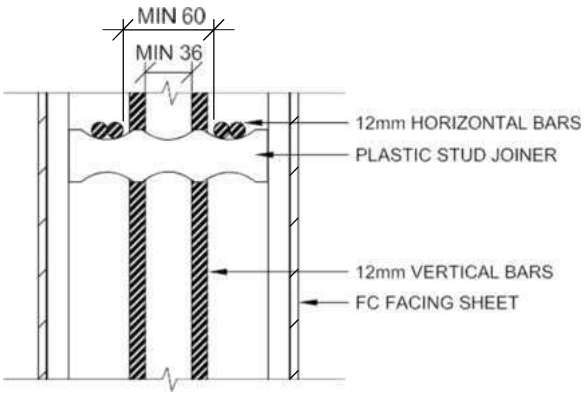
Tee junctions are usually designed with a 200mm cogged end in the horizontal bars within the leg of the tee. An extra vertical bar should be wired to the horizontal bars before the fibre-cement tee closer is put in place. Cross junctions should have an extra vertical bar wired to the horizontal bars before the junction is completed. If necessary, the horizontal bars can be lap-joined at this point, as shown in Figure 3.14.

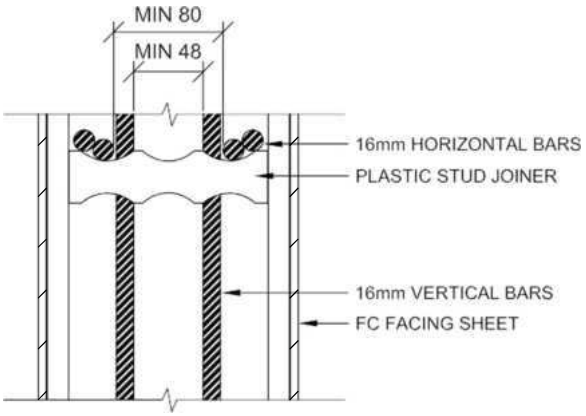
TEE JUNCTIONS & CROSS JUNCTIONS REINFORCEMENT SECTIONAL PLAN **FIGURE 3.14**

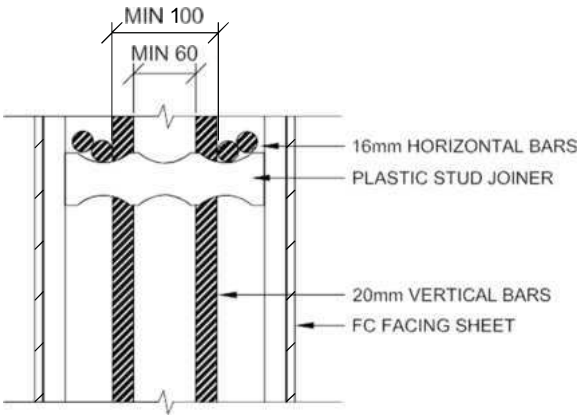


TYPICAL DOUBLE LAYER REINFORCEMENT DETAILS FOR 200mm & 265mm PANELS **FIGURE 3.9B**

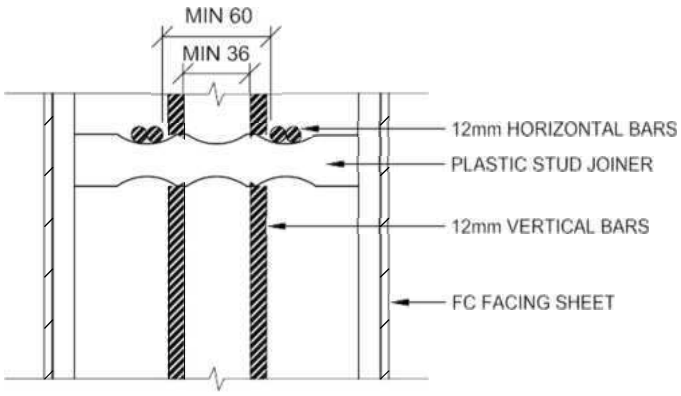
Ritek 200 Wall Panel

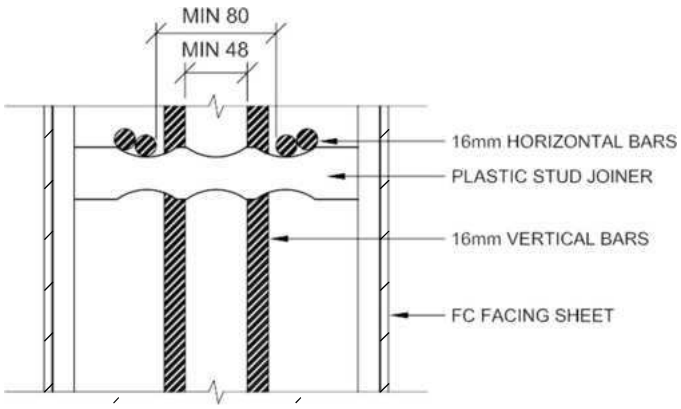


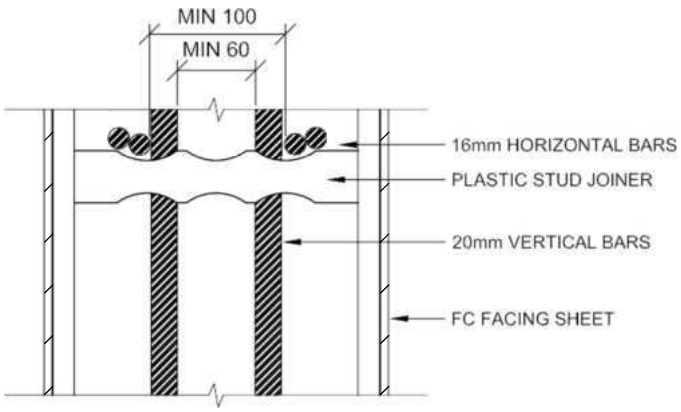


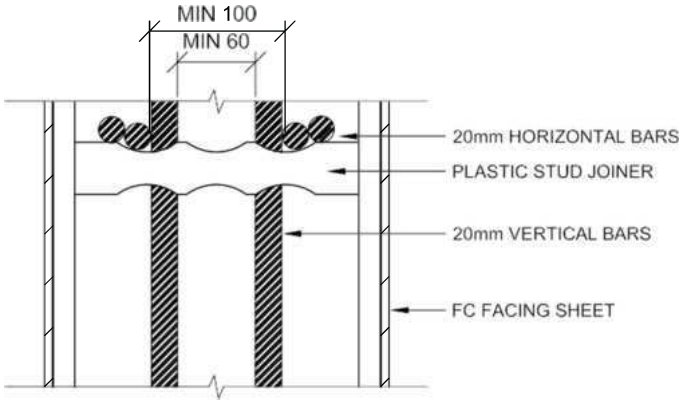


Ritek 265 Wall Panel









Minimum clear distance between vertical parallel bars 3db (AS3600)

50mm between horizontal bars to allow for mechanical vibration

Ritek® Wall Systems - **Services in Walls**

Plumbing

It is recommended that, where possible, plumbing be installed on the outside of the Ritek panel. The wall is then finished with standard battens and plasterboard, unless there are acoustic requirements, in which case it is finished with an attached insulated plasterboard lining or a discontinuous insulated wall, as appropriate. Refer to Figure 3.15.

If plumbing is to be installed within the Ritek panel then a number of options are available:

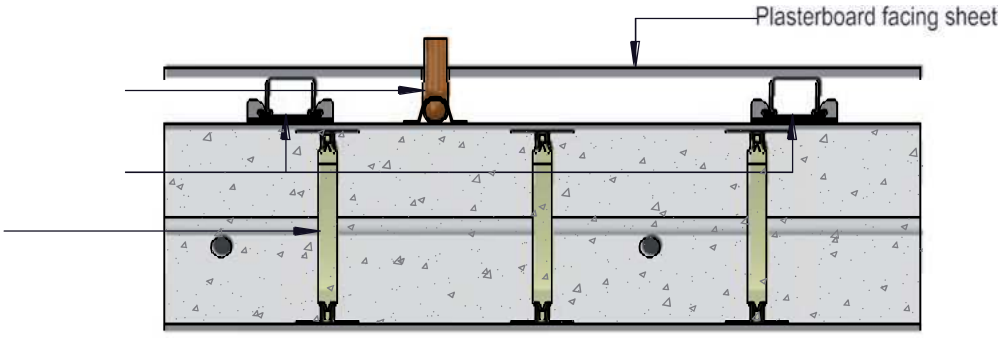
- Plumbing dropped into position from the top of the wall (preferred method);
- Plumbing placed in slab below the wall, or;
- Wall chased after concrete core filling.

Where plumbing is dropped into position from the top of the wall, cut out the panel face (i.e. sheeting) prior to core-filling, install the unit, then box-up in preparation for concrete core filling. It is recommended that pipework be tested prior to core-filling.

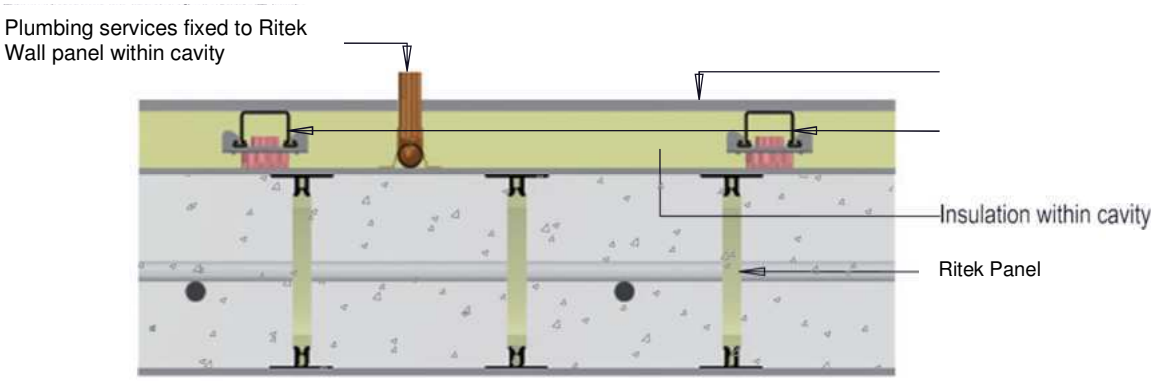
Where plumbing supply lines are under the slab, pipework can be run below the centre of the Ritek bottom plate assembly to the required location, with vertical pipes rising to the required height. The Ritek panel is then lifted over and the vertical pipe positioned within the appropriate void. Finally, cut out the panel face, install the unit, then box-up in preparation for concrete core filling. It is recommended that pipework be tested prior to core-filling.

The chased option should be carried out just after concrete core filling is finished, while the concrete is still green. Chase the wall, install the unit, then patch the wall as in a blockwork application.

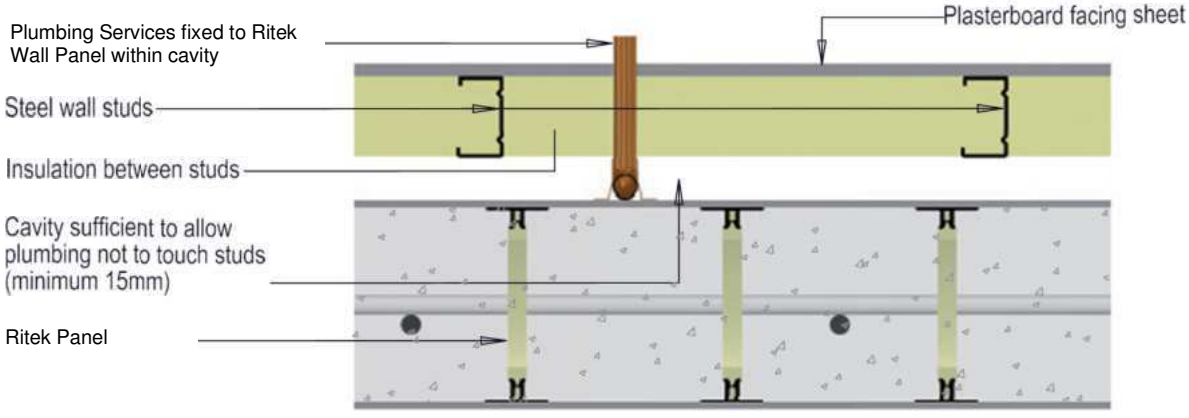
PLUMBING SERVICES SECTIONAL PLAN **FIGURE 3.15**



ATTACHED PLASTERBOARD LINING



ATTACHED INSULATED PLASTERBOARD LINING



Ritek® Wall Systems - **Services in Walls**

Electrical

Generally, two systems may be used; 1. Surface-mounting kits 2. Conventional electrical box in wall.

System 1

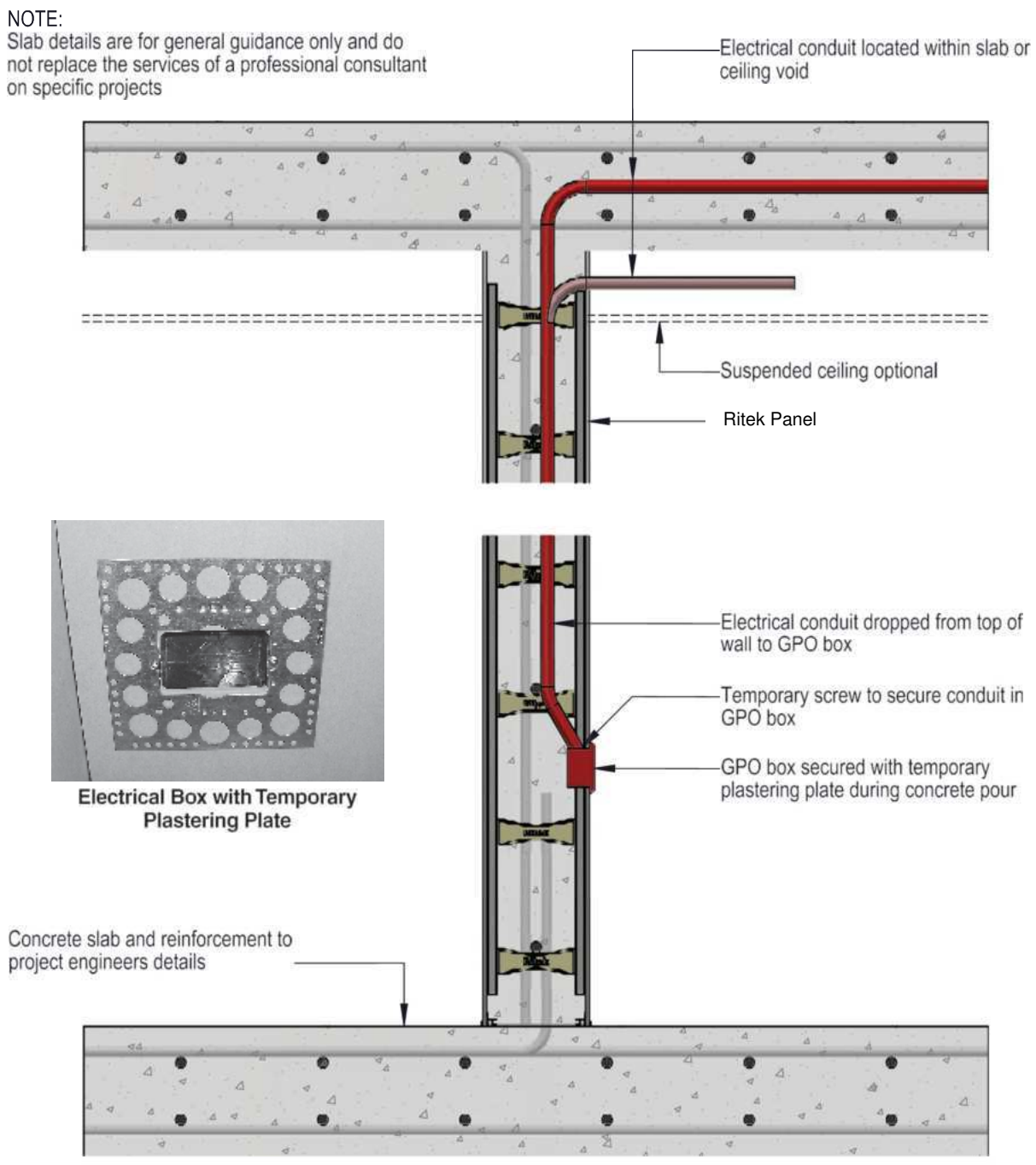
Mark locations and required heights of services on the Ritek panels and make a hole in panel ready to receive the conduit. Place a 90° bend in the conduit then drop down within the wall from above and secure with a screw ready for concrete core-filling.

System 2

Mark locations and required heights of services on the Ritek panels. Trace around the box and cut the panel using a diamond blade. Attach temporary plastering plate to the box, push the box into the cut hole and screw plaster plate to fibre-cement sheet. Feed conduit from the top of the Ritek panel into box and secure box using the nailing plate as in timber framing. See Figure 3.16 below.

If a Ritek® Wall System is used to satisfy acoustic requirements, GPO boxes on opposite sides of the wall must be off-set so there is 200 mm of concrete between them, and they must each have separate conduits.

ELECTRICAL SERVICES SECTIONAL ELEVATION **FIGURE 3.16**

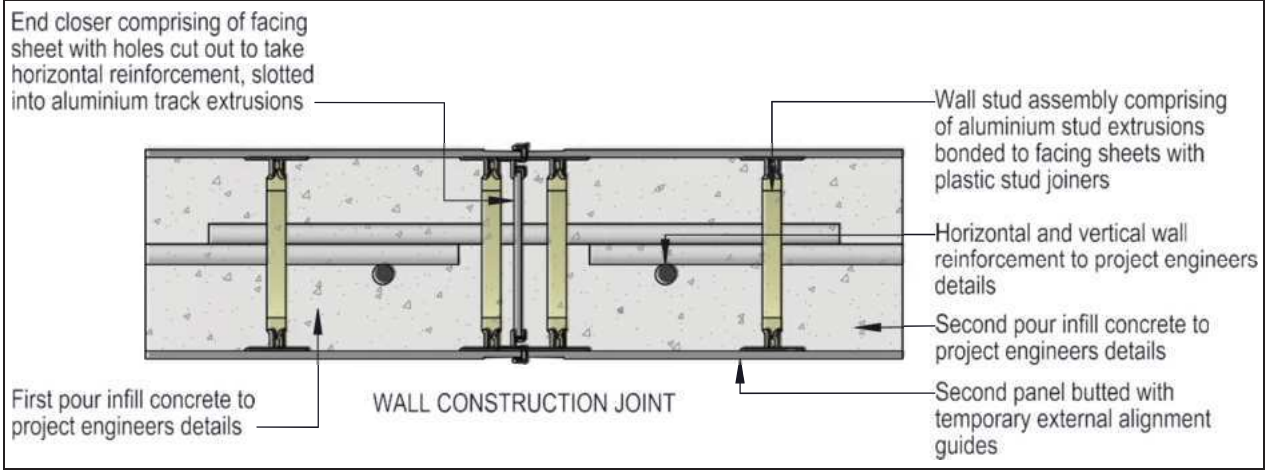


Ritek® Wall Systems - **Wall Movement Joints**

Wall Construction Joints

These may be planned or unplanned but should follow the typical details shown in Figure 3.18

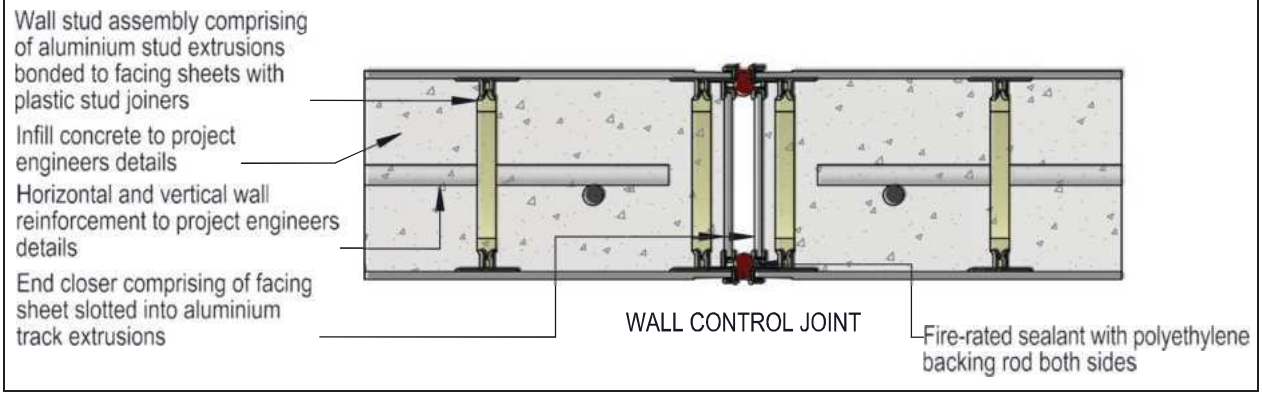
WALL CONSTRUCTION JOINTS SECTIONAL PLAN **FIGURE 3.18**



Wall Control Joints

The engineer will nominate locations for control joints. A control joint consists of two end-sections of wall panel butted together with a 12mm gap. The gap should be detailed with a proprietary fire-resistant material. Refer to engineers details for any additional requirements. See Figure 3.19 for typical details.

WALL CONTROL JOINTS SECTIONAL PLAN **FIGURE 3.19**



Ritek® Wall Systems - **Concrete Mix Specification**

Recommended guidelines for concrete mix and slump specification for the Ritek® Wall Panels

Typical Concrete Mix Specification (25 MPa to 60 MPa) Concrete shall be supplied in accordance with AS 1379:2007- Specification and Supply of Concrete.

The concrete supplier is responsible to provide a mix design in accordance with the Ritek® requirements for high flow characteristics, minimum water content, and a target slump at the pump as specified in the table below and aggregate size of 7mm to 10mm (max), using retarders and plasticizers to achieve the desired slump.

RITEK® CONCRETE MIX SPECIFICATION (DENSITY > 2200 KG / M³)					
Mix Description Ritek®	Ritek® 25/7/180	Ritek® 32/7/180	Ritek® 40/7/180	Ritek® 50/7/180	Ritek® 60/7/180
Strength f 'c (MPa)	25	32	40	50	60
Cement Type (AS 3972)	SL				
Course Aggregate Size (mm)	7 - 10				
Max. Water/Cementitious Ratio	0.50				
Slump ± 20 (mm)	180				
Concrete Admixtures	Yes				
Max. Supplementary Cement Content	20%				

Concrete Compressive Strength (f 'c)

The concrete compressive strength is specified by the design engineer. Common specified strengths for walls are shown.

Cement Type

Shrinkage Limited cement (SL) complying with AS 3972 should be used in the concrete mix to limit drying shrinkage.

Concrete Aggregate

The specified mix design includes coarse aggregate size of 7mm to 10mm (max) to ensure the correct concrete flow in the Ritek® panels is achieved.

Water to Cementitious Material Ratio (w/cm)

The specified mix designs maximum water-to-cementitious-materials ratio of 0.50 is intended to limit the amount of excess free water in the concrete mix which is known to increase concrete shrinkage during the curing process. The cementitious materials include cement and supplementary cement content (fly ash) in the ratio limit calculation. No additional water is to be added to the supplied mix at the point of discharge.

Concrete Slump

Slump specification is to ensure the concrete mix completely fills the formwork up to the intended level during placement while it expels entrapped air and closely surrounds all fixings, reinforcement, tendons, ducts, anchorages and embedment's.

Concrete Admixtures

The concrete supplier is responsible for the use of water-reducers, superplasticizers and slump keeper admixtures in the mix design to achieve the targeted slump value without the need for additional water on-site.

Supplementary Cement

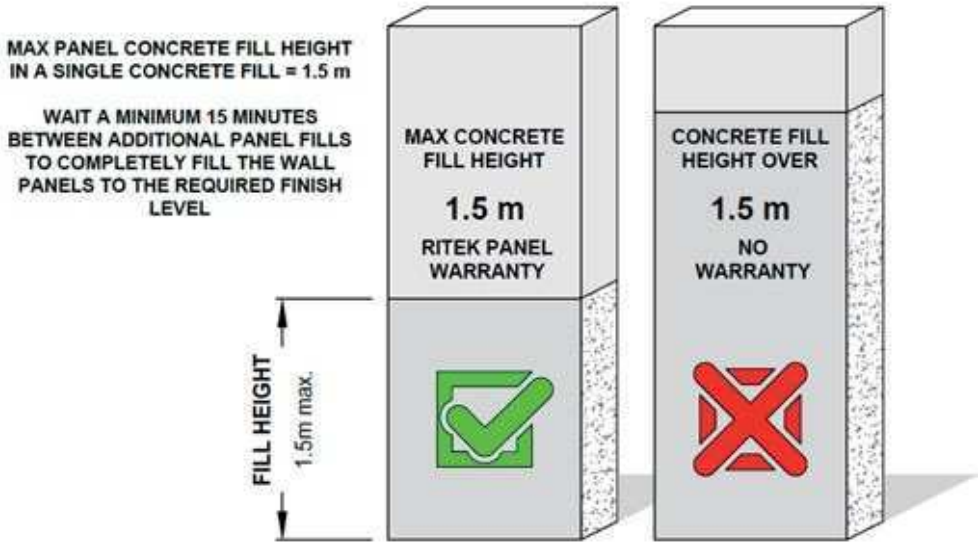
Fly ash may be used as a cement substitution up to a maximum limit of 20% in the concrete mix design. The use of slag cement and other pozzolans should be avoided as some have been shown to have adverse effects on early concrete strength gains and potential long-term drying shrinkage.

Block Mix

A standard "Block-Mix" should not be used for core-filling of the Ritek® panels as the ratio of coarse aggregate to fines is typically low and is not as capable in limiting crack development within the concrete structure.

Ritek® Wall Systems - **Concrete Mix Specification**

PANEL CONCRETE FILL HEIGHT SPECIFICATION



IF THE RITEK PANELS ARE SATURATED WET DUE TO HEAVY RAIN, PANEL FILL HEIGHT IS TO BE REDUCED TO 0.6M

Concrete Placement

Clause 17.1.3 of the Australian Standard AS 3600 Concrete Structures requires that "Concrete shall be handled, placed and compacted so as to completely fill the formwork to the intended level, expel entrapped air, and closely surround all reinforcement, tendons, ducts, anchorages, embedment's and fixings.

Panels are to be filled progressively in layers up to 1500 mm high. Scaffold or formwork decks are required to place the concrete. When using higher strength concretes (40 MPa - 60 MPa), light wetting of the steel and inside face of the Ritek® panel may assist concrete flow between concrete pours during hot and dry site conditions.

Concrete Pump Equipment

Concrete is to be placed using a concrete boom pump or line pump. The boom pump or line pump delivers the concrete in a continuous stream. For maximum efficiency when pouring, schedule the concrete trucks approximately 30 minutes apart to provide continuous supply of concrete to the pump with minimal idle times. Ensure a 50 mm (2") or 75 mm (3") reducer is used and a flexible hose at the end.

Concrete Vibration

The design of the Ritek® Wall® Systems and the flow characteristics of the Ritek® concrete mix specification allows the concrete to flow efficiently within the Ritek® panels and completely fill them without trapping pockets of air, and will closely surround all reinforcement, tendons, ducts, anchorages, embedment's and fixings. Mechanical vibration, although not usually required, is permitted on Ritek® panels; however excessive use of vibration is likely to result in more damage to the panels than the benefits of increased compaction.

Use a 25 mm vibrating shaft (pencil vibrator). When mechanical vibration is required, the most effective method is by vibrating the concrete from the bottom to the top of the concrete as the panels are being filled. Vibrating the steel reinforcement bars positioned inside the Ritek® Panels can also be effective. Choose the appropriate method to best suit the actual site condition/panel configuration.

Concrete Fill Height

Ritek® Wall® panels have a maximum concrete fill height of 1.5 m (in a single fill) and are core filled in stages with a 15 minute rest time before the next fill. The Ritek® concrete mix specification allows the concrete within the panel to be easily levelled off to accommodate being filled in stages. Ensure rest time does not allow the concrete to set over upper reinforcement steel.

Ritek® Wall Systems - **Design Examples**

It is proposed to use a Ritek 150X-Plus Wall for the internal bearing walls in a multi-story Class 2 building. The wall is 3.1 m high, 4.0m long carrying a permanent load (PL) of 150 kN/m, an imposed Load (IL) of 100 kN/m and a racking force (assumed to be at top of wall) of 300 kN. The wall is to be filled with 32 MPa concrete and N12 @ 400 crs starter bars are to be used to match the vertical reinforcement in the wall.

Check the wall for vertical strength, racking strength and fire resistance. Load Factors (LF) are in accordance with AS1170.

Wall self-weight, $SW = \rho Ht$
$= 25 \times 3.1 \times 0.138$
$= 11$ kN/m

Vertical Strength

Design load (at mid-height) $= LF.PL + LF.SW + LF.IL$
$= 1.2 \times 150 + 1.2 \times 11/2 + 1.5 \times 100$
$= 343$ kN/m

Effective wall height- $H_{we} = 0.75H_{wu}$
$= 0.75 \times 3.1$
$= 2.325$ m

Load eccentricity, Case (1) $e = 0.05\, t_w$
$= 0.05 \times 0.138$
$= 0.0069$ m

Additional eccentricity- $e_a = \frac{H_{we}^2}{2500 t_w}$
$= 2.325^2/(2500 \times 0.138)$
$= 0.01567$m

Design Capacity- $\phi N_u = \phi(t_w - 1.2e - 2\, e_a)\, 0.6F'_c 10^3$

$= 0.6\,(0.138 - 1.2 \times 0.0069 - 2 \times 0.0157)\, 0.6 \times 32 \times 10^3$
$= 1133$ kN/m

>Vertical Load of 343 kN/m Vertical strength OK

Alternatively, check capacity using load chart Case (1)

From chart ϕN_u = 1130 kN/m OK

Racking Strength

Design racking force = 300 kN

Check Shear Capacity

$H_w/L_w = 3.1/4.0 = 0.8 < 1.3$

$$V_{uc} = \left[0.66\sqrt{f'_c} - 0.21\frac{H_w}{L_w}\sqrt{f'_c}\right] 0.8\, L_w t_w 10^3$$
$$= \left[0.66\sqrt{32} - 0.21 \times 0.78\sqrt{32}\right] 0.8 \times 4.0 \times 0.138 \times 10^3$$
$$= 1280 \text{ kN}$$

$$V_{us} = \frac{A_s}{s} f_{sy}(0.8L_w)10^{-3}$$
$$= 113/400 \times 500(0.8 \times 4.0)10^{-3}$$
$$= 452 \text{ kN}$$

$$Vu = \phi(Vuc + Vus)$$
$$= 0.7(1280 + 452)$$
$$= 1210 \text{ kN}$$

Check Overturning Resistance

Restoring Load- RL = LF.PL + LF.SW + LF.IL
= 0.9 x 150 + 0.9 x 11 + 0 x 100
= 145 kN/m

Anchored Reinforcement- $A_{st} = \frac{A_s}{s} \times \frac{L_w}{2} \times 10^{-3}$
= 113/400 x 4.0/2 x 10^{-3}
= 565 mm^2

Overturning Resistance-

$$\frac{\phi\left[\left(f_{sy}A_{st}10^{-3} + RL.L_w\right)d\left(1 - \frac{0.6\left(f_{sy}A_{st}10^{-3} + RL.L_w\right)}{t_w d f'_c 10^3}\right) - RL.L_w\left(d - \frac{L_w}{2}\right)\right]}{H_w}$$

$$\frac{0.7\left[\left(500x565x10^{-3} + 145x4.0\right)3.0\left(1 - \frac{0.6\left(500x565x10^{-3} + 145x4.0\right)}{0.138x3.0x32x10^3}\right) - 145x4.0\left(3.0 - \frac{4.0}{2}\right)\right]}{3.1}$$

= 449 kN

Racking Resistance = the lesser of shear strength and overturning resistance
≤ 1210 and 449
= 449 kN
> 300 Design Load Racking OK

Check using CHART 4.1- Applied load = LF.PL = 0.9 x 150 = 135
Interpolating for a wall height of 3.1 m and applied load 135 kN,
Racking resistance = 440 kN > 300 OK

Ritek® Wall Systems - **Design Examples**

Fire Design

Design by calculation in accordance with Eurocode 2, Part 1-2: General rules – Structural fire design, ANNEX B.2 Zone method.

Wall being an internal loadbearing wall, it is required to have a FRL of 90/-/- (fire on both faces).

Insulation and integrity – no requirements for minimum thickness.

Structural Adequacy – check that the fire load capacity exceeds fire design load

Design load for fire = LF*PL + LP*SW + LF*IL
= 1.0*150 + 1.0*11/2 +0.4*100
= 196 kN/m

For fire on both sides; W = half wall thickness
= 138/2
= 69 mm

Find reduced concrete strength, using Figure B.5 (a);
For 90 minutes and W = 69 $k_c = 0.65$
Reduced concrete strength; $f'_{cf} = k_c f'_c$
= 0..65*32
= 20.8 MPa

Find reduced wall thickness, using Figure B.5 (c);
Damaged zone (90 minute fire); $a_z = 25$ mm (on both faces)
Reduced Design Thickness $t_{wf} = t_w - 2*a_z$
= 138 – 2* 25
= 88 mm

Load eccentricity (continuous floor slab); $e = 0.05\ T_{wf}$
= 0.05*88
= 4.4 mm

Additional eccentricity; $e_a = H^2_{ins} / (2500\ T_{wf})$
= (3100*0.75)^2/(2500*88)
= 24.6 mm

Fire Load Capacity; $\Phi N_{uf} = \Phi(t_{wf} - 1.2e - 2e_a)0.6f'_{cf}10^3$
= 0.6(0.088 – 1.2*0.0044 – 2*0.0246)0.6*20.8*10^3
= 251 kN/m
> 196 Wall has satisfactory Structural Adequacy for FRL 90/-/-

Alternatively, check using CHART 6.1
From chart, Load Capacity = 250 kN/m OK

Ritek® Wall Systems - **Design Examples**

Aluminium Components

The Australian Standard AS3600 Concrete Structures requires that “Metals such as aluminium shall not be embedded in structural concrete unless effectively coated, covered, or treated to prevent chemical action between the metal and the concrete and electronic action between the metal and steel.”

All aluminium extrusions as part of Ritek® Wall Systems are adequately coated with chromate plating and sufficient to satisfy the requirements of the Standard.

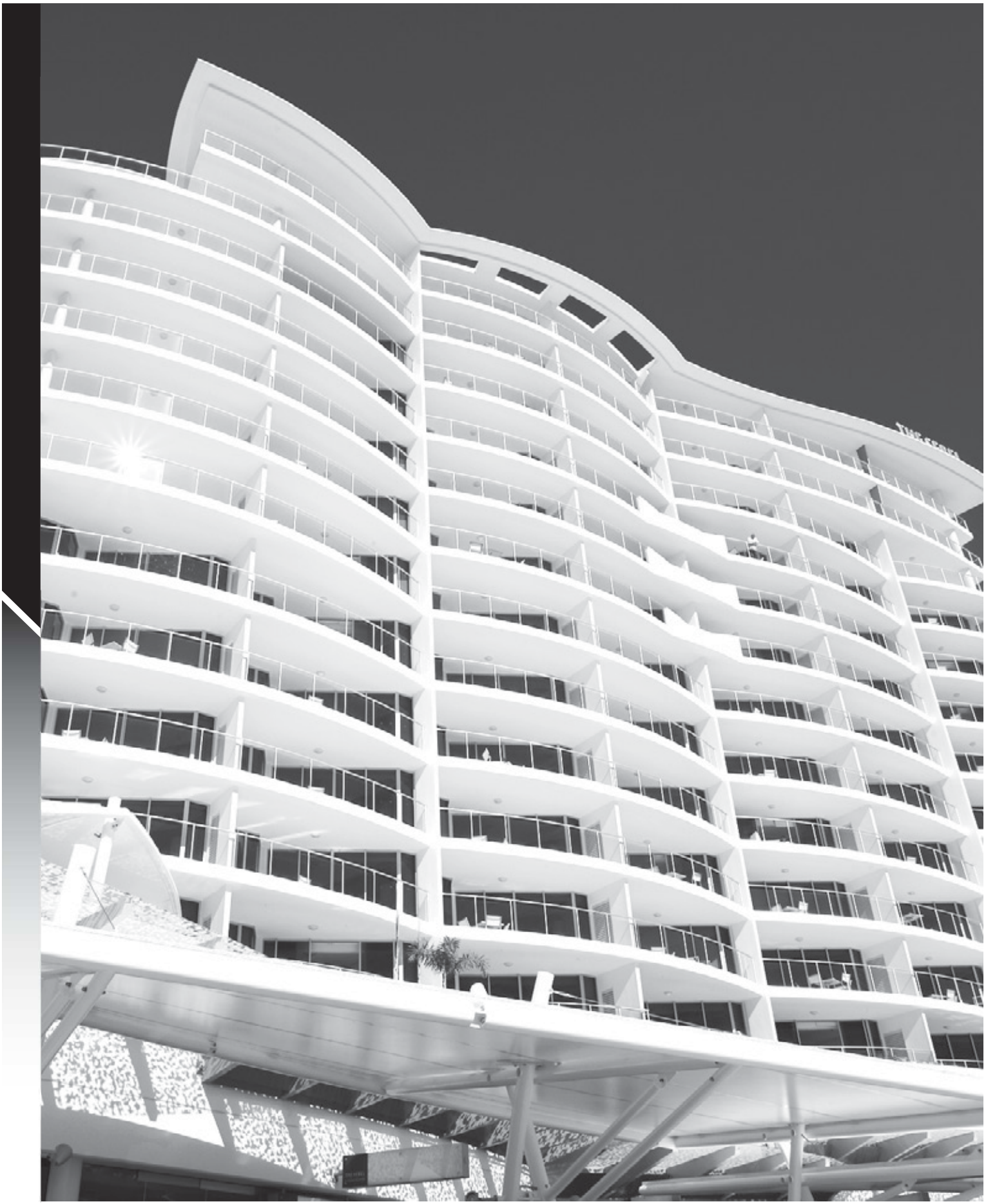
Generally, for electrolytic action to take place the concrete needs to be continuously wet with aluminium in contact with the reinforcement. Electrolytic action is unlikely to occur as once the concrete has cured and the finished panels will remain dry. There is no contact between the extrusions and the reinforcement due to the design of the wall systems.

The Ritek® Wall Systems aluminium extrusions serve no purpose once the concrete is in place, even if the extrusions were to corrode completely away, this would have no detrimental effect on the structure.

The chromate plated aluminium extrusions that form part of the Ritek® Wall Systems can safely be used and embedded in concrete.

Ritek® Wall Systems - **Notes**

Ritek® Wall Systems - **Notes**



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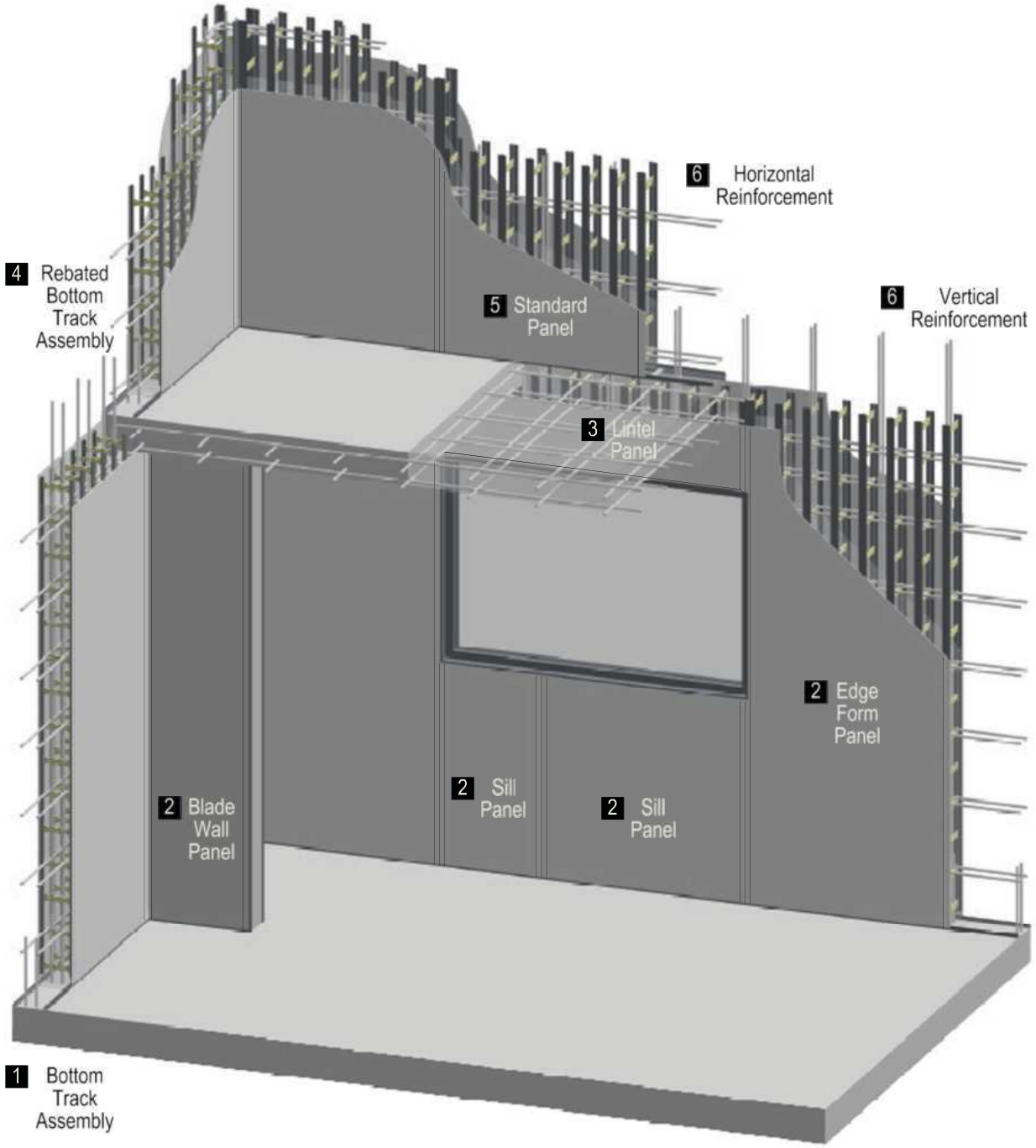
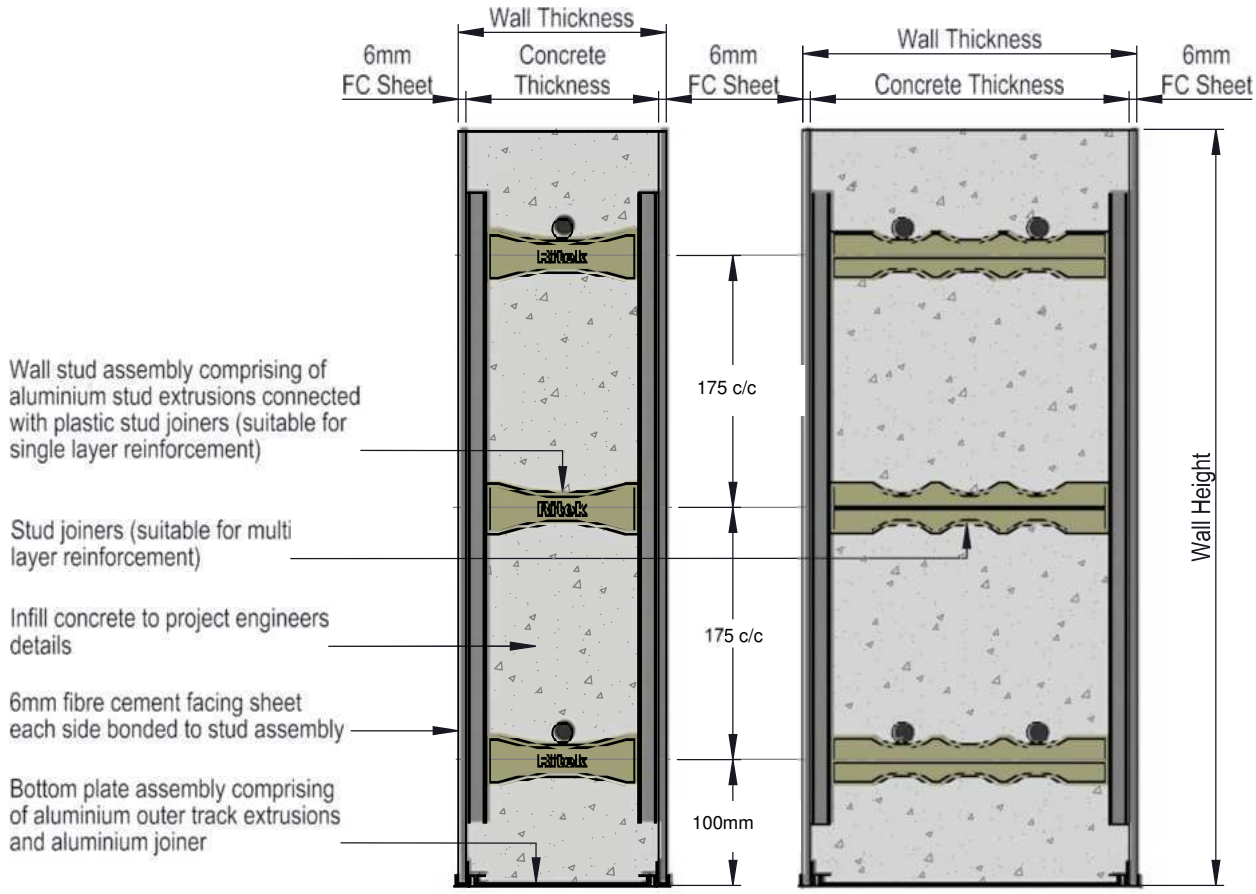
Ritek® Wall Systems - Architectural Details

WALL SYSTEM COMPONENT OVERVIEW **FIGURE 4.1**

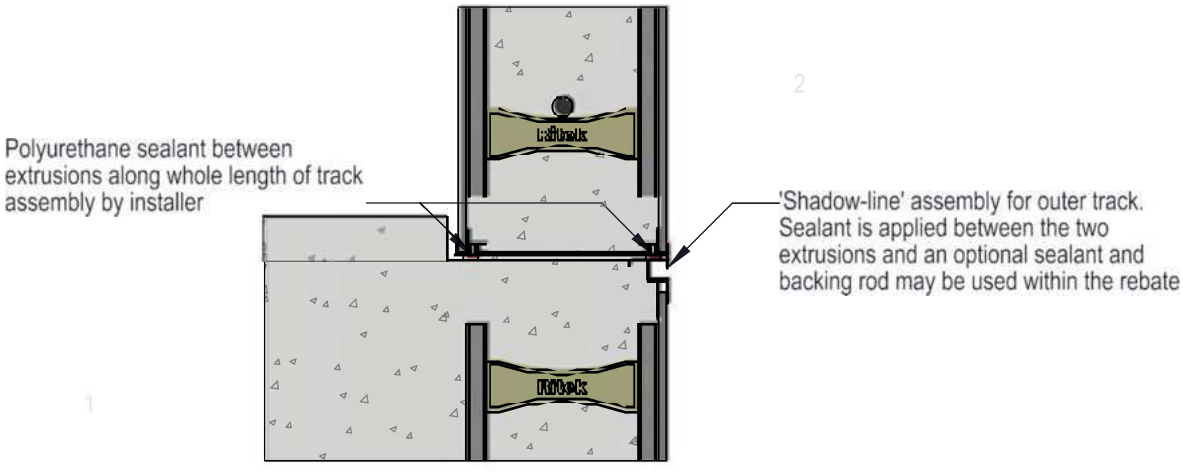


Ritek® Wall System - Architectural Details



115 to 165 XL & X-Plus Walls

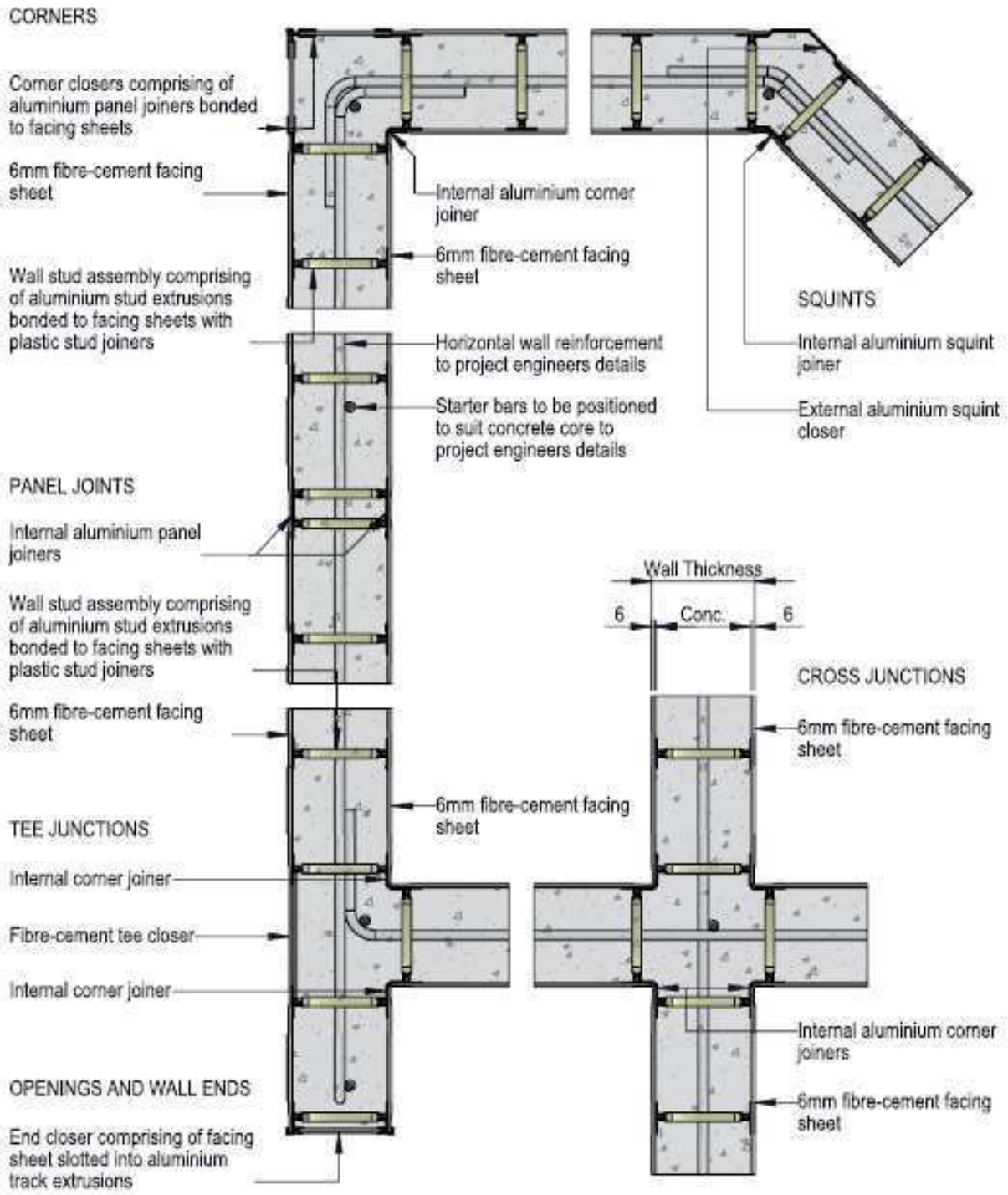
200 and 265 XL & X-Plus Walls



DETAIL AT SUSPENDED FLOOR JUNCTION

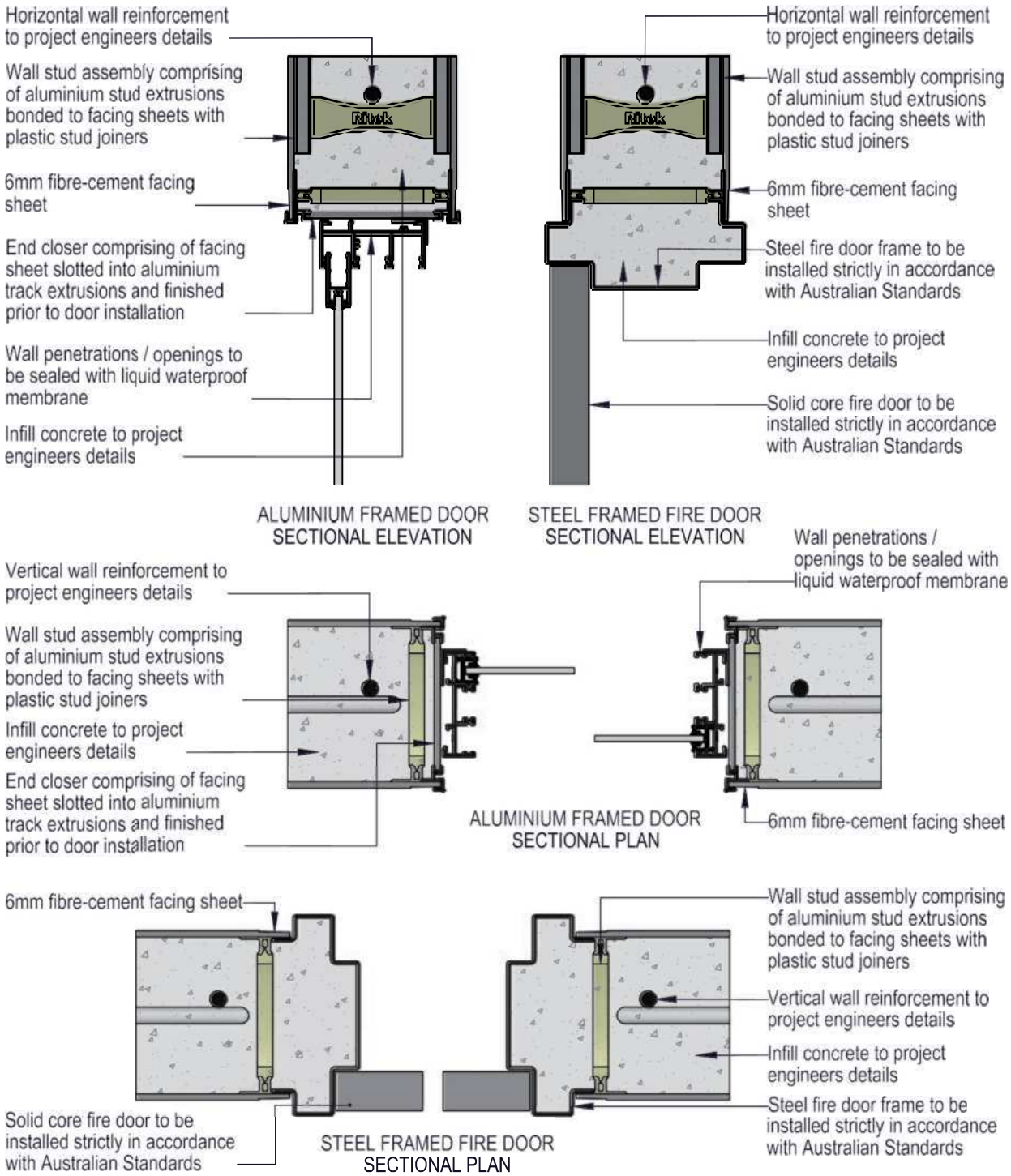
Ritek® Wall Systems - Architectural Details

RITEK WALL SYSTEM SECTIONAL PLANS FIGURE 4.5



Ritek® Wall Systems - Architectural Details

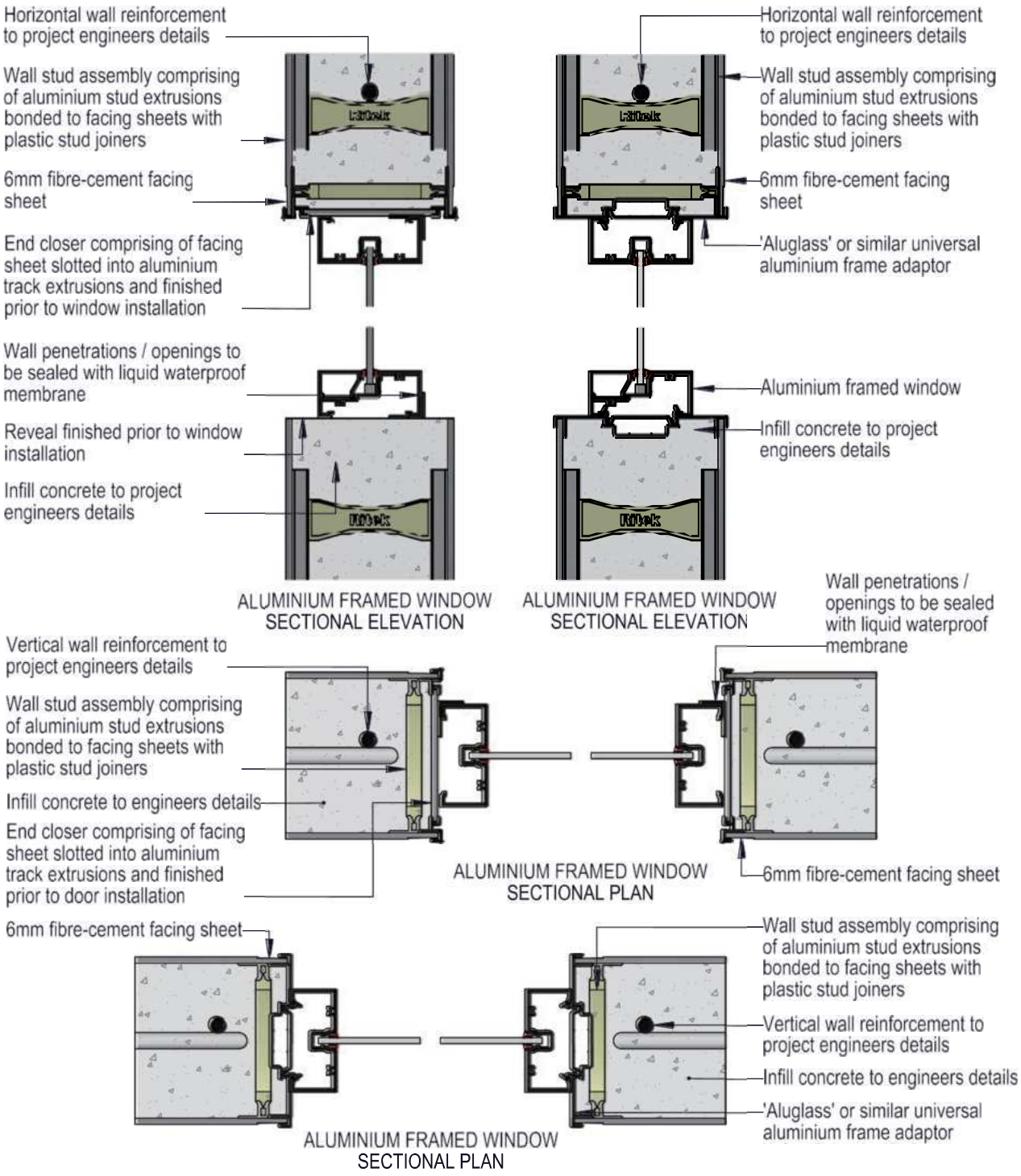
DOOR SECTIONAL DETAILS — FIGURE 4.7



Note: Wall penetrations/openings to be sealed with liquid waterproof membrane.

Ritek® Wall Systems - Architectural Details

WINDOW SECTIONAL DETAILS **FIGURE 4.9**



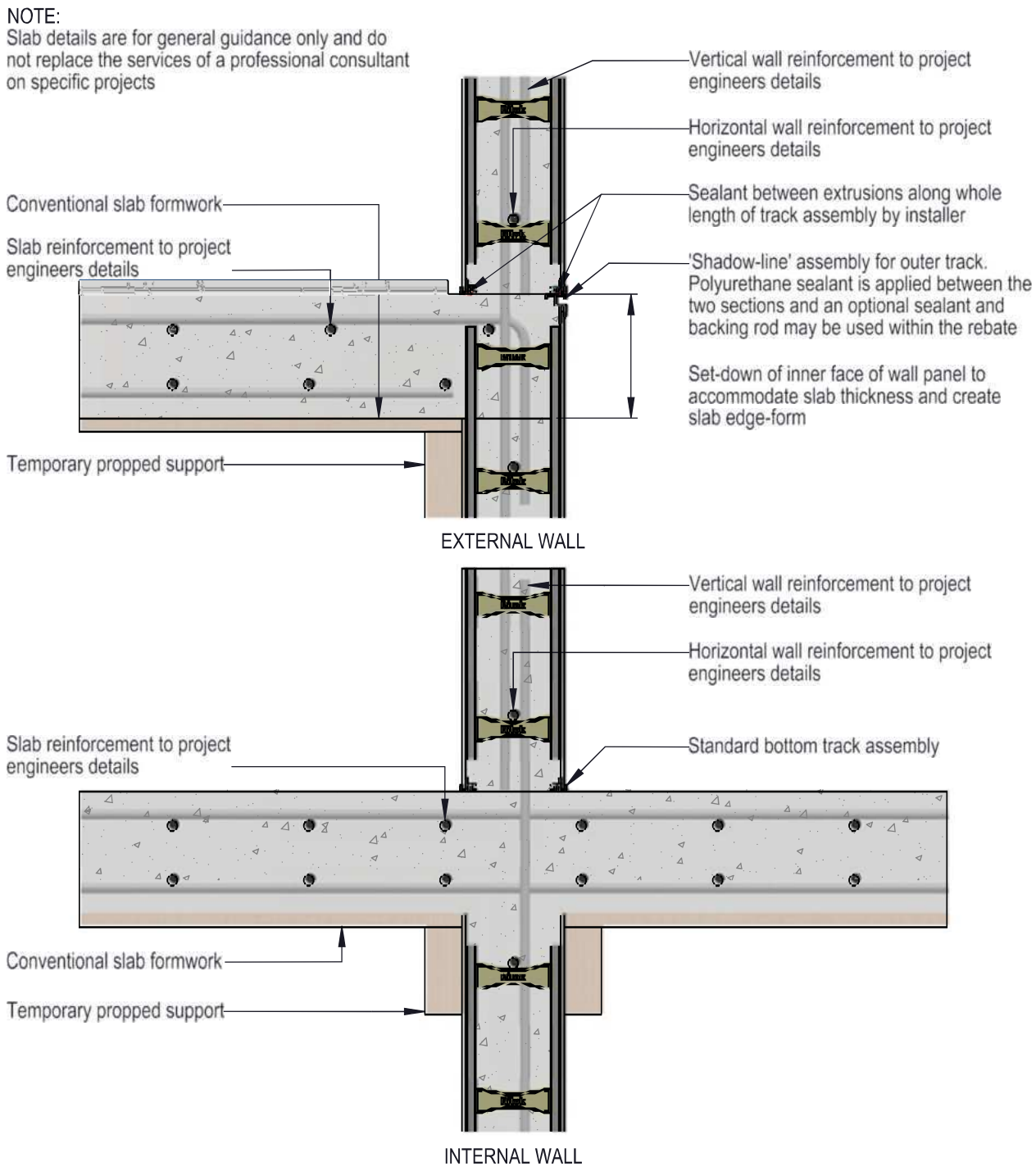
Note: Wall penetrations/openings to be sealed with liquid waterproof membrane.

Ritek® Wall Systems - Architectural Details

Conventional Slab Junction

Typical details are shown in Figure 4.11 for both external and internal wall junctions.

CONVENTIONAL SLAB JUNCTION **FIGURE 4.11**

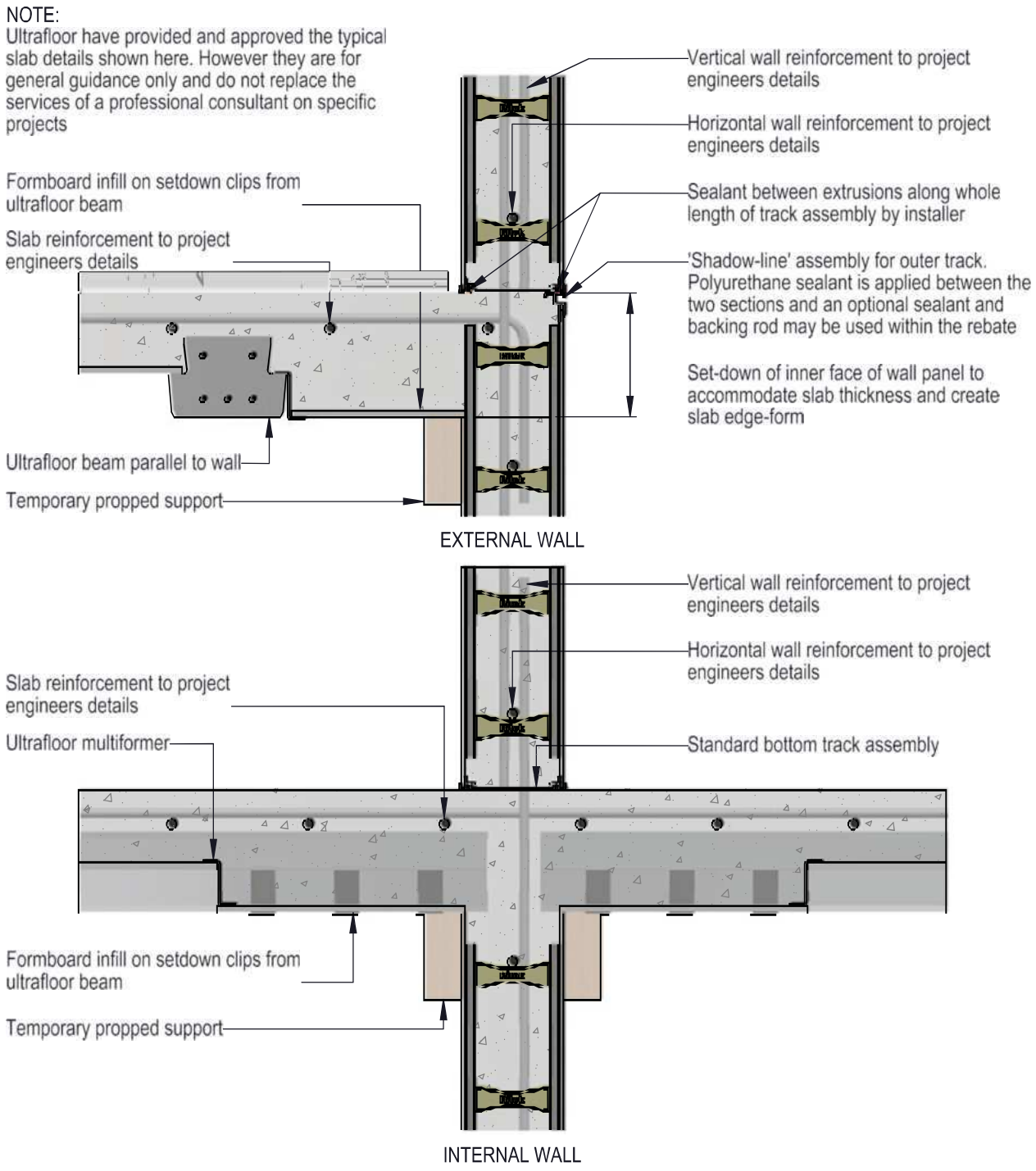


Ritek® Wall Systems - Architectural Details

Ultrafloor Slab Junction

Typical details are shown in Figure 4.12 for both external and internal wall junctions assuming opposite orientations of the floor beams. Each detail can be adapted for the other orientation.

ULTRAFLOOR SLAB JUNCTION **FIGURE 4.12**

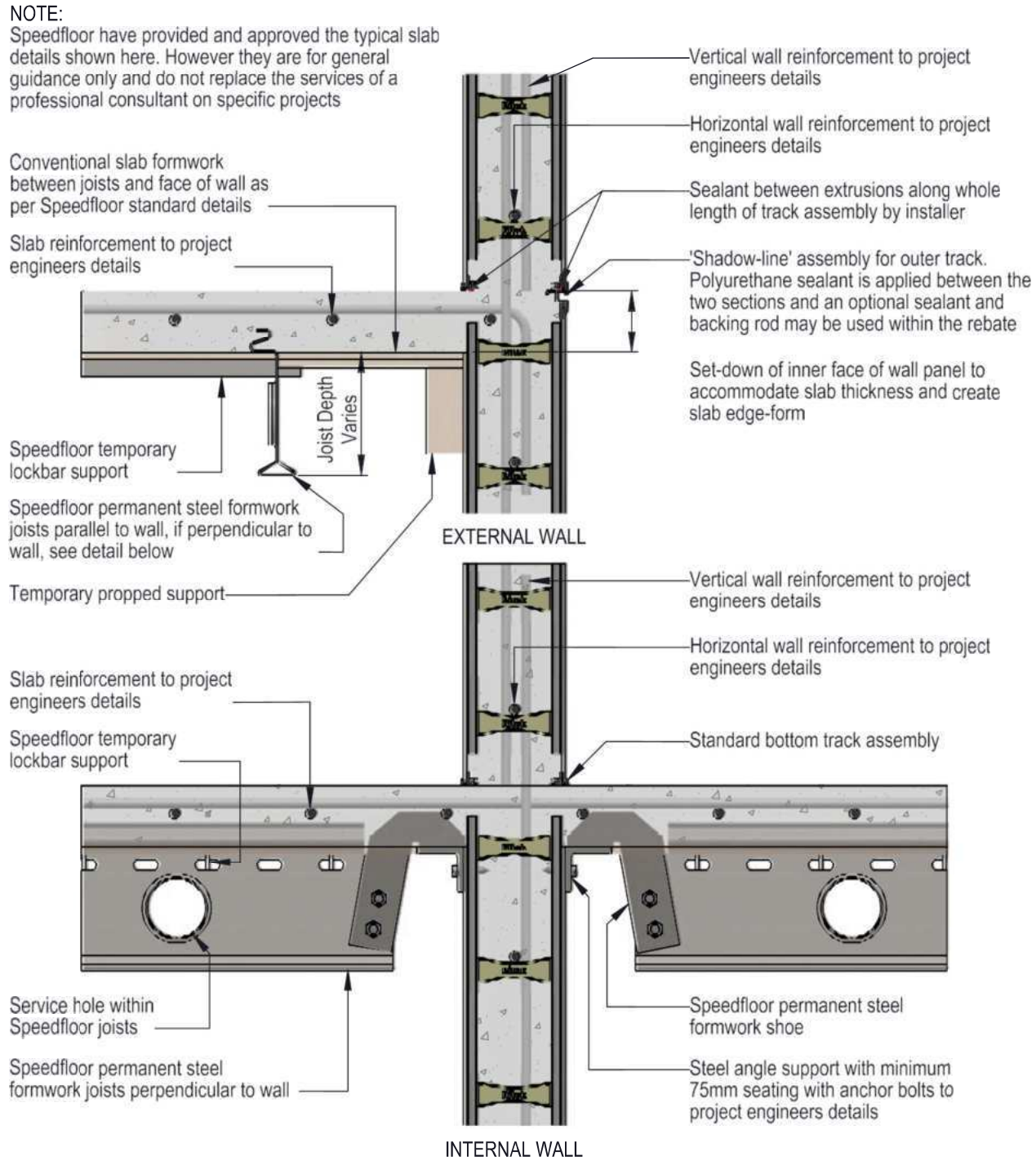


Ritek® Wall Systems - Architectural Details

Speedfloor Slab Junction

Typical details are shown in Figure 4.13 for both external and internal wall junctions.

SPEED FLOOR SLAB JUNCTION **FIGURE 4.13**

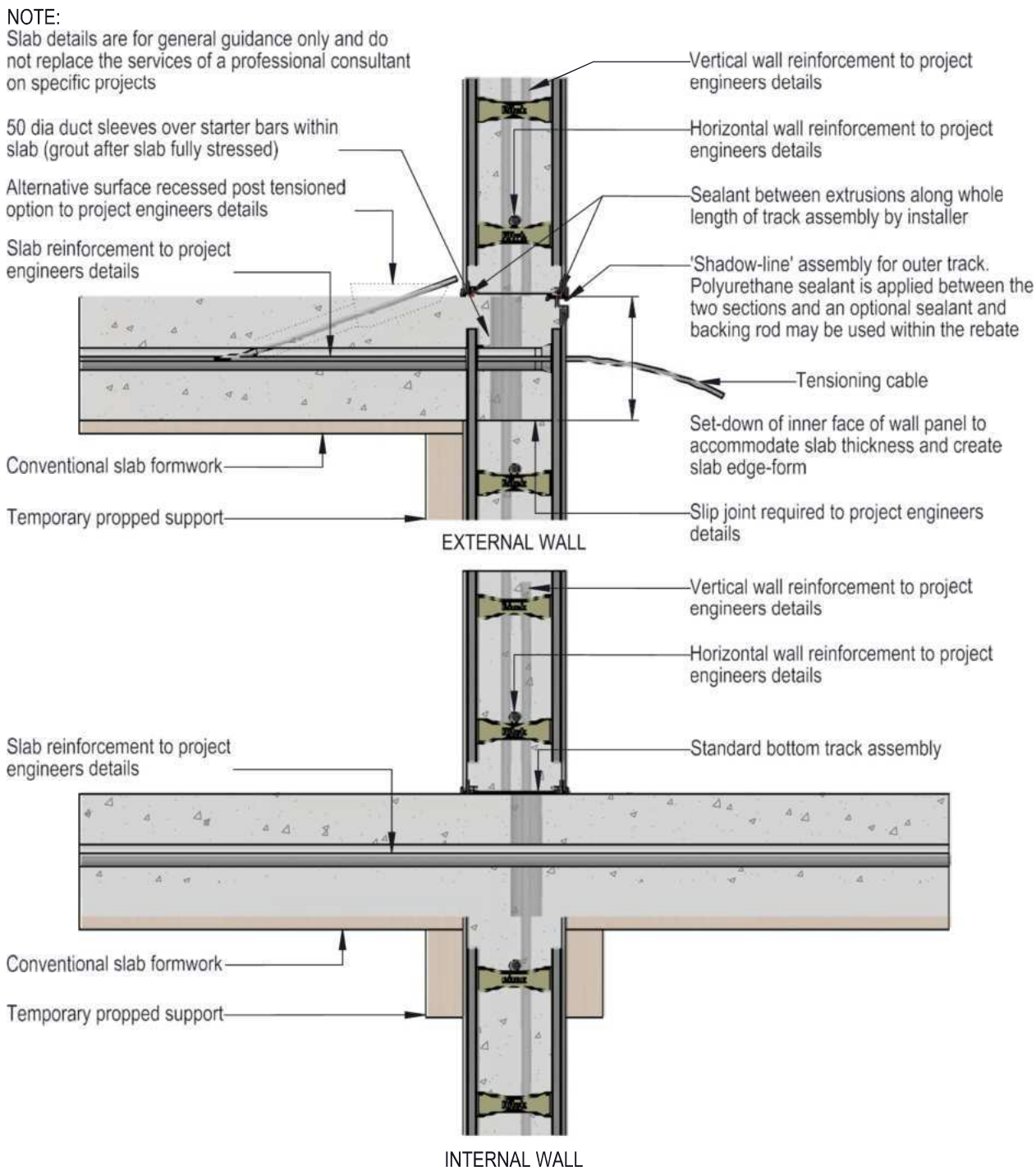


Ritek® Wall Systems - Architectural Details

Post Tensioned Slab Junction

Typical details are shown in Figure 4.14 for both external and internal wall junctions.

POST TENSIONED SLAB JUNCTION **FIGURE 4.14**

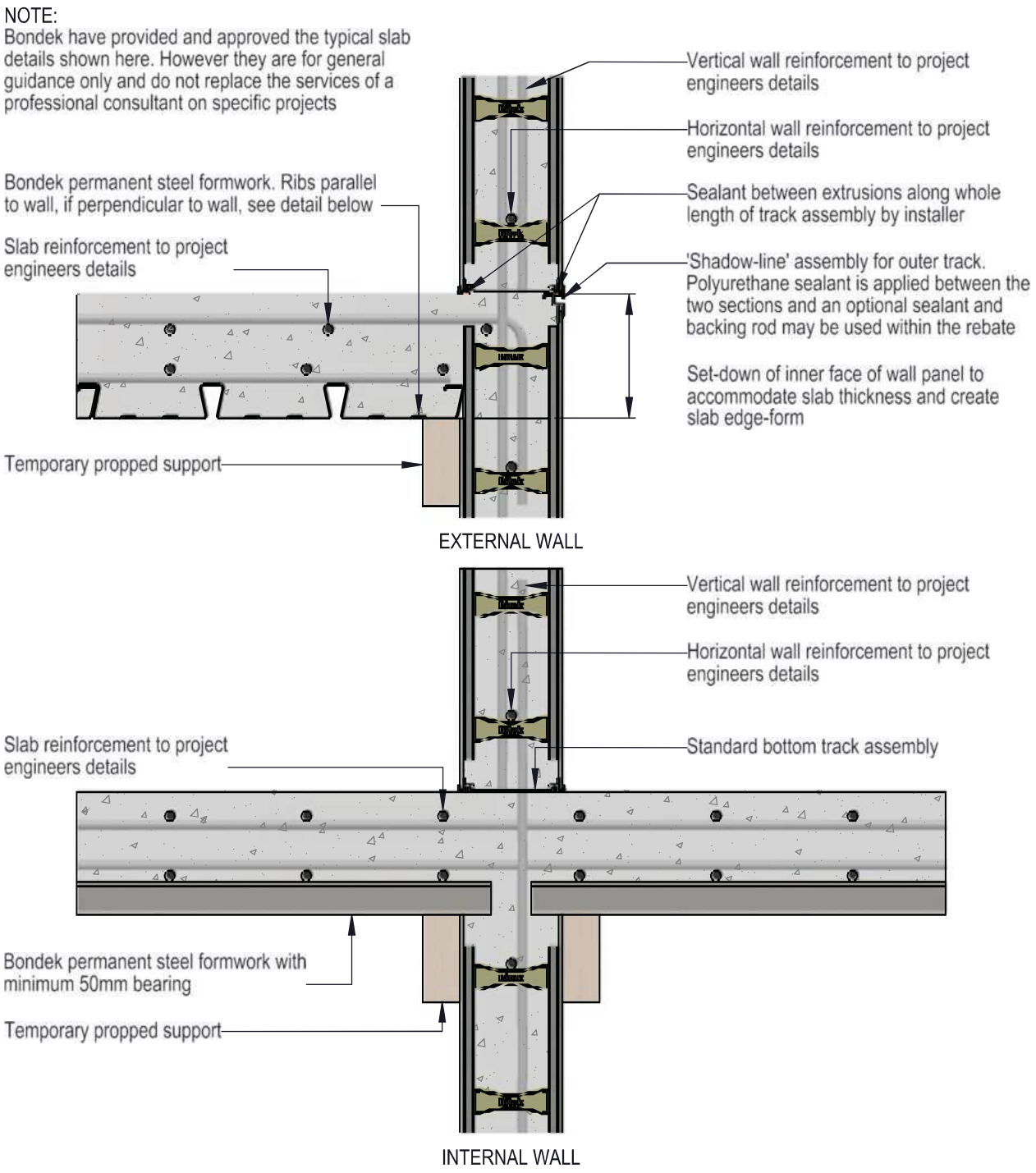


Ritek® Wall Systems - Architectural Details

Bondek Slab Junction

Typical details are shown in Figure 4.15 for both external and internal wall junctions.

BONDEK SLAB JUNCTION **FIGURE 4.15**

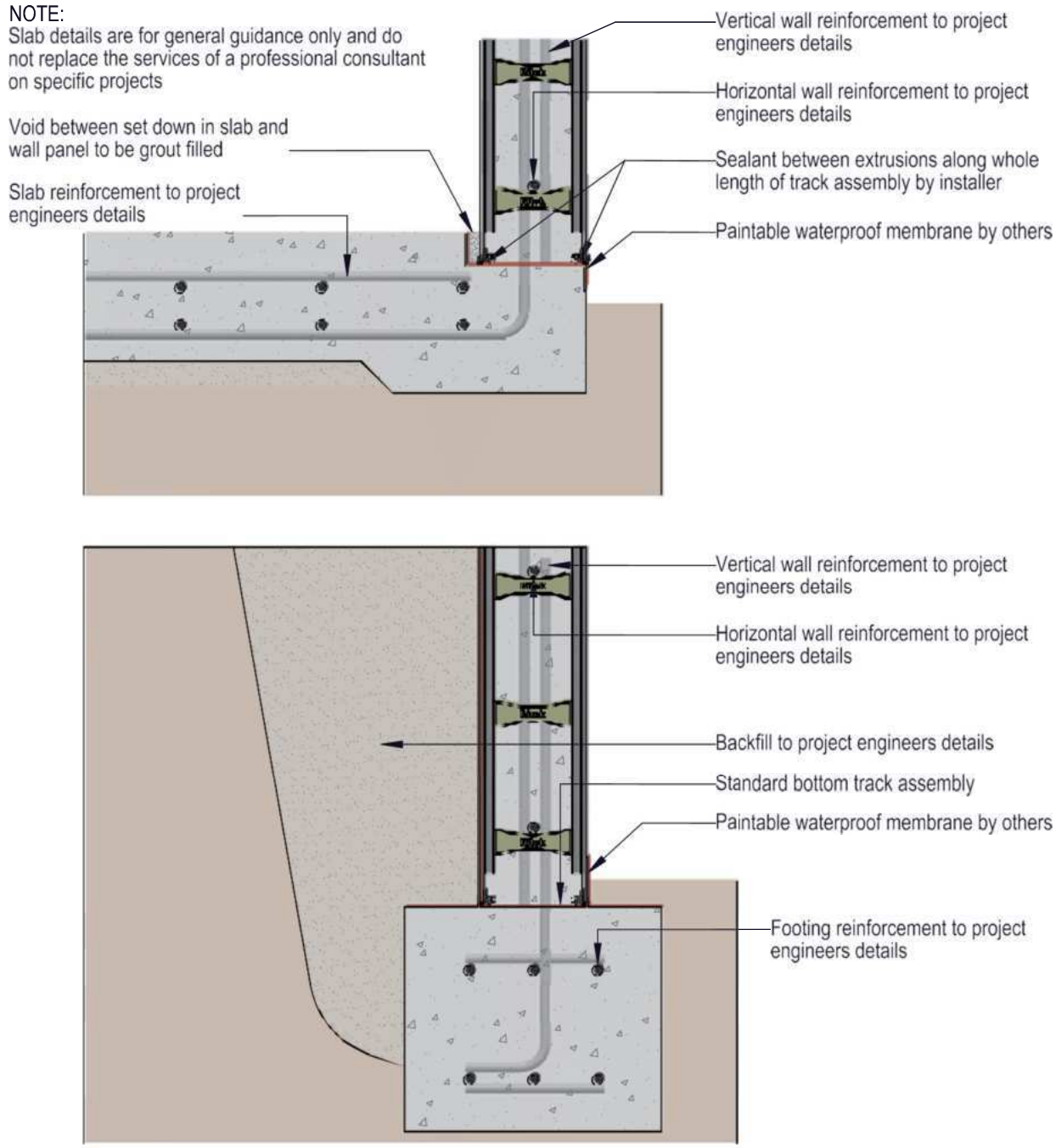


Ritek® Wall Systems - Architectural Details

Footing Connection

Typical details are shown in Figure 4.16 for footing connection.

FOOTING CONNECTION **FIGURE 4.16**



Ritek® Wall Systems - Waterproofing

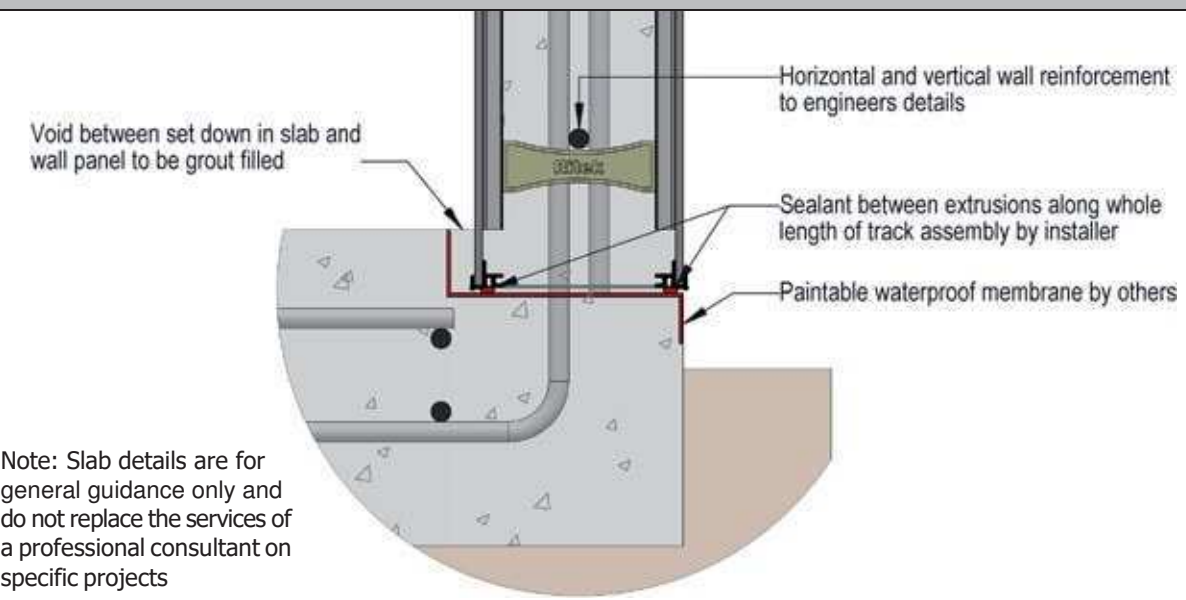
With any application using Ritek® Wall Panels, it is the Project Engineers responsibility to be mindful that the Ritek® panels and some accessories are manufactured using fibre cement sheeting. Ritek® panels and accessories require protection from moisture and exposure to weathering by applying a suitable protective waterproofing coating system to them, ensuring the prevention of any water ingress to a building through its facades.

In the case when using Ritek® Wall System as a retaining wall, where there is a high probability of hydrostatic pressure against the panel and in turn the wall, an applicable proprietary waterproofing system is required.

Refer to Figures 6.8 and 6.9 for typical footing to wall connection details. It is recommended that the Ritek® Wall Panels have a full waterproof membrane applied prior to installation and that a sealant is applied at panel to panel joints and all connections to accessories.

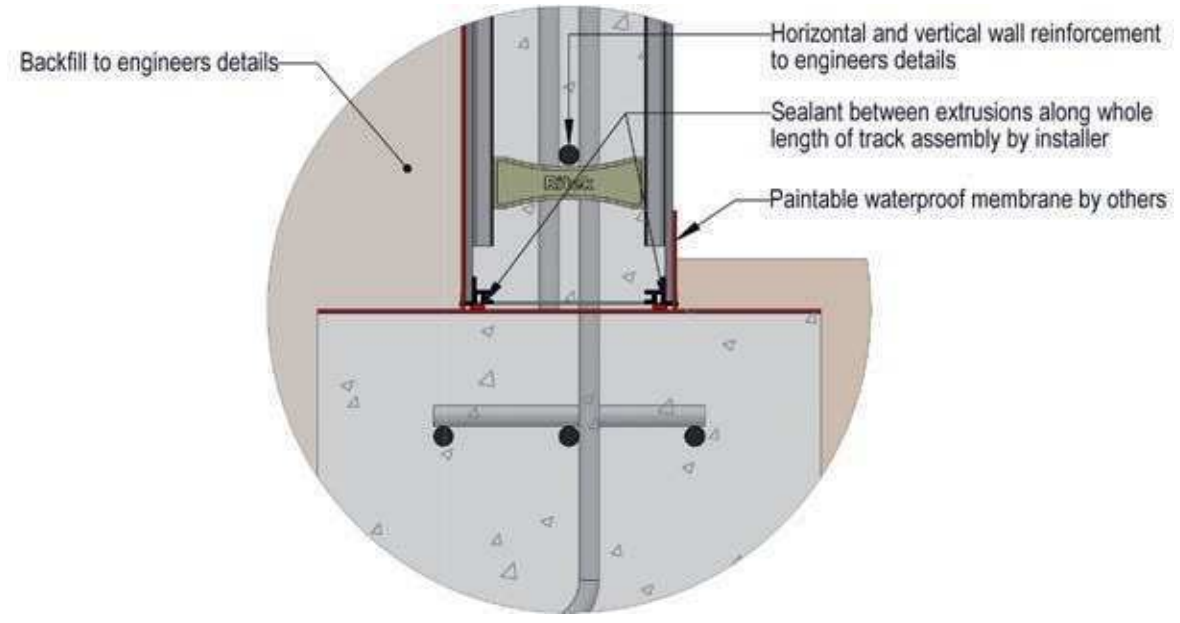
Waterproofed Ritek® Wall Panels have been shown to withstand intense weather events in a variety of environments, providing all standard requirements for structural adequacy and drainage are maintained. The proprietary waterproofing system must be applied in accordance with the proprietary waterproofing system manufacturer. Ritek® does not provide any guarantee on the watertightness of the panels.

SLAB EDGE DETAIL **FIGURE 6.8**



Note: Slab details are for general guidance only and do not replace the services of a professional consultant on specific projects

FOOTING DETAIL **FIGURE 6.9**



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Ritek® Wall Systems - **Internal Finishing**

Recommended guidelines for internal joint setting of Ritek®\ Wall® System.

Interior Joint Setting of Ritek® Wall Panels

Industry Standards
Refer to AS/NZS 2311:2009 Standard for guidance and recommended good practice for the preparation of specifications, the application and maintenance of decorative paint systems for use by the paint industry.

Preparation for Joint Setting / Flushing Compounds

Ritek® Wall Panels can be covered in dust, mud and other contaminants following installation on project sites. The panels need to be cleaned of all contaminants to ensure of a quality finish being applied.

Required Procedure:

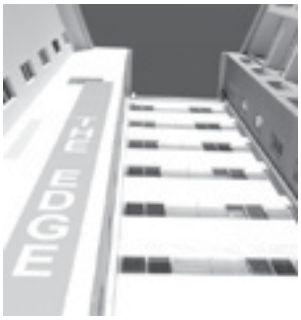
Ensure that the substrate surface condition meets the requirements of the jointing compounds and finishing systems being used at the time of application.

Ritek® Panel Rebate Detail

Ritek® Wall® Panels are supplied with a standard FC sheet rebate detail to allow for jointing compounds and joint reinforcing tapes to be used. A standard FC sheet rebate detail is typically 0.5mm deep tapering to 1.5mm deep at the edge of the panel and 30mm wide.

Required Procedure:

The rebate detail must be clean of any excess concrete, adhesive or any other contaminant.
Fixing screws used during the panel installation must be set below flush with the surface or removed.


External


Lift Shafts / Internal Walls


Stairwells


Party Walls

Ritek® Panel Moisture Content

Ritek® Wall Panels following core-fill, after heavy rain or during high humidity periods may result in a wet substrate surface. Due care is required to ensure the finishing systems are applied within the acceptable conditions of the system being applied. It is standard practice to ensure the substrate contains less than 20% Wood Moisture Equivalent (WME) before applying joint setting / patching materials and finishing system. Refer to the joint setting compound manufacturer's specification sheets.

Aluminium Accessories

The Ritek® Wall System uses aluminium accessories for corners and nib end closers. All aluminium accessories are supplied etched with a chromate finish as a protective coating to prevent corrosion and a barrier to the concrete. During panel assembly, aluminium accessories can be cut to length, scratched, holes created for screw fixing etc. and can have dust, mud and other contaminants on them. It is important to ensure that the substrate surface condition meets the requirements of the jointing compounds and finishing systems being used at the time of application.
Refer to the joint setting compound manufacturer's specification sheets.

Internal Joint Setting

For setting to internal joints please refer to section I1 of this manual.

Ritek® Wall Systems - **Internal Finishing**

Wall System Finishes

The aesthetic appeal of the walls depends on:

- Correct installation of the panels
- Straightness / flatness of walls
- Choice of finishes for internal or external walls
- The amount of glancing light projected on the wall surface; and
- The quality of the applied paint or texture system.

Lighting

Lighting design is very much a matter of cause and effect. The Australian Standard AS2589 details five levels of finish. It is recommended designers give consideration to the level of finish required and eliminate potential problems due to critical lighting.

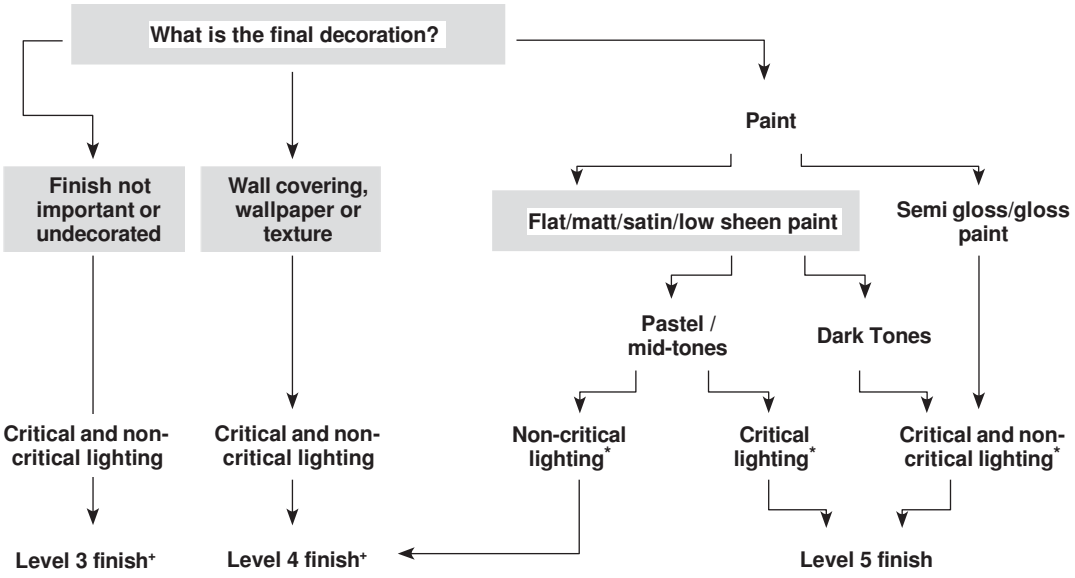
Interior Joint Setting and General Setting

Procedures for flush jointing the Ritek® wall system panels are similar to jointing of any fibre cement sheeting lining. Ritek® guidance is to use products which are designed and recommended for flush joint setting of fibre cement lining/ sheeting.

Internal Joint Setting

For setting to internal joints please refer to section I1 of this manual.

LEVELS OF FINISH AVAILABLE **CHART 5.1**



* Critical lighting: natural or artificial light projected across a surface at a low incidence angle. Non-critical lighting: when the light striking the surface is diffuse or at right angles, or both.
+ May not be suitable for subsequent decoration to high levels of quality in the future. See Level 4 or Level 5 for upgrading requirements.

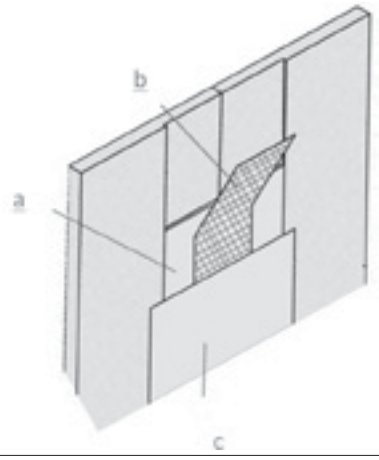
Ritek® Wall Systems - **Interior Joint Setting**

Typical Joint Setting Application

First Coat

a. Apply Base Coat to fill the rebate using a 150mm broad knife.
b. Embed the fibre mesh centrally over the joint using a 150mm broad knife ensuring there are no voids under the tape and remove excess compound.
c. Immediately cover tape with thin layer of Base Coat applied using a 150mm broad knife.

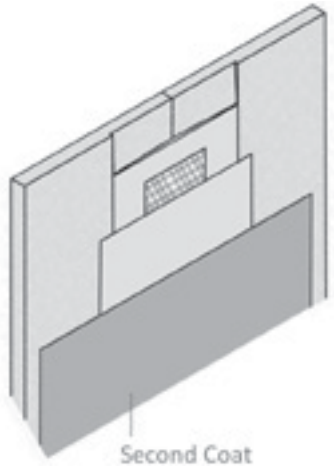
FIRST COAT FINISHING **FIGURE 5.1**



Second Coat

When the base coat is fully dry, use a 150mm wide second coat trowel to apply the Base Coat. Apply this coat approximately 180mm wide, laid down over the rebate and feather the edges.

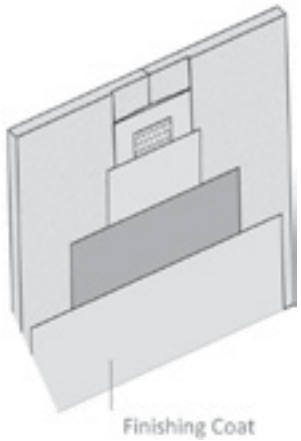
SECOND COAT **FIGURE 5.2**



Finishing Coat

Ensure the second coat is fully dry. Using a finishing trowel, apply a coat of Topcoat 200mm wide centrally over the joint and feather out the edges. Allow to dry fully before sanding.

FINISHING COAT **FIGURE 5.3**



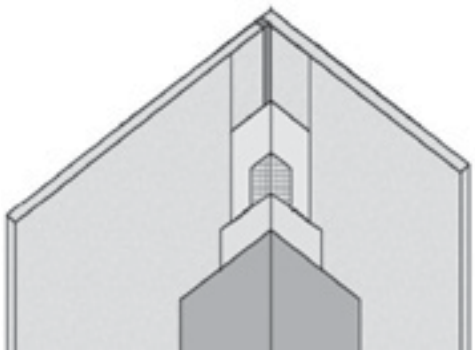
Sanding and Finishing

a. Allow the finish coat to dry at least 24 hours.
b. Lightly Sand smooth with 150 grit paper or with 220 sanding mesh.
c. Wipe off excess dust with a slightly damp cloth prior to painting.

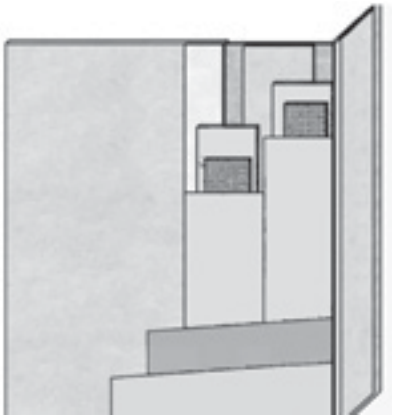
Corner Closer Setting

All Ritek® wall systems aluminium accessories are specially treated to ensure correct adhesion of industry standard finishing compounds and finishes.

INTERNAL CORNER DETAIL **FIGURE 5.4**



EXTERNAL CORNER DETAIL **FIGURE 5.5**



Ritek® Wall Systems - **Interior Joint Setting**

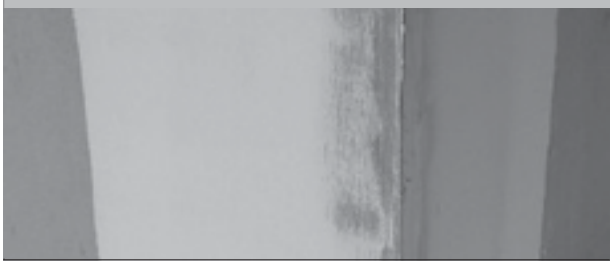
BASE COAT APPLIED **FIGURE 5.6**

Figure 5.7 shows base coat application to a corner closer. A second coat is applied with the final sanded finish shown in Figure 5.8.

BASE COAT APPLIED TO CORNER CLOSER **FIGURE 5.7**

Note: Aluminium corner shown

SANDED FINISH TO CORNER CLOSER **FIGURE 5.8**



Setting of Nib Ends, Square-set Doors and Window Openings

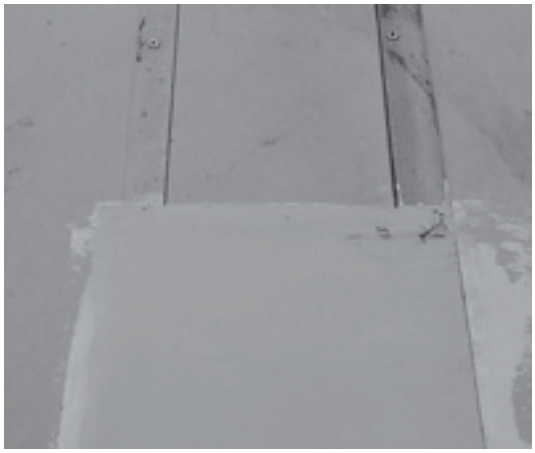
Nib ends, square-set door and window openings are set to the standard aluminium track extrusion. Figure 5.9 shows base coat for window/door opening and the sanded finish.

BASE COAT WINDOW / DOOR OPENING **FIGURE 5.9**

Setting of Tee-Junction Closers

Tee junction closers are set back approximately 1 mm from the line of the wall face to allow for a flush joint. The setting process is the same as for standard panel joints, Figure 5.10.

SETTING OF T-JUNCTION CLOSERS **FIGURE 5.10**



Interior Panel Decoration

To achieve a satisfactory standard of finish it is recommended that a prime coat and two finish coats of "brand name" acrylic paints be applied in accordance with the paint manufacturer's recommendations. Correct setting and surface preparation is critical to ensuring an appropriate finish is achieved.

Note: *Paints, when subjected to critical light, may require a higher level of finish (Level 5) and hence cost implications.*

Steps in Floor Levels

Where panels are joined horizontally at midfloor, due to a different floor slab height in the adjoining room, the horizontal join may move due to differential movement in the structure. Provision should be made to express the joint or the wall should be sheeted over with plaster board or similar.

Cracking and Peaking of Internal Joints

Fibre cement sheet constructions are prone to stress cracking if the correct design, installation and finish systems are not applied. Stress cracking is caused by a number of factors including structural movement, thermal expansion and contraction, improper construction, lack of adequately formed control and movement joints, improper fixing and a variety of other factors which are all beyond the control of Ritek®.

Internal Joint Setting to Non Ritek® Panels

For joints between Ritek® Wall Panels and non Ritek® panels such as dry walls and stud partition walls, it is recommended to install an expansion joint or express the joint using a paintable flexible sealant. Walls having a different thermal mass are likely to expand and contract at different rates therefore flush jointing is not recommended.

Ritek® Wall Systems - **Over Sheeting of the Ritek® Wall System**

Over sheeting of the Ritek® Wall Systems can be achieved by using the following methods:

- Batten and sheeting (recommended method)
- Direct stick plasterboard (optional method)

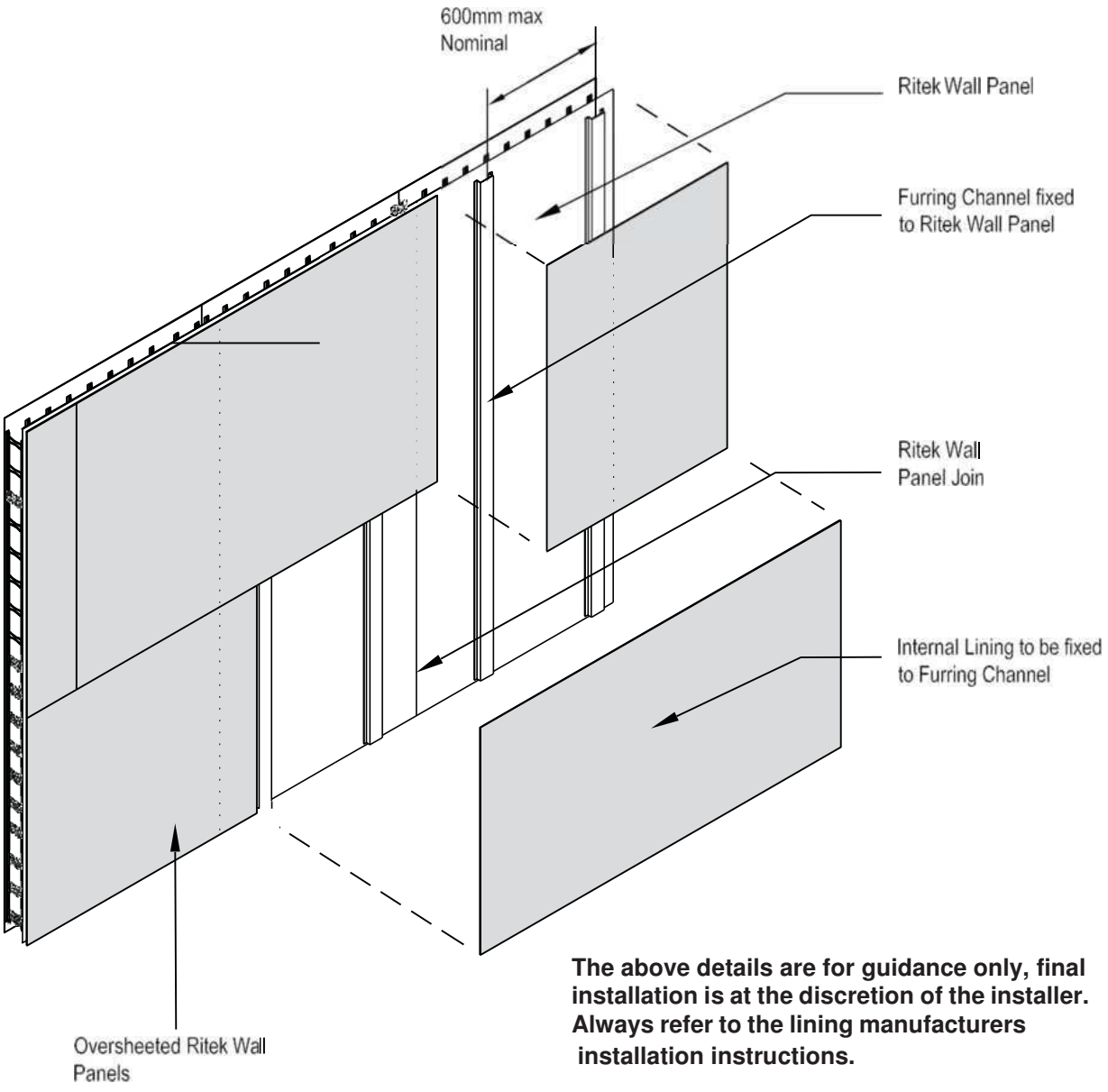
Batten and Sheeting of Plasterboard to Ritek® Wall Panels

Ritek® recommends the batten and sheeting method using a furring channel/batten mechanically fixed to the Ritek® Wall Panel then sheeted with plasterboard.

The surface of the Ritek® Wall System must be flat, clean and dry prior to the installation of the battens and plasterboard sheeting.

The installation of the furring channel/battens, plasterboard and requirements for setting of the plasterboard joints is to be carried out in accordance with the installation and joint setting methods provided by the appropriate plasterboard supplier's installation and finishing guidelines.

OVERSHEETING WALL PANELS BATTEN & SHEETING METHOD **FIGURE 5.11**



The above details are for guidance only, final installation is at the discretion of the installer. Always refer to the lining manufacturers installation instructions.

Ritek® Wall Systems - **Over Sheeting of the Ritek® Wall System**

Direct Sticking of Plasterboard to Ritek® Wall Panels

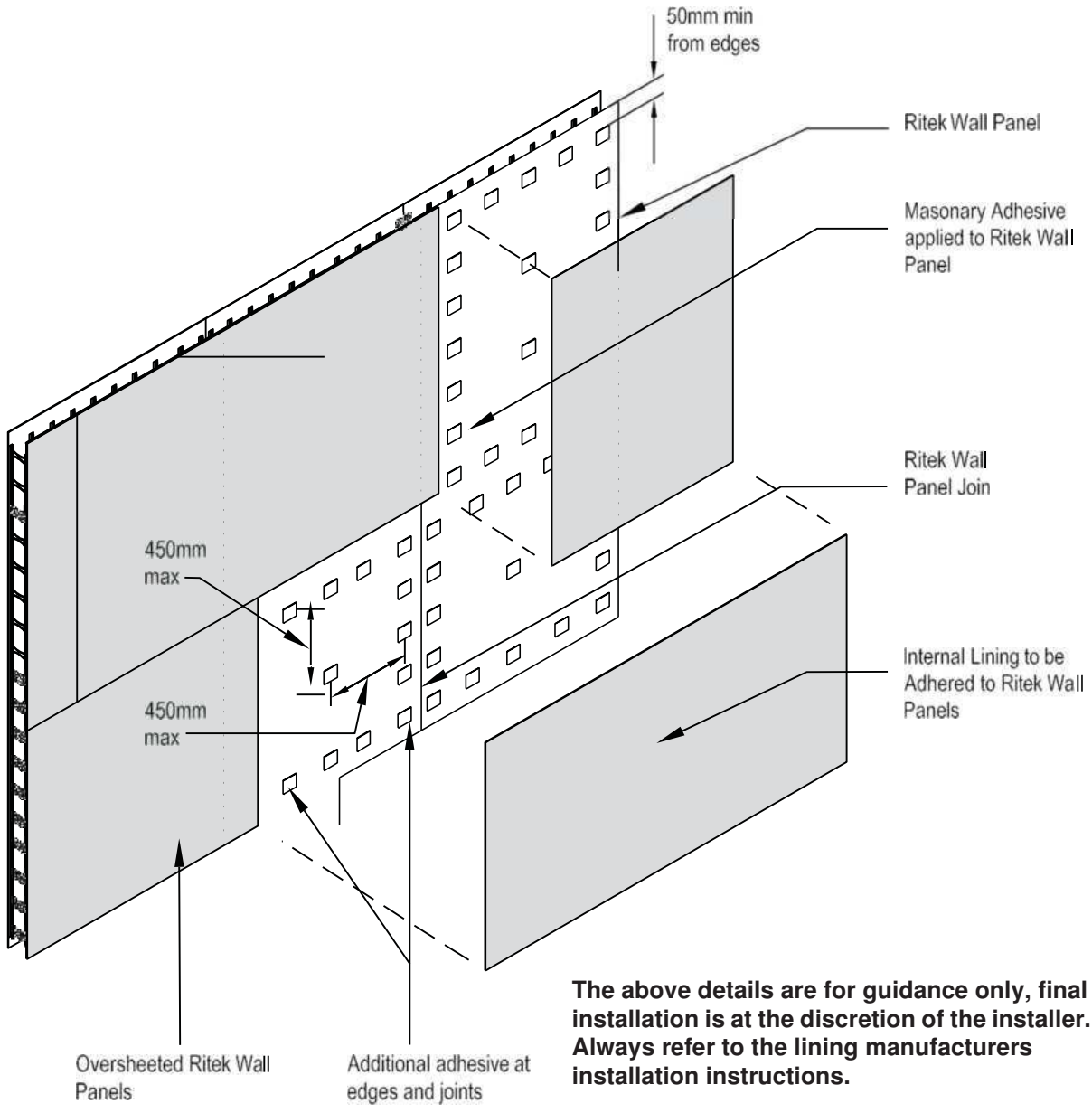
'Direct stick plasterboard' is a term used for directly adhering plasterboard lining to the Ritek® Wall System. The surface of the Ritek® Wall System must be flat, clean, dry and free of dust, oil and other elements that may reduce the plasterboard adhesive performance.

Daubs of plasterboard adhesive are applied to the Ritek® Wall System surface or to the back of the plasterboard sheets at 450mm centres maximum vertically and horizontally. Additional daubs of plasterboard adhesive can be used at butt joints of the plasterboard for additional adhesive strength. Plasterboard sheets must be held in position until adhesive sets by using temporary masonry nails as required.

The installation of the plasterboard and requirements for setting of the plasterboard joints is to be carried out in accordance with the installation and setting methods provided by the respective plasterboard supplier / manufacturer's installation and finishing guidelines.

When direct sticking plasterboard to walls requiring an acoustic rating, plasterboard adhesive may need to be trowelled on to prevent a drummy effect when wall is impacted. Please discuss with your acoustic consultant prior to installation.

OVERSHEETING WALL PANELS MASONARY ADHESIVE METHOD **FIGURE 5.12**



The above details are for guidance only, final installation is at the discretion of the installer. Always refer to the lining manufacturers installation instructions.

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CodeMark Australia | CMI Certification Certificate CM40374

XL Wall Panel

CodeMark Australia | CMI Certification Certificate CM40375

X-Plus Wall Panel

Ritek®

Design, Detailing & Installation Manual

Ritek® Wall System

Version Jan 2025

F EXTERNAL FINISHING

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CodeMark Certificate CM40374 — XL Wall Panel

CodeMark Certificate CM40375 — X-Plus Wall Panel

Ritek® Wall Systems - External Finishing

Recommended guidelines for external joint setting and finishing systems for the Ritek® Wall System

External Joint Setting of Ritek® Wall Panels

Industry Standards
Refer to AS/NZS 2311:2009 Standard for guidance and recommended good practice for the preparation of specifications, the application and maintenance of paint systems for use by the paint industry.

Preparation for Joint setting / Flushing Compounds

Ritek® Wall Panels can be covered in dust, mud and other contaminants following installation on project sites. The panels need to be cleaned of all contaminants to ensure a quality finish.

Required Procedure:
Ensure that the substrate surface condition meets the requirements of the jointing compounds and finishing systems being used at the time of application.

Ritek® Panel Moisture Content

Ritek® Wall Panels following core-fill, after heavy rain or during high humidity periods may result in a wet substrate surface. Due care is required to ensure the finishing systems are applied within the acceptable conditions of the system being applied. It is standard practice to ensure the substrate contains less than 20% Wood Moisture Equivalent (WME) before applying joint setting / patching materials and finishing system. Refer to the joint setting compound manufacturer's specification sheets.

Aluminium Accessories

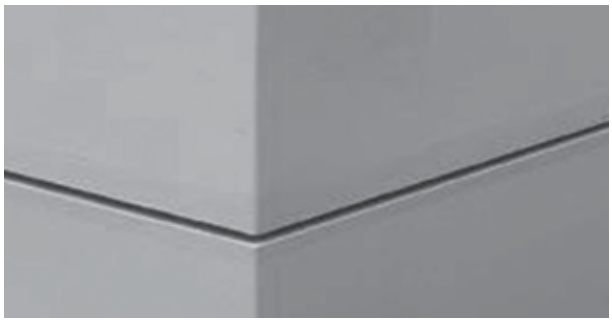
The Ritek® Wall System uses aluminium accessories for corners and nib end closers. All aluminium accessories are supplied etched with chromate finish as a protective coating to prevent corrosion and a barrier to the concrete. During panel assembly, aluminium accessories can be cut to length, scratched, holes created for screw fixing etc. and can have dust, mud and other contaminants on them. It is important to ensure that the substrate surface condition meets the requirements of the jointing compounds and finishing systems being used at the time of application. Refer to the joint setting compound manufacturer's specification sheets.

Ritek® Panel Rebate Detail

Ritek® Wall Panels are supplied with a standard FC sheet rebate detail to allow for jointing compounds and joint reinforcing tapes to be used. A standard FC sheet rebate detail is typically 0.5mm deep tapering to 1.5mm deep at the edge of the panel and 30mm wide.

Required Procedure:
The rebate detail must be clean of any excess concrete, adhesive or any other contaminant.
Fixing screws used during the panel installation must be set below flush with the surface or removed.

Note: It is recommended for external walls that an industry-standard, external texture coat system be applied. It should, as a minimum, entail a 2–3 mm trowel-on system and be designed to perform as a membrane.



Rebate Finish

External Jointing Tape

The use of jointing tape must be used for fibre cement sheeting flush jointing. 160GSM fibre mesh, non-adhesive alkaline resistant mesh tape is required to reinforce the Ritek® Wall panel to panel and panel to accessory joint. Tape dimensions to be appropriate to that which the joint application requires.

Required Procedure:
Mesh jointing tape is to be used for joint setting:

- 160GSM Fibre Mesh Tape – without self-adhesive backing - alkaline resistant
- Tape width at panel to panel joint = 50mm
- Tape width at FC/alum corners = 2 x 75mm
- Tape width at full aluminium corners & squint corners = 150mm (min 50mm on the fibre cement sheeting)
- Tape width at FC/alum nib ends (only required on longer side of aluminium extrusion) = 50mm

Facing Sheet Movement Joints
It is essential that a movement joint be placed in the facing sheets a distance of no more than 5400mm centres. On western walls or walls exposed to significant heat, movement joints should be located at 4800mm centres maximum. This is completed by saw-cutting the fibre cement facing, both internally and externally, after the concrete pour, at the desired locations.

Ritek® Wall Systems - External Finishing

External Joint Setting Compounds

In order to achieve a quality result a high level of skill and experience is required on behalf of the contractor responsible for the application.

There are a number of different types of compounds including setting type, drying type or acrylic drying type. All compounds can be applied by hand or with mechanical jointing tools. Acrylic drying type compounds produce very strong and durable joints. These joints are resistant to some movement without displaying cracking.

Ritek® recommend low-shrink jointing compounds which provide a high performance, semi - flexible filling compound for joints in fibre cement, Blue Board, weatherboard sheeting etc.
It is important that a system is used from one reputable and long standing manufacturer and not made up from a range of different component materials as they would not have been tested for adhesion or cohesion etc.

Refer to the specific product specification from the Ritek® recommended finishing system provider as included within this technical bulletin.

Note: Gypsum/plasterboard jointing compounds are not approved as they are known to cause joint cracking and joint peaking under certain environmental / weathering conditions.

Recommended and Approved Suppliers:
Astec: Exterior render System
Dulux : Acra-Tex render system
Euromix: Exterior render System
Rockcote : Rockcote render system
RSA : Acrylic render system
STO: Exterior render System
Wattyl : Granosite render system

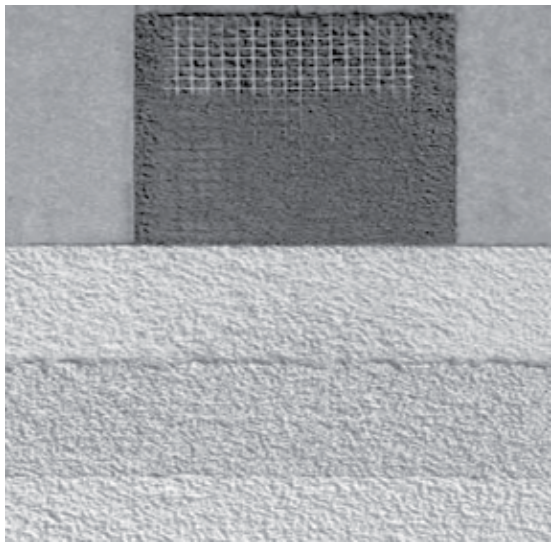
Cracking and Peaking of External Joints

Fibre cement sheet constructions are prone to stress cracking if the correct design, installation and finish systems are not applied. Stress cracking is caused by a number of factors including structural movement, thermal expansion and contraction, improper construction, lack of adequately formed control and movement joints, improper fixing and a variety of other factors which are all beyond the control of Ritek®.

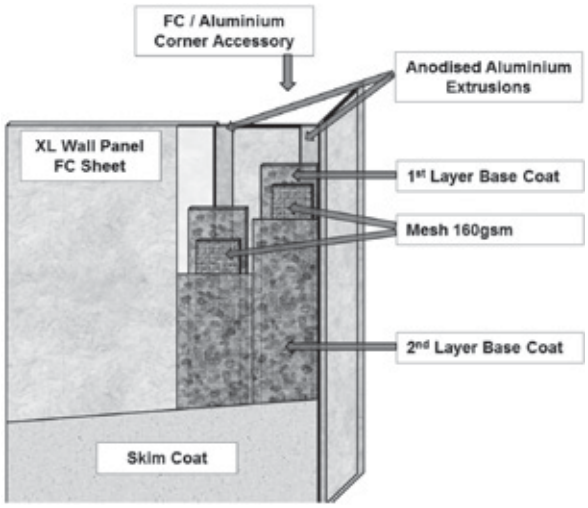
External Joint Setting to Non Ritek® Panels

For joints between Ritek® Wall Panels and non Ritek® panels such as dry walls and stud partition walls, it is recommended to install an expansion joint or express the joint using a paintable flexible sealant. Walls having a different thermal mass are likely to expand and contract at different rates therefore flush jointing is not recommended.

EXTERNAL JOINT SETTING **FIGURE 6.1**



EXTERNAL JOINT SETTING **FIGURE 6.2**



Ritek® Wall Systems - External Finishing

Wall Finishes

The aesthetic appeal of the walls depends on:

- Correct installation of the panels.
- Straightness / flatness of walls.
- Choice of finishes for internal.
- The amount of glancing light projected on the wall surface; and
- The quality of the applied joint setting, paint, or texture system.

Lighting

Lighting design is very much subject to the building application. The Australian Standard AS2589-1997 details six levels of finish. It is recommended designers give consideration to the level of finish required and eliminate potential problems due to critical lighting.

Typical Joint Setting Application

First Coat

a. Apply Base Coat to fill the rebate using a 150mm broad knife.
b. Embed the fibre mesh or paper tape centrally over the joint using a 150mm broad knife ensuring there are no voids under the tape and remove excess compound.
c. Immediately cover tape with thin layer of Base Coat applied using a 150mm broad knife.

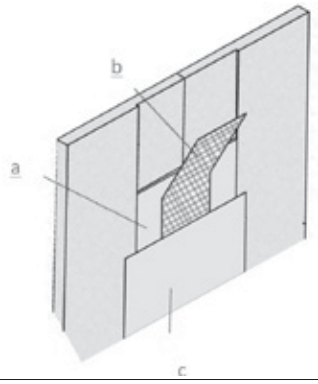
Second Coat

When the base coat is fully dry, use a 150mm wide second coat trowel to apply the second coat. Apply this coat approximately 180mm wide, laid down over the rebate and feather the edges.

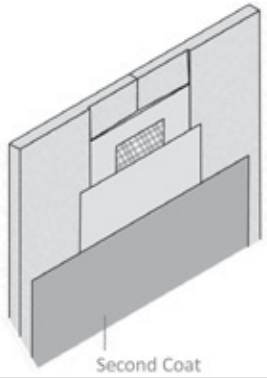
Sanding and Finishing

a. Allow the finish coat to dry at least 24 hours.
b. Lightly Sand smooth with 150 grit paper or with 220 sanding mesh.
c. Wipe off excess dust with a slightly damp cloth prior to render application.

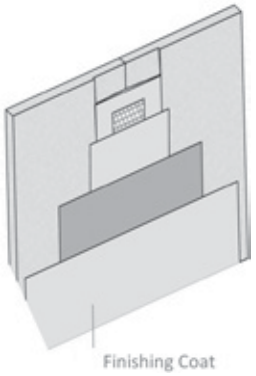
FIRST COAT FINISHING **FIGURE 6.3**



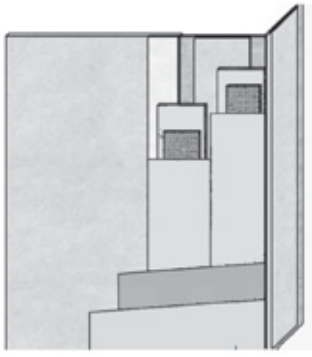
SECOND COAT **FIGURE 6.4**



FINISHING COAT **FIGURE 6.5**



CORNER DETAIL **FIGURE 6.6**



External Panel Texture Coating

General
All external walls need to have joints set with a flexible reinforced acrylic compound and then finished with a trowel-on render.

Texture coatings are available from several manufacturers who offer advice on the use of their systems.

System components must be from the one chosen manufacturer to obtain that manufacturer's system warranty.

External Panel Jointing
The procedure from the chosen manufacturer shall be followed. Generally this will include:

- priming the sheet;
- applying jointing compound

External Panel Texture Coating
The procedure from the chosen manufacturer shall be followed. The complete surface, joints and panels are primed. Rough texture is trowelled to a minimum thickness of 3 mm to successfully cover the panel joints. Where a fine texture is required, the complete surface is rendered (or skim coated) with one or more coats to a thickness of 1.5–10 mm to provide a flat surface for the fine texture.

After the texture application, the texture is sealed and coloured by the application of the "impact" coat.

The purpose of trowel-on finishes is to cover the set joints and to take out lips or variations to the surface of the sheet.

The quality of the preparation of the wall surface by the applicator, prior to application of the final coats is of paramount importance if a quality finish is to be achieved.

Note: *If external horizontal and vertical joints are set and not trowel-finished as above, the set joints will most likely be visible. If the walls are simply painted or finished with a roll-on texture coat, the joints will remain visible.*

The fibre cement sheeting used by Ritek® has been formulated and prepared to meet the requirements for use in wet areas and is primed during the sheet manufacturing process to give basic protection. Providing that an industry-standard texture coating system is applied and maintained, the sheeting will be fully protected against all weathering.

Texture Coatings Manufacturers
Texture coatings are available from a range of manufacturers who can offer advice on the use of their systems:

Astec: Exterior render System
Dulux : Acra-Tex render system
Euromix: Exterior render System
Rockcote : Rockcote render system
RSA : Acrylic render system
STO: Exterior render System
Wattyl : Granosite render system

TYPICAL TEXTURE COATING FINISH **FIGURE 6.7**

Ritek® Wall Systems - Notes

Ritek® Wall Systems - Notes

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G Installation

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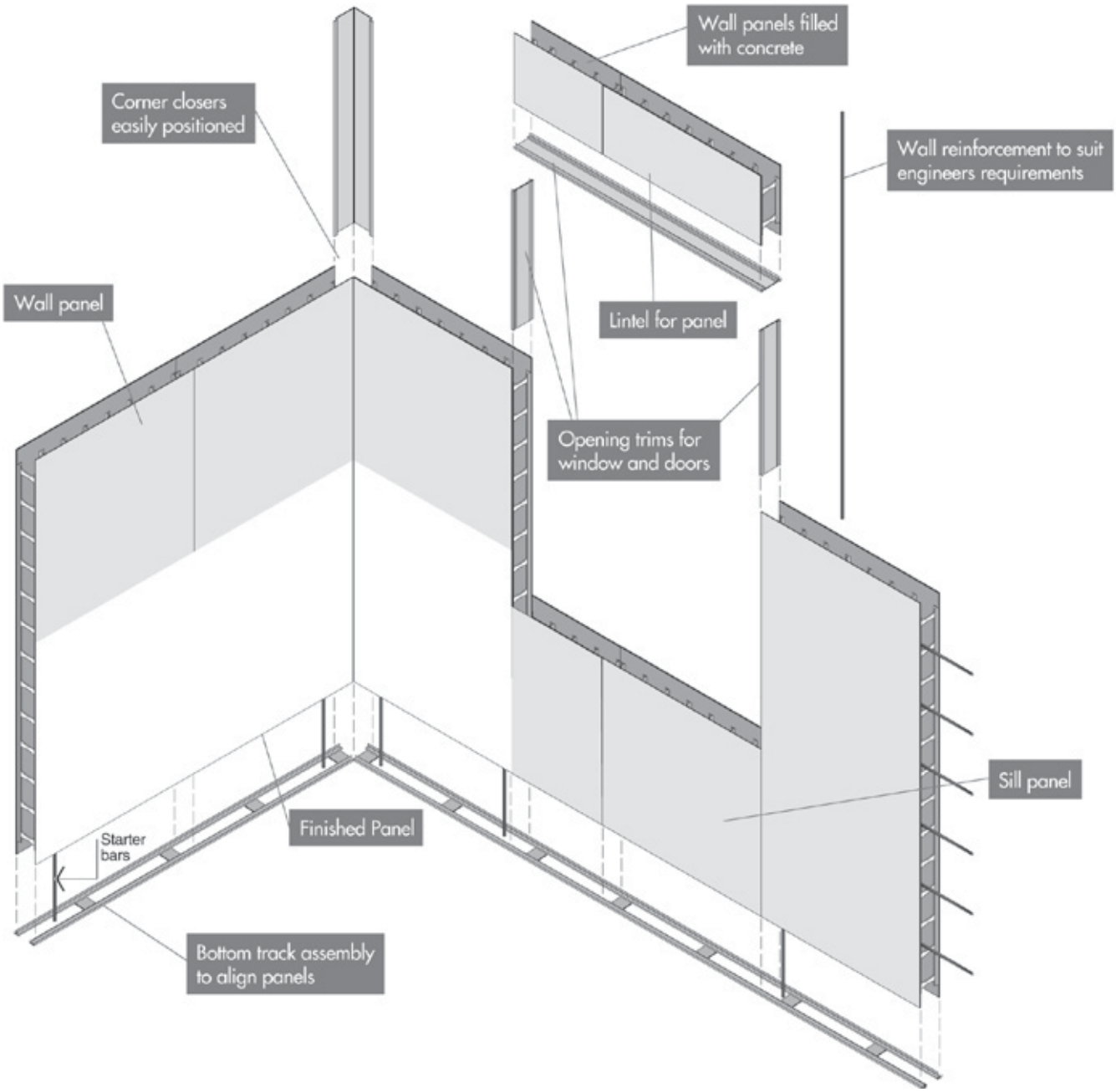
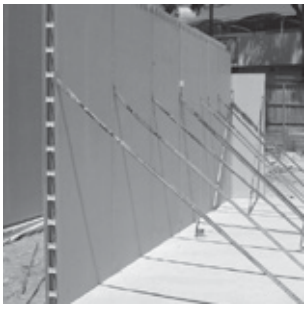
Ritek® Wall Systems - **Introduction**








Ritek® Wall Systems - Introduction

Introduction

Ritek Systems Pty Ltd (Ritek®) is an Australian owned, innovative wall and roof systems manufacturer combining over 30 years of expertise and solid business values. Ritek® is a leader in designing, manufacturing and supplying today's construction industry with cost effective, energy efficient and sustainable construction solutions to provide its customers with outstanding benefits.

Ritek® wall systems are prefabricated permanent formwork systems for concrete walls used for all types of external and internal walls. They consist of lightweight panels created by bonding quality hard-wearing and durable fibre cement sheets to a patented composite stud assembly. Ritek® wall systems are quickly and simply installed on site and then core-filled with structural concrete to achieve loadbearing walls that are fire and sound rated. The fibre

Disclaimer

It is at the discretion of the contractor or installer involved with the installation to use the information provided in this Installation Guide and other information as may be published by Ritek® or an alternate methodology for the purposes of installing the Ritek® Wall Systems.

The contractor or installer must meet or exceed the minimum requirements for plumb, straightness, finish and detailing as presented in this Installation Guide and as per other information as may be published by Ritek®, Australian Standards or the Project Engineer.

Installer Responsibilities

The contractor or installer involved with the installation of the Ritek® Wall System is responsible for:

- Proper installation of the System
- Supply of tools and equipment to complete the installation
- Supply of consumables to complete the installation
- Cutting of rakes to panels
- Cutting and forming of panels for apertures or the like less than 0.5m²
- Meeting or exceeding tolerances as documented in this Installation Guide for wall plumb and straightness
- Placement of the reinforcement steel in accordance with the Project Engineer's requirements
- Placement and compaction of the (concrete mix) core fill in accordance with information as documented in this guide, to suit the requirements of the Project Engineer
- Trowel to finish off window sills and top of walls
- Stripping of any forms and reduction of any proud concrete post concrete core fill
- Removal of props post concrete core fill
- Removal of any concrete spill from the wall surfaces and other building elements post concrete core fill
- Sealant under tracks

Ritek® is a manufacturer and supplier of the Ritek® Wall System only and is not responsible for the installation, installation workmanship and finishing of Ritek® Wall System.

This Installation Guide is subject to regular updates, the latest version can be obtained by contacting Ritek Technology Pty Ltd. on 1300 152 857 or at www.ritek.com.au

The design of the wall system for a building or application requires the services of professional consultants. This information has been prepared as a source of information to provide general guidance to professional consultants and no way replaces the services of professional consultants. No liability can therefore by accepted by Ritek Technology Pty Ltd for its use.

Ritek® Wall Systems - **Considerations Prior to Installation**

Installer Licenses

Installers need to be licensed as required by the appropriate authority in each State relevant to the works they are undertaking. (e.g. QBCC in Queensland)

Installer Insurances

Installers should carry Contractors All Risk, Public Liability Insurance and Work Cover as a minimum.

Contracts / Legal

Installers should be prudent when entering into contracts with the Project Builder / Principal Contractor. It is recommended for Installers to avail themselves with all the relevant information to the Project e.g.

- Contract Terms and Conditions, Scope of Works
- Architectural drawings, structural drawings
- Window / Reveal / Opening schedules
- Project construction program & sequence
- Cranage requirements and availability
- Required resources, EBA's
- Reinforcement requirements and scheduling
- Concrete supplier, MPa, Concrete placement
- SWMS (JSA)

Installers will require a SWMS (JSA) for lodgment with the Builder/Principal Contractor prior to starting works.

Site Inductions

Installers will be required to attend a Site Induction as determined by the Project Builder/Principal Contractor prior to starting works. Presentation by the Installer of a General Induction Card (White Card or as recognised) is required at this time.

Tool Box Meetings

Installers will be required to hold a Tool Box or Pre-Start Meeting prior to works each day or as determined by the Project Builder/Principal Contractor.

Safe Work Method Statement

A work method statement should be completed by the panel installation contractor and signed off prior to onsite work commencing.

Equipment Safety Tags

Ensure that all tools are tagged and tested.

Accurate Layout Grid and Set Out

An accurate Layout grid must be provided by the builder before wall bottom plate assembly is positioned. It is suggested that a surveyor mark out the slab to the architectural plans with surveying pins. It is imperative that there are pins at the wall corners, start of wall, the end of wall, and at every directional change (no offset).

Set out the slab using a chalk line and workshop drawings supplied. Check the set out with a string line to ensure the marked chalk line is correct. In this process it is also recommended that the distance between pins be measured and those measurements be checked with the workshop drawings.

For increase of speed of installation - with the use of Ritek® workshop drawings - mark out the slab with a marking crayon placing wall numbers and panel numbers with their coinciding walls.

Slab Level Tolerances

It is required as a minimum, that slab levels meet the following tolerances:
Generally, the floor slab tolerance is to be:

- Within + / – 10mm of level over the entire room
- Within + / – 5mm of level over any 3m length

Starter Bar Positions

Check location of cast-in starter bars or marked position of starter bars are in accordance with the Project Engineers specification.

Note: For XL Thermal Wall® – Starter bars to be positioned to suit the concrete core ensuring that sufficient concrete cover is achieved (bars may need to be offset from the insulation).

Ritek® Pre Installation Checklist

Refer to Ritek® Pre-works Checklist at the back of this Installation Guide.

TYPICAL RITEK® PANEL INSTALLATION TOLERANCES (UNLESS STATED OTHERWISE): TABLE 7.1

Description	Tolerance	
Concrete blow holes / voids	None	
Flatness	Over 1.25m Grid	Within 5mm
	At 5m over 10m	Within 7mm
Out of plumb	< 3m	Within 5mm
	> 3m	Within 8mm
Straightness	Wall Length / 1000mm	Within 3mm
Corner Details	Stated Angle	+ / - 2deg

Ritek® Wall Systems - **Safe Working Practices**

General Responsibility

All installers have a general responsibility, under Government Legislation, for the health, safety and welfare of themselves and their fellow workers. You should also become familiar with and comply with Federal and State Legislation specific to the building industry. Each building site may have its own specific rules for contractors and these must also be complied with.

As a guide only, these are some areas that require attention to health & safety when installing the Ritek® Wall Systems:

- Ultraviolet radiation
- Manual handling (lifting of panels)
- Scaffolding
- Working at height
- Exposed reinforcing steel
- Personal protective equipment
- Housekeeping
- Electrical safety
- Cranes and slings
- Power tools

PPE – Personal Protective Equipment kit should include:

- High visible vest/shirt
- Safety glasses
- Gloves
- Glove guard
- Ear plugs
- Dusk mask
- Steel cap boots
- Hard hat
- Long trousers
- Long sleeve shirt

Note: For XL Thermal Wall® – PUR or PIR insulation is used therefore eye protection and dust masks PPE must be worn.

Recommended Safe Working Practices

Breathing in fine silica dust liberated when working with products such as fibre-cement, clay and concrete is hazardous. Over time, usually a number of years, this may result in bronchitis, silicosis or lung cancer.

Work safely with fibre-cement sheets by following the precautions described below.

Minimise dust when cutting sheets, by using either Score and Snap knife, Kwikrip™ hand guillotine, Toolex Fibre Shears or Makita Wet Saw (Models 4101R and 4107R).

When using other power tools or abrasive hand tools on sheets, wear approved personal protective equipment, i.e. P1 or P2 dust mask and safety goggles.

Ensure containment of dust during clean-up and disposal.

These precautions are not necessary when stacking, unloading or handling fibre-cement products.

Ritek® Wall Systems - **Tools & Accessories**

To efficiently install the Ritek® wall systems it is essential to have the necessary tools and equipment available.

Note: Power tools require tagging as per site requirements.

Ritek® Pre Installation Checklist

Typical range of tools and equipment required by a 6-person installation crew:

- Tool box (x1) designed, manufactured and certified for lifting. Large enough to hold all tools and consumables, wired and tagged for battery charging, lockable
- Mitre saw with aluminium blade – power tool (x1)
- Gas-actuated fastening / nail tool (x1)
- 125mm angle grinder – power tool (x1)
- 225mm angle grinder – power tool (x1)
- 185mm circular saw with timber blade – power tool (x1)
- Fibre cement shears – power tool (x1)
- 150mm diamond grinder – power tool (x1)
- Wet and dry vacuum cleaner – power tool (x1)
- Extension power leads (x4)
- Cordless rotary hammer drill (x1)
- Cordless impact wrench (x1)
- Cordless impact screwdriver with charger and 2 batteries each (x5)
- Tool belt (x5)
  - Claw hammer, 8m measuring tape, Chisel, All-purpose tin snips, Steel fixing nips, Stanley knife, Marking crayon, Builders pencil, Set square,
- 30m measuring tape (x1)
- String lines 100m (x3)
- Chalk line (x1)
- Spirit level 600mm (x1)
- Spirit level 1200mm (x1)
- Spirit level 2000mm (x2)
- Roofing square (x1)
- Floor scraper (x2)
- Finishing trowel (x2)
- Platform step ladders (x2)
- Junction box with earth leakage safety switch.
- Saw horses or a bench (x2)
- Certified Panel braces (x400 minimum)
- Sponge and bucket for wiping down after pour
- 15 L metal bucket (x4)
- Concrete pencil vibrator 6m x 25mm shaft (x1)
- 30m hose (x2)

Access scaffold, ladders, steps & platforms:

All scaffold, safe access provisions are the responsibility of the builder and installers and are governed by the site conditions. It is essential that safe work practices and safe work methods are complied with.

Installers would typically provide ladders, steps and platforms for personal access to the top of the panels for the fixing of braces.

TYPICAL RANGE OF INSTALLER POWER TOOLS	
GX 120 gas system with 40 nail magazine	
	Used for fastening bottom track assembly to slab with masonry pins.
Makita 24v Cordless Rotary hammer drill	
	Used to prepare holes ready for a 10mm x 60mm Concrete Screw Bolt
SIW 144-A cordless impact wrench	
	Used to secure the certified brace with an 10mm x 60mm Concrete Screw Bolt to the finished slab
SID 144-A cordless impact screwdriver	
	Used to fix the 7g/8g x 25 CSK Ribbed Head Winged Tip Tek Point Self Tapping Screws and 6.5mm x 40 mm Tek screws
DG 150 diamond grinder	
	Used to grind out any imperfections after the installation is completed
VCD 50 dry vacuum cleaner	
	Unit is connected to the DG 150 Diamond Grinder to extract the dust whilst grinding
225mm Angle Grinder	
	Used for cutting or grinding where needed. A diamond cutting blade is used for fibre cement and aluminium
125mm Angle Grinder	
	Used for trimming and cutting panels if needed
185mm Circular Saw	
	Circular saw is used to cut form ply if needed
Compound Saw	
	Used for cutting the aluminium section (mitre and 90º)

Ritek® Wall Systems - **Tools & Accessories**

To efficiently install the Ritek® wall systems it is essential to have the necessary tools and accessories required. Ritek® wall panels are fixed into place using the screw types and fixing centres as per the schedule table below.

It is important that the correct screw fixing type is used to ensure a secure and reliable connection and quality finish. Class 3 galvanized plated screws must be used. On some projects the builder may specify stainless steel fixings in external areas.

RITEK® WALL – STANDARD FIXING SCHEDULE				
Wall Fixing Location:	**Top & Bottom Fixing from Edge**	**Typical Fixing c/c**	**Maximum Fixing c/c**	**Fixing Type**
Panel To Panel Joiner	150	600	900	CSK Wing Tek Class 3 7-18 x 25 or 8-18 x 25 
Internal Corner Closer	100	450	900	
External Corner Closer	100	300	300	
Panel End Closer	100	300	300	
Bottom Track Joiner To Slab (2 x Nails Per Fixing)	N/A	600	600	Hilti X-GN 20 MX Nails - 20mm 

Other consumables required for panel installation:

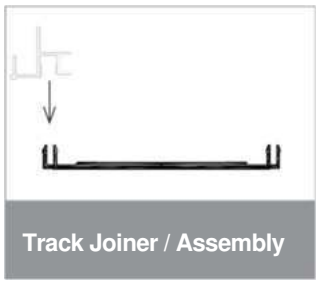
- Expandable foam filler
- Form ply sheets
- AV515 Polyurethane adhesive or equivalent
- Polyurethane sealant

Ritek® Wall Systems - **Components Overview**

Standard Track
Aluminium extrusions used in conjunction with Track Joiner to make a Standard Bottom Track Assembly. Also used as part of the assembly for Nib End Closers.

Standard Track

Track Joiner
Aluminium extrusion combined with two lengths of Standard Track to make a Standard Bottom Track Assembly.



Track Joiner / Assembly

Standard Bottom Track Assembly
Secures Wall Panels, Tees and End Closers to floor slabs and footings.

Panel Joiner
Aluminium Extrusion to secure Wall Panels to adjacent Wall Panels, Tees and Corners in the same plane.
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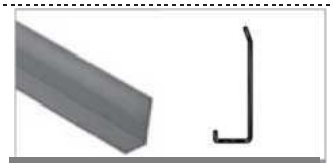


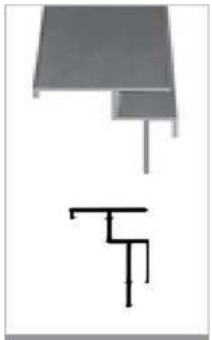
Panel Joiner

Rebated Top Track
Optional Accessory. Aluminium extrusion used when a clean upper edge is required on Edge Form Panels. Also used in conjunction with Rebated Bottom Track to form an articulated horizontal joint and weather seal.

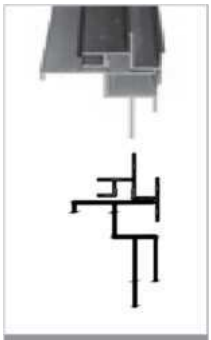
Rebated Bottom Track
Aluminium extrusion used in conjunction with Track Joiner and Rebated Top Track to make a Rebated Track Assembly. Also used as an optional edge on a finished slab to perimeter walls when no step down in the slab is provided.

Rebated Track Assembly
Used to create a shadow joint at Panel to slab and

Rebated Bottom Track



Rebated Top Track



Rebated Track Assembly

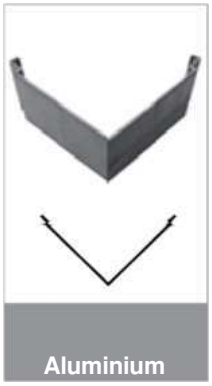
Two Part FC External Corner
Prefabricated FC and aluminium assembly installed at 90° external corners.

Internal Corner Closer
Prefabricated aluminium extrusion folded to suit required internal corner angle.

Aluminium Squint Closer
Prefabricated aluminium extrusion folded to suit required external corner angle other than 90°.

XL External

Internal



Aluminium

Tee Closer

Custom sized FC sheet assembly installed at Wall Panel Tee Junctions.

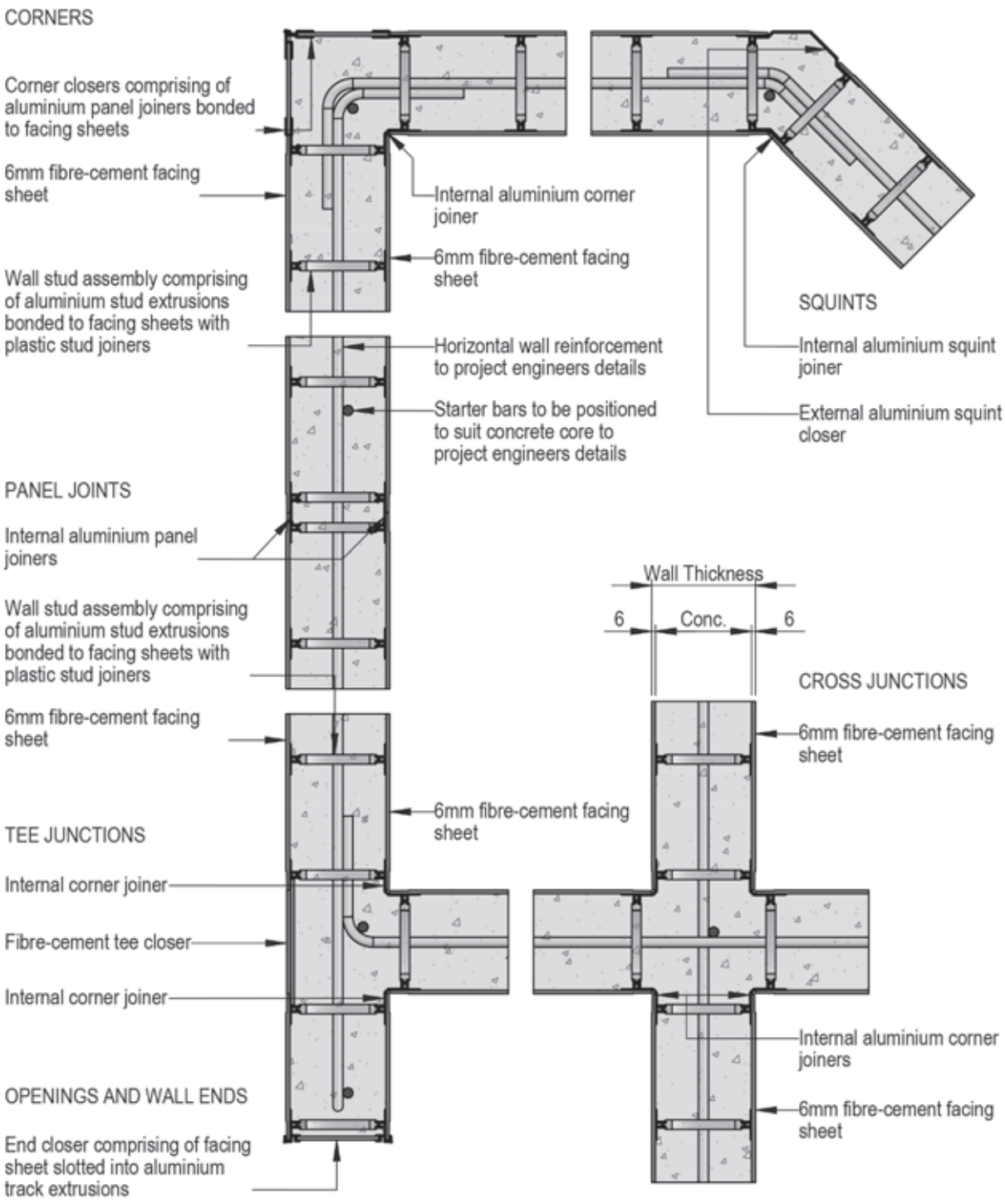
Nib End Closer
FC and Standard Track assembly to close off wall ends, window and door openings without aluminium window adaptors or folded metal door frames. Nib End Closers for 265 Wall Panels use a different track.

Tee Closer

265 Nib

Ritek® Wall Systems – **Wall System Sectional Plans**

WALL SYSTEM SECTIONAL PLANS **FIGURE 7.1**



Ritek® Wall Systems - **Handling of Panels**

General

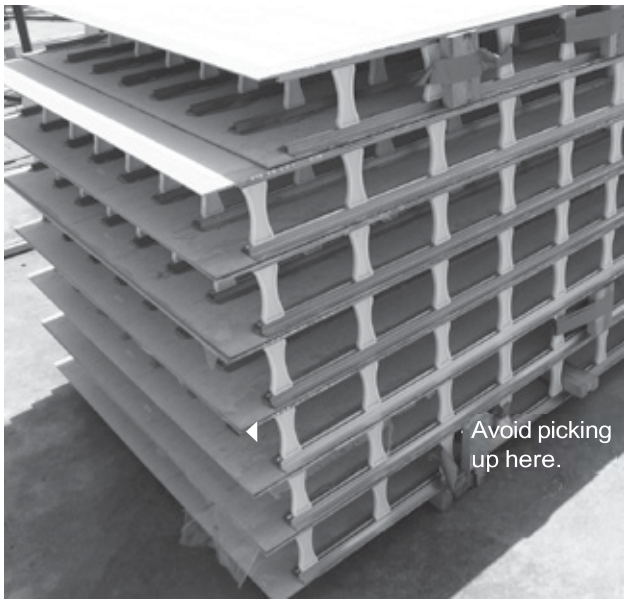
The panels will typically arrive on site on a flat bed semi-trailer.
The pallets will be labelled clearly for identification and to assist in the placement on slab.
A typical pallet of panels, say 2400 x 1200 x 1200 will weigh approximately 864 kg based on 25 kg/m^2.

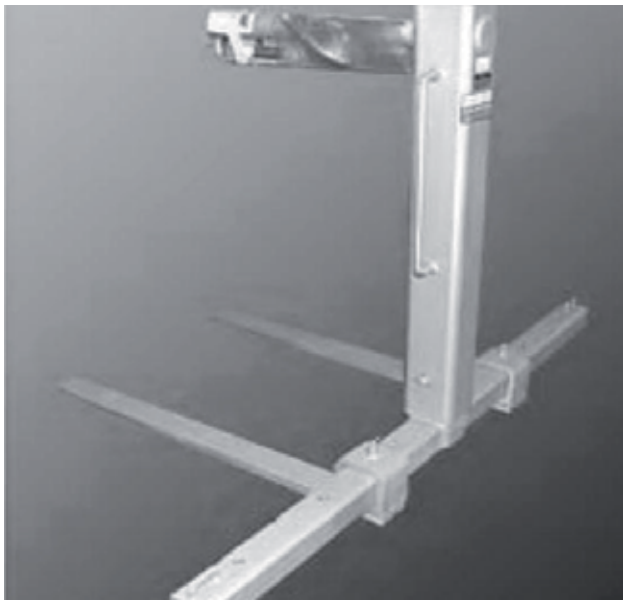
Handling Mechanically

Panels can be removed from the delivery vehicle by forklift or crane. If the crane is to be used it is at the crane drivers discretion which lifting method is acceptable.

Detailed are two recommended lifting methods that are used for unloading the Ritek® system.

In addition, approved and correctly-rated slings may be used to crane panels. Contact Ritek® for further information on the lifting tynes.





Typical sqm per semi load (200 - 300sqm)

Ritek® Wall Systems - **Overhead Crane Lifting using Soft Slings**

Ritek® wall panels should be stacked flat, off the ground on a level platform or on support members which extend the full width of the panels.

Packs of panels are to be craned onto the working deck as close as possible to the erection location.

Operational And Safety Procedures

A qualified person shall operate the crane and a qualified person (Dogger) shall attach the slings to the panels and crane, and direct the movement of panels handled by the crane.

A Dogger shall perform the following tasks:

- Check the loads to be moved, estimating size, shape, weight and centre of gravity, and ensure loads do not exceed lifting capacities of cranes or slings
- Ensure the sling is positioned correctly to the Ritek® panels centre of gravity
- Choose and use slings, covering sharp corners with padding to prevent damage to slings
- Guide the Ritek® panels into position as they are lowered
- Ensures the crane hook does not rest on top of the Ritek® panels.

Preliminary Safety Checks

A qualified person shall check that the crane hook and chains have been correctly fitted to the slings before hoisting.

All signage must be strictly adhered to and checked to ensure that the compliance plate is not damaged and is legible.

General Operating and Safety Procedures

Before the crane elevates any load, the dogger shall lift it to the required working height to confirm that all slings function correctly.

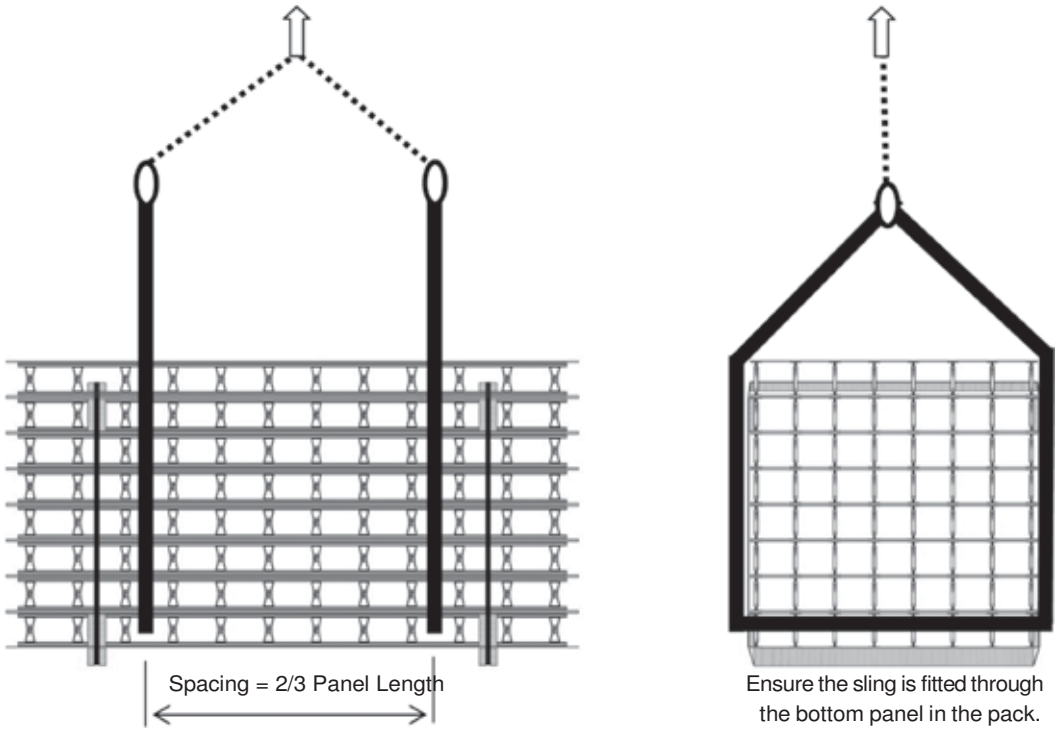
Ensure the crane hook does not rest on top of the Ritek® panels causing damage.

Lifting Procedures

Soft slings must be used to lift the Ritek® panel packs. Feed the soft sling through the bottom panel in the pack and place extra protection around the top of the packs, to prevent any damage to the load.

Ensure the original steel strapping is in place to prevent any potential movement of the panels during the lifting

SOFT SLING PLACEMENT **FIGURE 7.3**



NOTE
This information has been prepared as a source of information to provide general guidance to qualified / professional persons and no way replaces the services of qualified / professional persons responsible for site safety. No liability can therefore

Method Of Attachment To Crane

A qualified person shall operate the crane, and the pallet hook shall be hoisted in a safe manner. Engage the crane hook through the pallet hook lifting ring ensuring it is correctly fitted before hoisting.

When engaging or disengaging the crane hook, ensure that the hoist used to lift the pallet hook is not twisted or tangled. If a single fall rope is used to hoist the pallet hook, the hook may spin and create a dangerous situation. Do not allow the crane hook to rest on top of the pallet hook. Keep the pallet hook in an upright position at all times.

Operational And Safety Procedures

Preliminary Safety Checks

A qualified person shall check that the crane hook has been correctly fitted to the pallet hook lifting ring before hoisting.
All signage must be strictly adhered to and checked to ensure that the compliance plate is not damaged and is legible.
General Operating and Safety Procedures.

The use of the pallet hook shall be limited to those situations
for which it is specifically designed or in accordance with AS 2550.1.

Before and during hoisting of any load, the operator must account for the combined factors of pallet hook tilt, speed of travel, and the pendulum effect from the drop of the crane hook. A qualified person shall check the pallet hook load including the condition of the pallet supporting the load before hoisting. Before the pallet hook elevates any load, the operator shall lift it to the required working height to confirm that all systems function correctly. Do not exceed the recommended crane or attachment rating.

PALLET HOOK EXAMPLE **FIGURE 7.4**

Operating Procedures

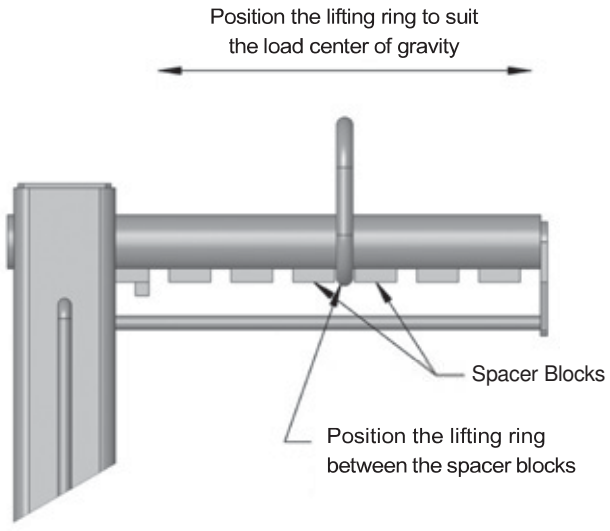
When lifting the pallet hook, ensure that the lifting ring is between the spacer blocks as shown in Figure 7.5. In this position, the lifting ring will not slide along the supporting bar creating a dangerous situation.

When lifting, place the load at the rear of the tines. Determine the centre of gravity of the load and position the lifting ring on the closest lifting position above this point as shown in Figure 7.6.

Because the pallet hook is free to swing on the lifting ring and crane hook, it is of the utmost importance and safety that the load and the lifting ring be positioned correctly. The further the loads vertical centre of gravity is away from the lifting ring, the further the pallet hook will tilt when hoisted.

To ensure safe lifting and transport of loads about the workplace, the pallet hook should be back tilted between 5°
and 10°.

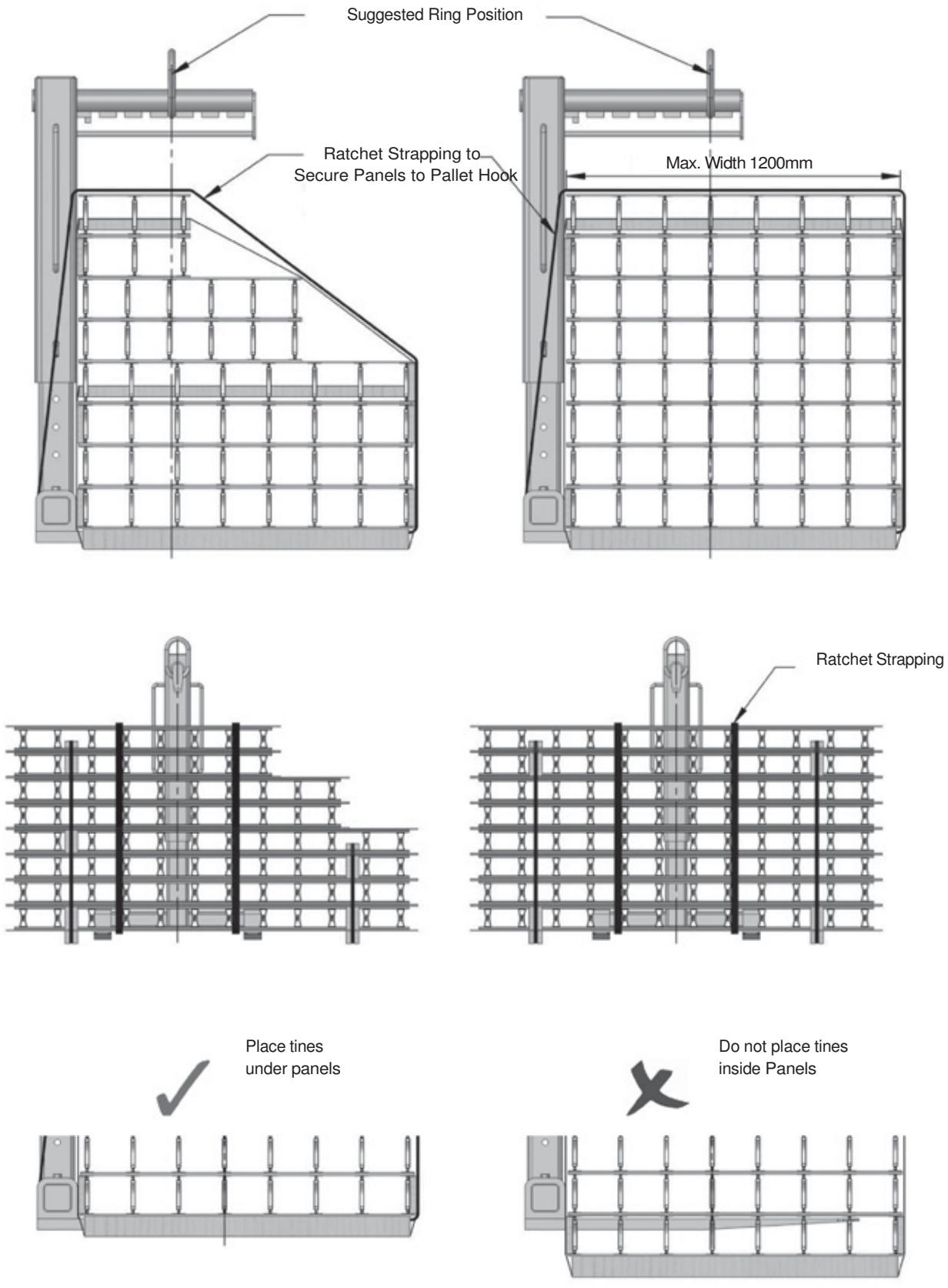
PALLET HOOK EXAMPLE **FIGURE 7.5**



Ritek® Wall Systems - **Overhead Crane Lifting using Pallet Hook**

Operational And Safety Procedures

PALLET HOOK PLACEMENT **FIGURE 7.6**



Ritek® Wall Systems - **Overhead Crane Lifting using Pallet Hook**

Risk Control Measures

When handling loads, the following risk control measures are to be observed by the crane operator and crane personnel to ensure all identified hazards relative to using this equipment are eliminated or controlled.

1. The crane operator's qualifications must conform to the requirements of the relevant regulatory authority. Where applicable, the crane operator shall hold a certificate of competency. To operate a particular crane, the operator must be authorized by a responsible representative of the crane used or hiring contractor. Training in the safe use of the attachment shall be undertaken before usage. The crane operator must not work with the crane unless they are physically and mentally capable. This is in accordance with AS 2550.1 clause 6.2.
2. Authorised personnel must perform the following pre-checks on the crane in accordance with the operating manual before the crane is placed into service. Typically, crane pre-checks as stated in AS 2550.1 appendix G covers the following;
    - Oil level, fuel levels and lubrication.
    - Condition of ropes, rope terminals, fittings and anchor points, rope drums and sheaves.
    - Condition and pressure of tyres where applicable.
    - Drain all water from air reservoirs.
    - Structural checks for loose, damaged or cracked components that may be indicated by rust marks, flaking or marked paint.
    - Check the security and application of counter weights.
    - Load movement system, where fitted is correctly set.
    - Indicator appropriate to the boom or fly-jib length is correctly fitted.
    - Cleanliness of cabin, is it free from grease, oil, rags, tools etc.
    - Pneumatic and hydraulic systems and their safety devices operate correctly.
    - Operation of the crane through all motions with particular attention to brakes.
    - Operation of all limit switches, cut-out and safety devices.
    - Communications equipment is working correctly and clearly loud enough to be heard.
    - All fire extinguishers are placed in the correct position, are suitable for the particular application and are in working order.
3. In conformance with AS 2550.1 clause 6.1, the operator shall review the logbook where applicable and be satisfied about the presence of unauthorized personnel on the crane, safe working condition of the crane and safe operation of each of the crane movements. Authorised personnel must carry out any adjustments or alteration needed for safe operation.
4. Any stabilizers shall be engaged prior to lifting.
5. Gain assurance from a responsible person that the load may be handled safely with a pallet hook and that person has provided all information necessary to ensure that risks are eliminated or controlled.
6. A competent person shall inspect the pallet supporting the load to ensure it is in good condition and safe to use with the pallet hook.
7. Do not exceed the rated working load of the crane.
8. Ensure the lifting ring is positioned at the closest lifting point to the centre of gravity of the load to prevent undue pallet hook tilt. To ensure safe lifting and transport of loads about the workplace, the pallet hook should be back tilted between 5° and 10°.
9. Ensure that all movements of the crane are carried out under power.
10. When engaging or disengaging the crane hook, ensure the hoist being used is not twisted or tangled.
11. Do not allow the crane hook to rest on top of the pallet hook.
12. The operator to be aware of the crane hook spinning when using a single fall rope as this may create a dangerous situation.
13. The operator shall check the pallet hook is securely attached – refer 'Method of Attachment to Crane'.

Ritek® Wall Systems - **Overhead Crane Lifting using Pallet Hook**

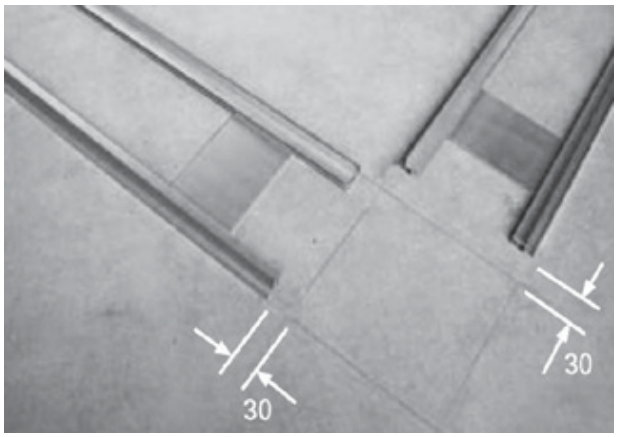
Risk Control Measures

14. Do not move the crane / pallet hook unless the safety of persons in the vicinity of the crane is assured.
15. While lifting in an area subject to passing traffic, barriers or warning signs shall be used to prevent any interference.
16. The operator shall hoist the pallet hook vertically and in a smooth manner at slow speeds with minimum acceleration and deceleration.
17. Sudden stops, jerky or other movements that may cause the load to swing unduly must be avoided. Ensure minimum impact when crane engages 'end stops'.
18. Movement of crane hook / pallet hook when out of sight is only permissible when directed by an authorized person such as a dogman, crane chase, spotter or rigger.
19. The crane hook / pallet hook must be raised sufficiently to avoid collision during horizontal movement. Only when load is freely suspended is horizontal movement permissible.
20. The operator shall stay with the crane controls at all times.
21. No personnel shall ride on the pallet hook at any time.
22. When landing the pallet hook, avoid developing rope slack.
23. The operator shall keep clear of overhead obstructions and in particular maintain relevant clearance of electrical conductors.
24. Before any load is hoisted by the pallet hook, the operator shall lift the pallet hook unladen to the required working height to confirm that all systems are functioning correctly.
25. The operator must know the location of the main isolation switch and firefighting equipment.
26. Ensure there has been no unauthorized interference or alteration to the plant that may cause risk.
27. Ensure regular maintenance, testing and inspections are carried out and recorded in accordance with the relevant crane manuals and corrective action initiated where applicable. Particular attention must be paid to the fork arms, which should be thoroughly examined visually for cracks and defects.
28. Ensure the instructions of Ritek® Technology are followed.
29. If any of the equipment becomes unsafe, stop all usage until the risk is eliminated or controlled.

Ritek® Wall Systems - **Panel Installation**

Set out wall positions from grid lines supplied by the head contractor. Mark locations of openings and individual panel positions ready for the bottom plate assembly.

At corner intersections, position bottom plates so both track sections stop 30 mm short of the corner.

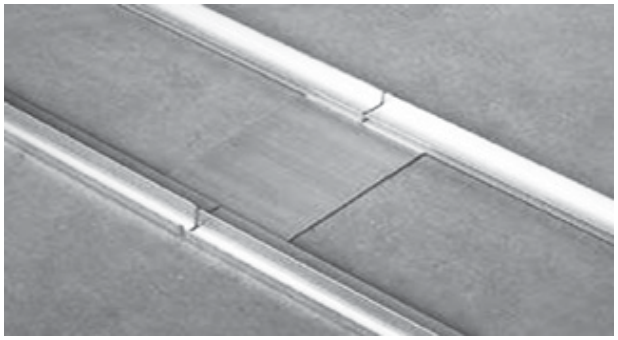


90º Corner Bottom Plate Set-out

T-Junction Bottom Plate Set-out

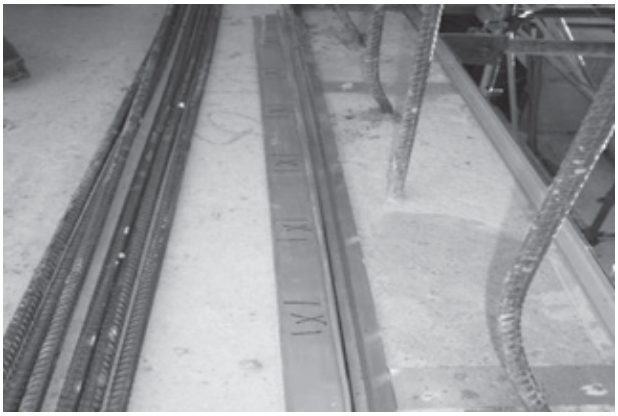
Fix Track Joiners down with masonry nails once the bottom plate is correctly positioned. Track joiners should be fixed at 600mm centres. Masonry nails should be positioned close to each track rail. Track joiners can be slid sideways before fixing to slab to avoid metal-to-metal contact with steel starter bars.

For long wall runs which require Track Joiners to be end-joined, locate a Track Joiner to bridge the joint between the extrusions.

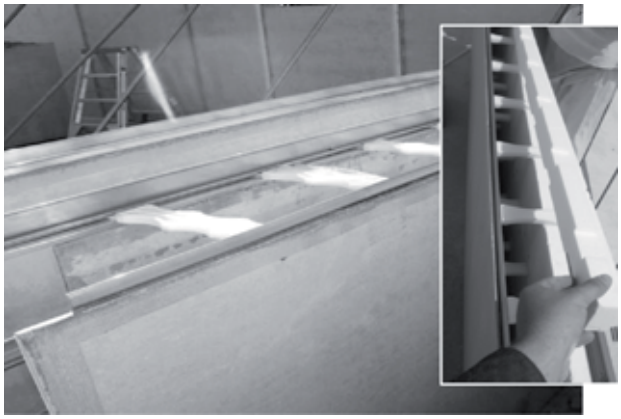


Ritek® Wall Systems - **Panel Installation**

The installation of the panels is undertaken in the following manner, care is to be taken when inserting the panels into the bottom track, and ensuring that the starter bars do not conflict with the studs, which can be done prior to installing the panel (ensure to keep starter bars at engineers specifications). Always be sure to start the installation process from a corner or end of wall



Create jig to ensure starter bars do not conflict with studs



For increased speed of panel installation fix the panel joiners to the panel before erecting.

Position first panel in line with surveyor's wall starting point.

Secure brace foot plate to slab with Excalibur bolt and brace to panel with self-tapping screws into panel stud. Proceed to plumb panel in all directions utilizing the brace's push pull mechanisms and a level.

Standard panel requires three people to be placed into position.

Panel is lifted over starter bars, slid over the Panel Joiners of the fixed panel and then lowered into position.

Ritek® Wall Systems - **Panel Installation**

Guide each face of the panel into bottom track when

Panel is then checked for level and screwed off at 600mm centers into the rebate of the adjoining panel.

Note: Panels over 4.2m are to be craned into position. Please adhere to the Ritek®'s single panel lifting procedure and ensure that industry Workplace Health and Safety is followed.

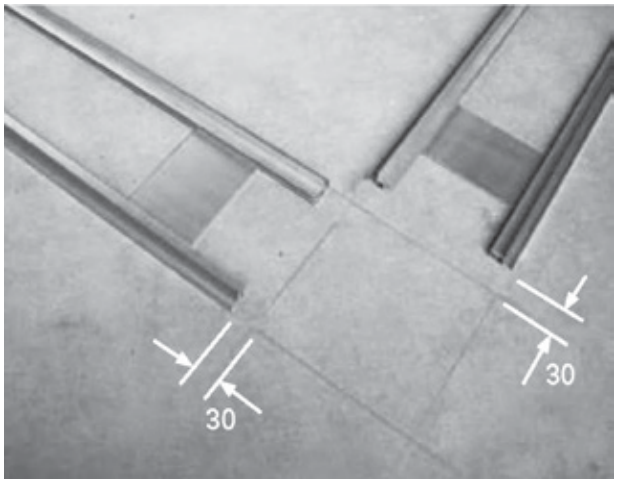
Wall Straightening

Secure Tek screws at either end of wall and fix a string line between the two. Cut three lengths of electrical conduit at the same diameter and length and place one at either end of the wall.

Ensure that both ends of the wall are plumb with a level, then move along to each panel join placing the conduit on the face of the panel beside the rebate. Adjust the brace until the string line touches the conduit to ensure a straight surface is achieved.

Note: Be sure to plumb and straighten every wall before any directional change occurs.

Ritek® Wall Systems - **Corner Installation**



Set bottom plate assembly 30mm back from internal corner to allow the corner extrusion to be flush with the slab.

Check corner panel positioning, ensuring that internal sheets are flush but allow 2mm in each direction for external corner to be fitted.

Install panels at corner ensuring they are levelled in both directions before fixing off internal corner.

Proceed to fix internal corner extrusion at 450mm centres to the stud as shown above. Ensure that all cogged bars are inserted and all horizontal steel is in place. At this stage the structural engineer is able to inspect the structural steel and sign off on it.

Reinforcing spacer wheels may be required to centralize the horizontal reinforcement.

Note: Allow corner extrusion to run 150mm past the Finished Floor Level (FFL) on all exterior walls that are consecutive. Use this same process on nib end closures and tee junctions that are on the exterior of the building.

Insert corner extrusion and fix off at 300mm centres ensuring the corner is plumb and square.

Ritek® Wall Systems - **T Junction Installation**

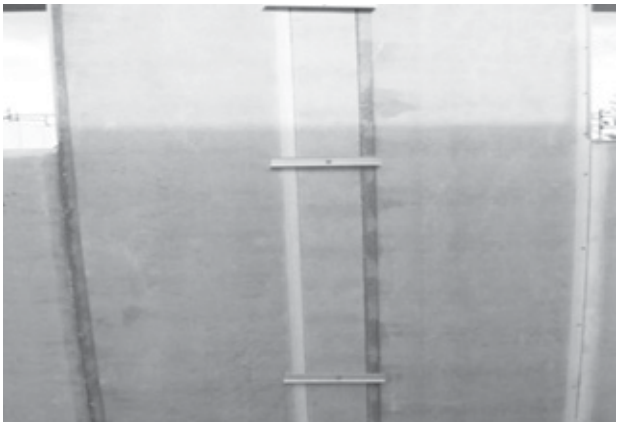
Set out the Tee Junction to surveyors pins

Fix bottom plate assembly to set out on slab with 20mm masonry pins.

Ensure panels are plumb in all directions and screw off internal corners. Ensure that all horizontal and vertical reinforcement has been fixed to engineers specifications.

Place Tee Closure into position ready for closing off

Fix a toggle (ply wood or aluminium angle) to the tee junction bringing it flush with adjacent panels.



Fix toggles vertically up the tee junction to keep it in position during the pour process

Ritek® Wall Systems - **Closing Wall Ends**

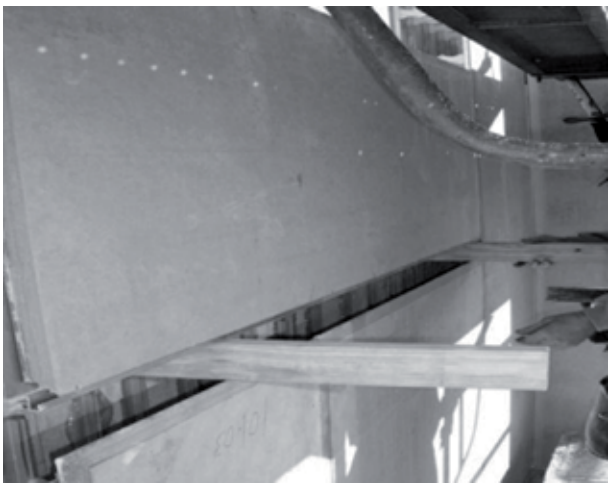
Wall and Blade Wall Ends

An End Closer section is placed over the end of the open wall and tapped into position. Screws are then fixed at 300mm centres through the sheeting and into stud extrusion. For 200 and 265mm walls, it is recommended that hex-head screws are fixed through the aluminium end closer into the studs.

Once reinforcement has been inspected and signed off, the ends are closed.

Fixing Sill and Lintel Panels

Screw-fix panel joiners to either side of the lintel and the end closure to the underside.



Place sill panels into position checking for level in all directions. Screw in place the lintel section into the adjacent panel on some timber packers ready for positioning.

Install adjacent panel to window opening and fix the lintel into position utilizing a Level for precision. Screw-fix the lintel at 300mm centres to the adjacent panels ensuring the bottom of lintel is level.

Prop Lintel sections with timbers and/or acrow-props prior to core-fill being placed to avoid any deviation.

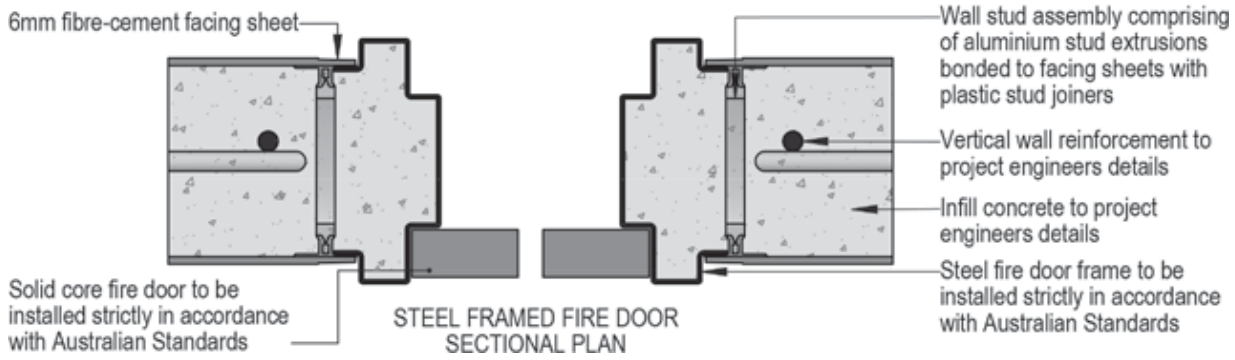
Install door frame, fixing it off at 300mm centres around the frame to the specification below.

Ensure the fire door frame is level in all directions then prop prior to pouring to avoid or stop any deviation occurring.

Fire Door Connection Detail

Fire Rated Frame is designed specifically for the Ritek Wall®. Recommended detail shown below. Manufacturing drawings for the subframe detail are available on request. Fire Certification is the responsibility of the fire door & frame manufacturer.

STEEL FRAMED FIRE DOOR SECTIONAL PLAN **FIGURE 7.7**



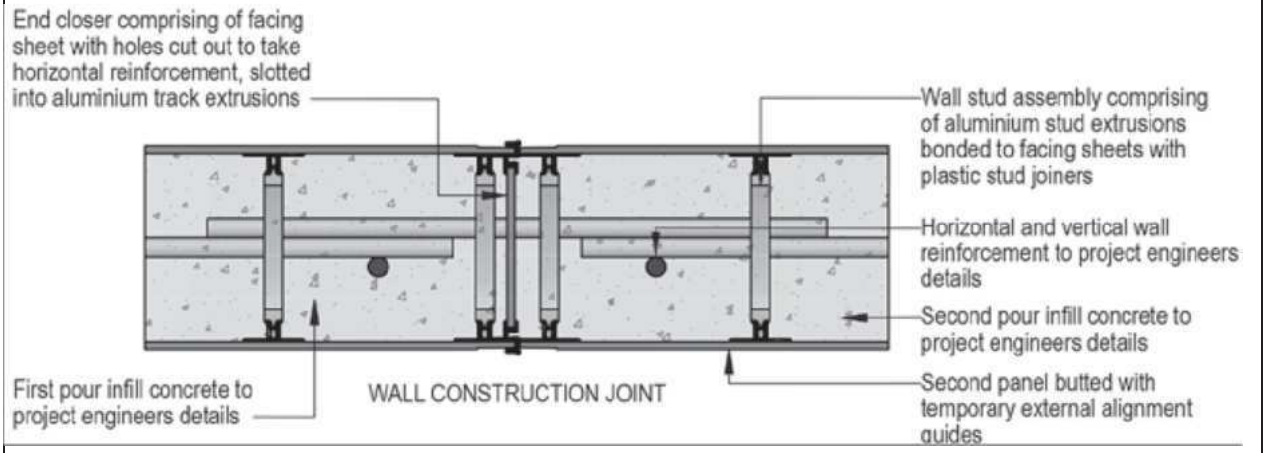
Ritek® recommend the use of internal fit door subframe systems

Ritek® Wall Systems - **Control & Construction Joint Installation**

Wall Construction Joints

These may be planned or unplanned but should follow the typical details shown in Figure 7.9.

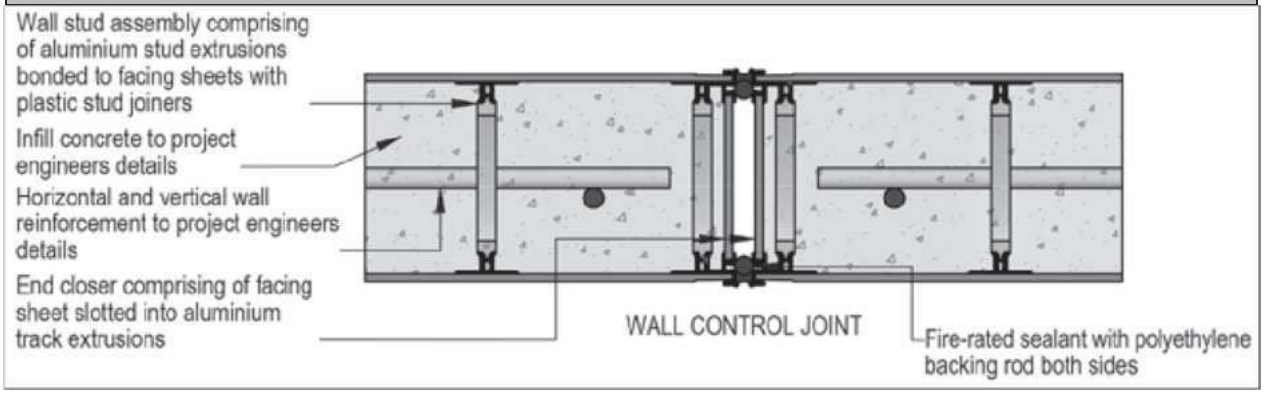
WALL CONSTRUCTION JOINTS **FIGURE 7.9**



Wall Control Joints

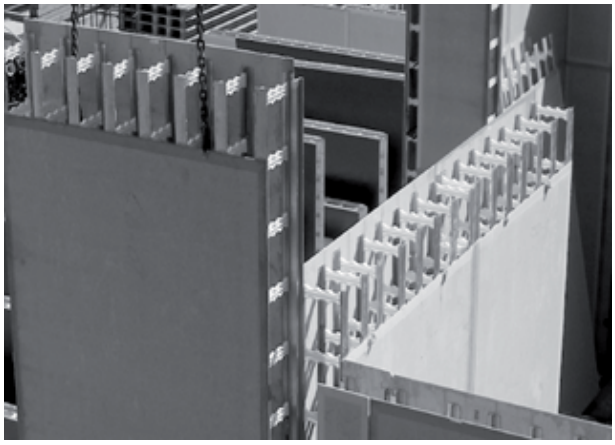
The engineer will nominate locations for control joints. A control joint consists of two end-sections of wall panel butted together with a 12mm gap. The gap should be detailed with a proprietary fire-resistant material. Refer to engineers details for any additional requirements. See Figure 7.10 for typical details.

WALL CONTROL JOINTS **FIGURE 7.10**



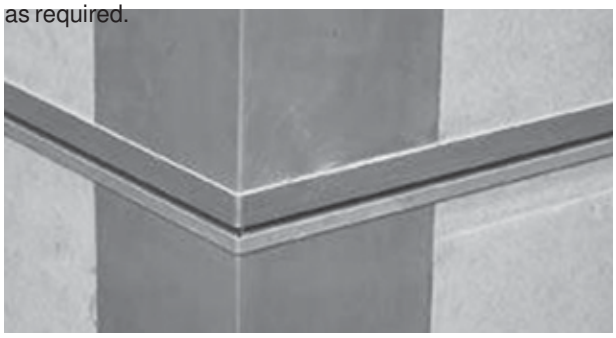
Ritek® Wall Systems - **External Wall & Slab Detail**

The External slab edge detail is completed with a drip groove former. This section replaces the standard bottom track on the external face of the wall sitting on the slab.

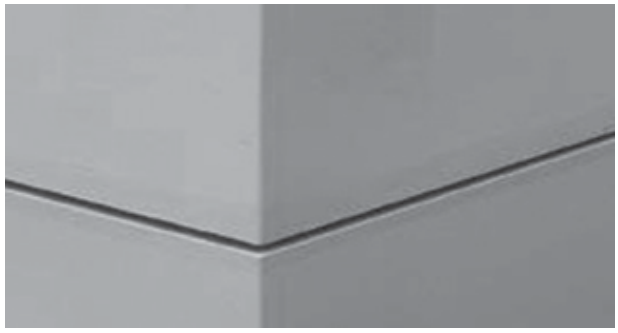


Install Rebated Top Track on top of the Edge Form utilizing a string line or a Dumpy level, ensure that the rebated top track is fixed to the correct finished floor level. Heights can vary in the edge form fibre cement due to inconsistent slab levels; alteration may be required, utilizing a chalk line and diamond cutting disc. For edge form above 300mm high additional site formwork is required. Edge form lintels with inside FC sheet height less than 800mm or any panels with edge form above 250mm high will require site formwork to support edge form as required.

Polyurethane sealant is applied between the Rebated Top Track and the Rebated Bottom Track for water proofing. Refer to Design, Detailing & Installation Manual Guide.

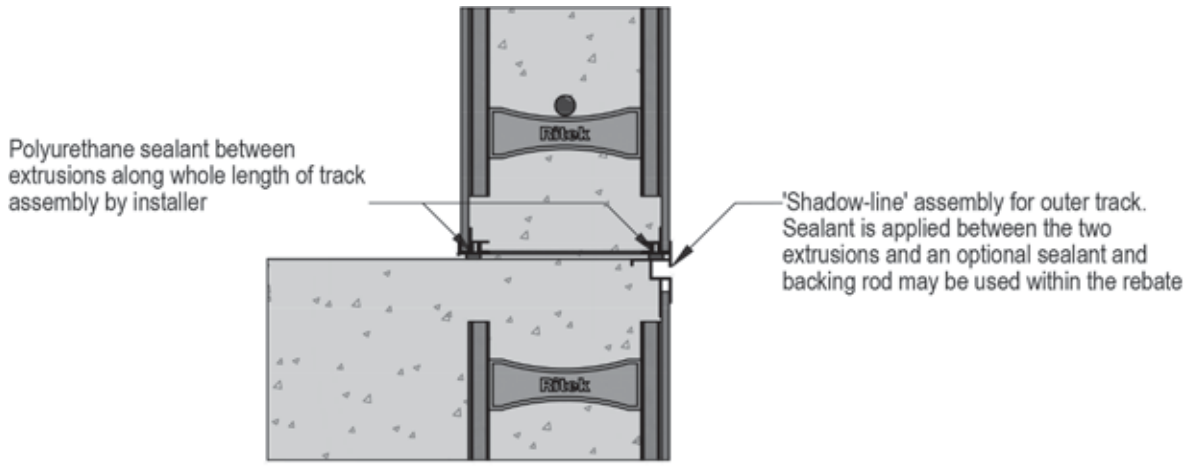


Finished external wall / slab Junction detail. Ensure to mitre the corners of the Rebated Top/Bottom extrusion if the expressed joint is required through to the corner. Ensure to use packers where required to provide an even expressed joint to finish too.



Silicon sealant can be applied to rebate at external wall finishing stage. Joint can be vee-joint detailed or set over as required by head contractor.

SUSPENDED FLOOR JUNCTION **FIGURE 7.11**



DETAIL AT SUSPENDED FLOOR JUNCTION

Note: If there is no express joint required through to corner, run corner extrusion 150mm past the R.L level of the finished slab and butt join the coinciding corner. Terminate the rebated top/bottom track inline with the edge of the corner.

Ritek® Wall Systems - **Concrete Mix Specification**

Recommended guidelines for concrete mix and slump specification for the Ritek® Wall System.

Typical Concrete Mix Specification (25 MPa to 60 MPa) Concrete shall be supplied in accordance with AS 1379:2007- Specification and Supply of Concrete.

The concrete supplier is responsible to provide a mix design in accordance with the Ritek® requirements for high flow characteristics, minimum water content, and a target slump at the pump as specified in the table below and aggregate size of 7mm to 10mm (max), using retarders and plasticisers to achieve the desired slump.

RITEK® CONCRETE MIX SPECIFICATION (DENSITY > 2200 KG / M³)					
Mix Description Ritek®	Ritek® 25/7/180	Ritek® 32/7/180	Ritek® 40/7/180	Ritek® 50/7/180	Ritek® 60/7/180
Strength f 'c (MPa)	25	32	40	50	60
Cement Type (AS 3972)	SL				
Course Aggregate Size (mm)	7 - 10				
Max. Water/Cementitious Ratio	0.50				
Slump ± 20 (mm)	180				
Concrete Admixtures	Yes				
Max. Supplementary Cement Content	20%				

Concrete Compressive Strength (f 'c)

The concrete compressive strength is specified by the design engineer. Common specified strengths for walls are shown.

Cement Type

Shrinkage Limited cement (SL) complying with AS 3972 should be used in the concrete mix to limit drying shrinkage.

Concrete Aggregate

The specified mix design includes coarse aggregate size of 7mm to 10mm (max) to ensure the correct concrete flow in the Ritek® panels is achieved.

Water to Cementitious Material Ratio (w/cm)

The specified mix designs maximum water-to-cementitious-materials ratio of 0.50 is intended to limit the amount of excess free water in the concrete mix which is known to increase concrete shrinkage during the curing process. The cementitious materials includes cement and supplementary cement content (fly ash) in the ratio limit calculation. No additional water is to be added to the supplied mix at the point of discharge.

Concrete Slump

Slump specification is to ensure the concrete mix completely fills the formwork up to the intended level during placement while it expels entrapped air and closely surrounds all fixings, reinforcement, tendons, ducts, anchorages and embedment's.

Concrete Admixtures

The concrete supplier is responsible for the use of water-reducers, superplasticisers and slump keeper admixtures in the mix design to achieve the targeted slump value without the need for additional water on-site.

Supplementary Cement

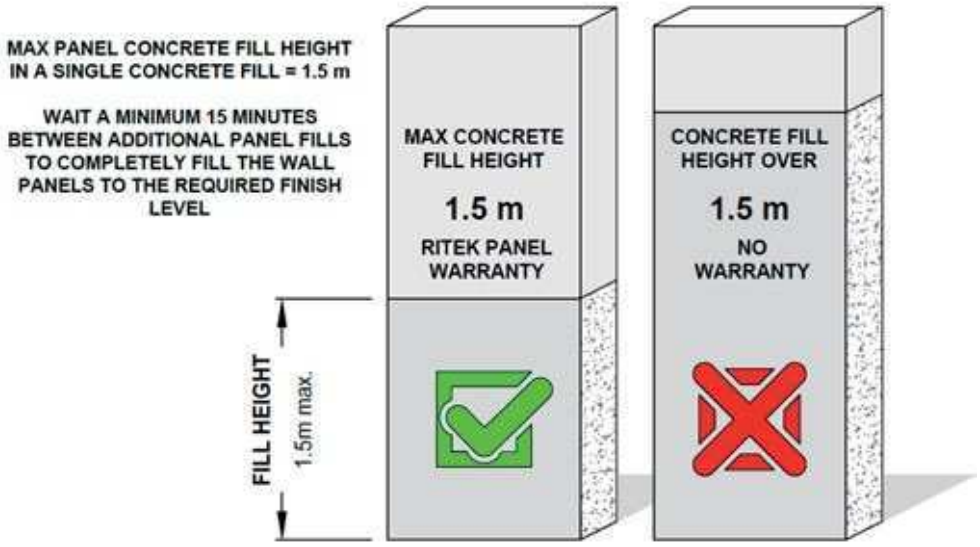
Fly ash may be used as a cement substitution up to a maximum limit of 20% in the concrete mix design. The use of slag cement and other pozzolans should be avoided as some have been shown to have adverse effects on early concrete strength gains and potential long term drying shrinkage.

Block Mix

A standard "Block-Mix" should not be used for core-filling of the Ritek® panels as the ratio of coarse aggregate to fines is typically low, and is not as capable in limiting crack development within the concrete structure.

Ritek® Wall Systems - **Concrete Mix Specification**

PANEL CONCRETE FILL HEIGHT SPECIFICATION



IF THE RITEK PANELS ARE SATURATED WET DUE TO HEAVY RAIN, PANEL FILL HEIGHT IS TO BE REDUCED TO 0.6M

Concrete Placement

Clause 17.1.3 of the Australian Standard AS 3600 Concrete Structures requires that “Concrete shall be handled, placed and compacted so as to completely fill the formwork to the intended level, expel entrapped air, and closely surround all reinforcement, tendons, ducts, anchorages, embedment’s and fixings.

Panels are to be filled progressively in layers up to 1500 mm high. Scaffold or formwork decks are required to place the concrete. When using higher strength concretes (40 MPa - 60 MPa), light wetting of the steel and inside face of the Ritek® panel may assist concrete flow between concrete pours during hot and dry site conditions.

Concrete Pump Equipment

Concrete is to be placed using a concrete boom pump or line pump. The boom pump or line pump delivers the concrete in a continuous stream. For maximum efficiency when pouring, schedule the concrete trucks approximately 30 minutes apart to provide continuous supply of concrete to the pump with minimal idle times. Ensure a 50 mm (2”) or 75 mm (3”) reducer is used and a flexible hose at the end.

Concrete Vibration

The design of the Ritek® Wall System and the flow characteristics of the Ritek® concrete mix specification allows the concrete to flow efficiently within the Ritek® panels and completely fill them without trapping pockets of air, and will closely surround all reinforcement, tendons, ducts, anchorages, embedment’s and fixings. Mechanical vibration, although not usually required, is permitted on Ritek® panels; however excessive use of vibration is likely to result
in more damage to the panels than the benefits of increased compaction.

Use a 25 mm vibrating shaft (pencil vibrator). When mechanical vibration is required, the most effective method is by vibrating the concrete from the bottom to the top of the concrete as the panels are being filled. Vibrating the steel reinforcement bars positioned inside the Ritek® Panels can also be effective. Choose the appropriate method to best suit the actual site condition/panel configuration.

Concrete Fill Height

Ritek® Wall panels have a maximum concrete fill height of 1.5 m (in a single fill) and are core filled in stages with a 15 minute rest time before the next fill. The Ritek® concrete mix specification allows the concrete within the panel to be easily levelled off to accommodate being filled in stages. Ensure rest time does not allow the concrete to set over upper reinforcement steel.

Ritek® Wall Systems - **Pre Pour Checklist**

Checking walls

- Make sure walls are straight, plumb, square and level – within specified standards
- Check corners are square and plumb

Checking Openings

- Check door frames are plumb and adequately propped
- Check window and door openings are located correctly and if openings are plumb and square

Checking Reinforcing Steel

- Check vertical and horizontal reinforcing steel comply with the engineers specifications
- Check reinforcing steel bars around window openings are installed
- Check reinforcing steel bars for lintels (window/ door headers) are installed and as per the engineers specifications

Checking Bracing & Alignment

- Check alignment and bracing is properly applied to keep panels plumb in the pouring process
- Check all Tee Junctions are braced adequately
- Check corners, joints, end closures are installed square and screwed off at correct screw centres
- Ensure that any variances in slab levels under standard bottom track are sealed
- Ensure any deviation at joints of panels are brought flush with cleat where necessary
- Ensure any broken edges are adequately patched and braced
- Ensure packers are placed between the Rebated Top Track and Rebated Bottom Track to provide an even expressed line of 5mm

Checking Wall Penetrations

- Check all penetrations (Electric, plumbing, mechanical.) have been accommodated and all form support has been installed

Checking Tool, Equipment and Materials

- Ensure you have steel trowels for finishing window sills.
- Ensure you have sponge and bucket for wiping any concrete spills on the wall panel.
- Ensure you have adequate materials to form up in the case of a blow-out or concrete spill.
- Ensure there are two shovels and a broom to clean up any concrete spill on formed deck.
- Ensure the specified Ritek® Concrete Mix Design is ordered and is acceptable for the method of placement and engineering requirements.
- A concrete slump test is recommended with the first concrete delivery to ensure the correct slump of 180 - 200mm is being applied
- Ensure that you have coordinated and confirmed the delivery times for both the boom pump and the concrete.
- Ensure there is enough man power to supervise the pour. Two men are required at the base, one either side of the wall and one man required to supervise the line hand and pump operator.

Checking Jobsite

- Check that the site is clean and there is enough room for trucks, workers etc.
- Refer to the back of this Installation Guide for Ritek®

Ritek® Wall Systems - **Concrete Filling**

Initiate the Pouring process at the window openings by pouring the window sills first.

Finish off window sills with a steel trowel providing an even finished surface. When concrete starts to set it may slump a little, ensure to top up the sills and provide a steel trowel finish to the concrete surface in accordance with the AS3610 for proceeding contractors.

Important Note:
Ensure concrete fill heights are kept to 1.5m lifts during the pouring process. Fill height to be reduced if the base of panel is wet. Pour should be avoided if the panels or panel closures are heavily saturated. (e.g. after heavy downpour of rain)

Clean off any excess concrete with a wet rag before it sets and continue the pour around the rest of the building filling in 1.5m increments until the top of the panel is flush with the underside of the slab.

Ritek® Wall Systems - **Post Pour Checklist**

Checking walls

- Ensure walls are straight, plumb, square and level.
- Ensure all concrete leaks are cleaned off finished walls and door frames.

Checking Openings

- Check if door frames have remained plumb through the pour process.
- Check that window sills have been topped up and a steel trowel finish has been applied to concrete surface
- Ensure that window sill finish is plumb and straight in accordance with the AS3610.

Checking Reinforcing Steel

- Check if vertical reinforcing steel and cogged bars are inserted to engineers specifications

Strip Bracing and Patches

- Ensure props remain fixed until the concrete slab above is poured in-situ.
- Ensure any pre-pour patching is stripped and prepared for following trades

Preparation Work

- Ensure that all core filled walls are finished in accordance with AS3600/AS3610
- Ensure all patching is removed and areas are prepared for following trades.
- Ensure that any Tek screws protruding are removed before finishing trades begin.
- Ensure all screw heads are flush on recesses to allow following trades to apply finishes.
- Ensure any peaks on panel joins are ground out and are left in an acceptable standard for finishing trades to apply a coating of up to a 400mm trowel width.
- Ensure all walls are straight and plumb in accordance with AS3600/AS3610 and acceptable installation tolerances.
- Ensure all packers in between the Rebated Bottom Track and Rebated Top Track are removed

Ritek® Wall Systems - **Health & Safety**

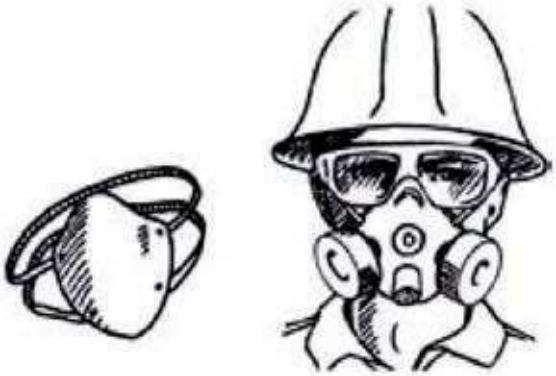
All installers have a general responsibility, under Government Legislation, for the health, safety and welfare of themselves and their fellow workers. You should also become familiar with and comply with Federal and State Legislation specific to the building industry. Each building site may have its own specific rules for contractors and these must also be complied with.

As a guide only, these are some areas that need attention when installing the Ritek® Wall System:

- Ultraviolet radiation
- Manual handling (lifting of panels)
- Scaffolding
- Working at height
- Exposed reinforcing steel
- Personal protective equipment
- Housekeeping
- Electrical safety
- Cranes and slings
- Power tools

For further information, contact WorkSafe Australia or the safety authority in your State.

Minimise dust when cutting



Wear P1 or P2 dust mask + safety goggles

Recommended Safe Working Practices

Breathing in fine silica dust liberated when working with products such as fibre-cement, clay and concrete is hazardous. Over time, usually a number of years, this may result in bronchitis, silicosis or lung cancer.

Work safely with fibre-cement sheets by following the precautions described below.

- Minimise dust when cutting sheets, by using either Score and Snap knife, Kwikrip™ hand guillotine, Toolex Fibre Shears or Makita Wet Saw (Models 4101R and 4107R).

- When using other power tools or abrasive hand tools on sheets, wear approved personal protective equipment, i.e. P1 or P2 dust mask and safety goggles.

- Ensure containment of dust during clean-up and disposal.

These precautions are not necessary when stacking, unloading or handling fibre-cement products.

Please refer to Technical Update Section I8

Please refer to Technical Update Section I8

Black Square Engineering

Black Square Engineering Pty Ltd
RPEQ Machinery and Industrial Plant Engineers
Design, Assessment, Inspection
ABN 65 616 628 838
PH: +61 7 3188 0455
www.blacksquareengineering.com.au

Engineering Certificate

Company name:	RITEK Technology		
Project:	RITEK Panel Lifting		
Job Number:	RIT0887	**Revision:**	0
Date of Issue:	29/09/2023	**Pages:**	1
Date of Expiry:	• On revision of listed standards or regulations, where the change affects the basis of performance. • On modification or addition by others, where the change affects compliance.		
Prepared by:	Hugh Green		

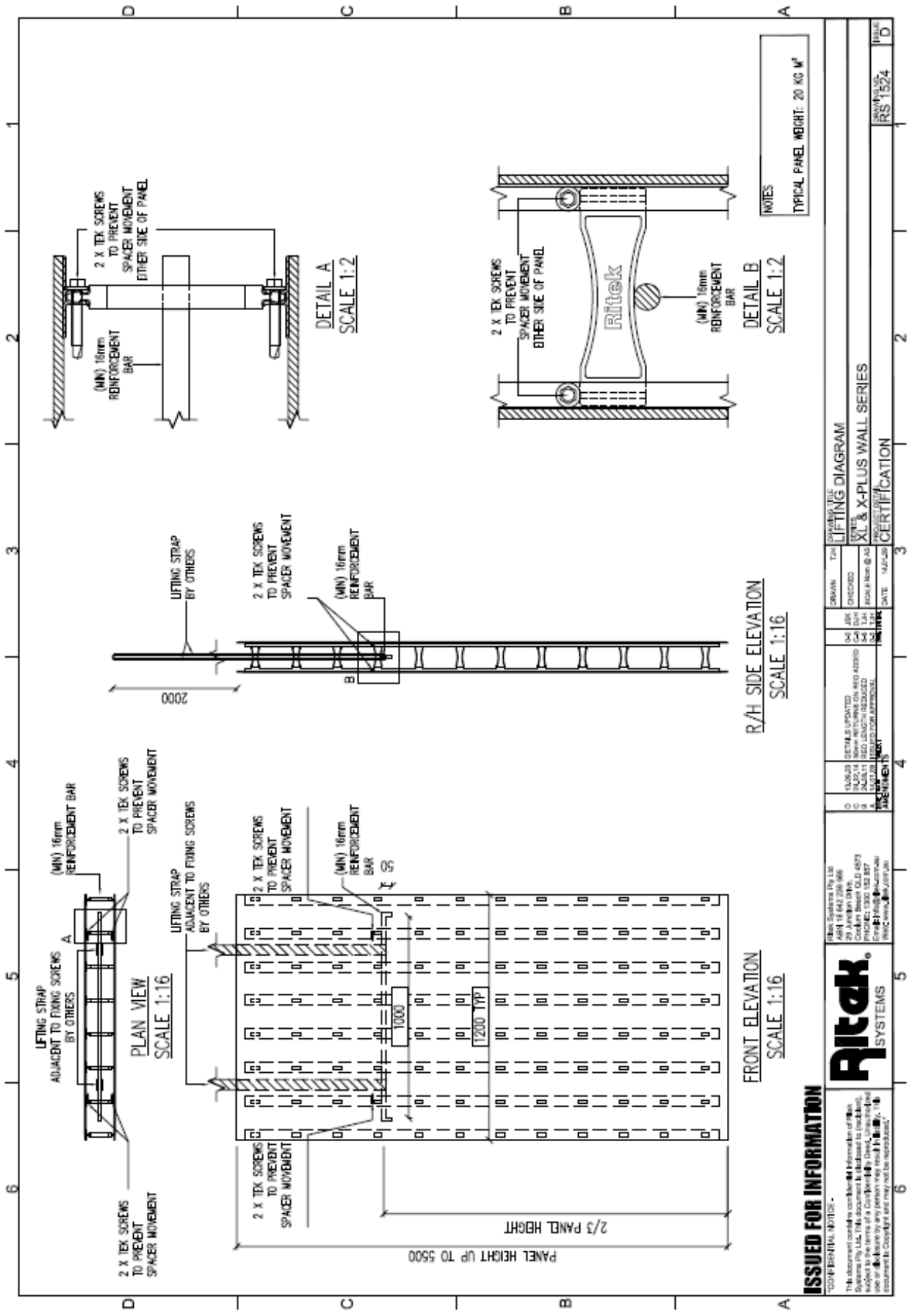
Scope of Works:	Engineering assessment of the lifting detail for RITEK panels.
Exclusions of Works:	The following are excluded from this certification: • The assessment only considers the suitability of the designated attachment points for lifting of the RITEK panels. No other aspect of the panel or intended use of the panel is considered under this certificate. • No inspection or testing of the lifting attachment points has been completed. Only a desktop assessment of the proposed detail has been completed.
Applicable Regulation:	Queensland, Work Health and Safety Regulation 2011.
Basis of analysis:	The relevant sections of the following standards were used as a basis for the analysis of the above equipment: • AS3990:1994 – Mechanical equipment – Steelwork • AS3850.1:2015 – Prefabricated concrete elements, Part 1: General requirements. (Used only as best reference for appropriate lifting practices)
Engineering data:	Client reference documentation. • RS1524 – LIFTING DIAGRAM – XL & X-PLUS WALL SERIES – CERTIFICATION – ISSUE D.
Conditions of Certification:	Operating conditions: • RITEK panels are to be lifted as shown in the referenced lifting diagram. • All rigging is to be suitably rated to lift a maximum panel weight of 185 kg. • The client is to ensure the requirements of this certificate are included in the safe work instructions for this equipment and operators are trained accordingly. Manufacturing and Maintenance requirements: • The four (4) TEK screws used to secure the lifting reinforcement bar are required to have a minimum shear capacity of 2.5 kN each. • The reinforcement bar is to have the ends turned down as shown in the referenced lifting diagram to ensure the bar and lifting straps remain engaged during the lift. • This equipment will undergo minimum annual inspection by a competent person to ensure suitability for continued safe service. Any indication of critical flaws or risks to continued service (damage, wear, corrosion...) shall be further investigated and made good before returning to service.

Compliance Statement:
The engineering works undertaken have been performed with due care and diligence.

RIT0887-C230929-RITEK PANEL LIFTING REV 0
29/9/2023

Hugh Green – Senior Mechanical Engineer
BEng (Mech), MIEAust, CPEng, NER, RPEQ

Ritek® Wall Systems - **Certified Panel Lifting**



Ritek® Wall Systems - **SITE COPY - Pre-works Checklist**

Check Footing/slab

- ☐ Make sure footing or slab RL's are correct
- ☐ Check concrete finish is suitable to receive Ritek® bottom track
- ☐ Check layout of reinforcement starter bars will not foul Ritek® panels

Check site conditions

- ☐ Check if panels can be or are loaded out to correct positions on slab
- ☐ Check site access is safe and to current legislation
- ☐ Check site for pump location and confirm with Site Manager
- ☐ Confirm delivery date with Site Manager of …….

Checking Reinforcing Steel

- ☐ Check if Reinforcement is on site
- ☐ Check if reinforcement has been scheduled and not stock bar
- ☐ Confirm location of reinforcement is correct, i.e. nearest possible area to installation

Comments and general observations:

CONDITIONS OF USE: This document is to be used to check the installation techniques used for the installation of the Ritek® Wall System in accordance with the Design, Detailing & Installation Manual Guide and to assist the clients Quality Systems and form part of a recorded ITP. This checklist does not cover the quality of workmanship or defects which are caused by third parties and therefore deemed to be outside the control of Ritek Technology Pty Ltd. No liability will be accepted by Ritek Technology for the use or reliance of this checklist.

Ritek® Wall Systems - **SITE COPY - Pre-Pouring Checklist**

Checking walls

- ☐ Make sure walls are straight, plumb, square and level – within specified standards
- ☐ Check corners are square and plumb

Checking Openings

- ☐ Check door frames and window openings & lintels are plumb and adequately propped / supported
- ☐ Check window and door openings are located correctly and if openings are plumb and square

Checking Reinforcing Steel

- ☐ Check vertical and horizontal reinforcing steel comply with the engineers specifications
- ☐ Check reinforcing steel bars around window openings are installed
- ☐ Check reinforcing steel bars for lintels (window/door headers) are installed and as per the engineers specifications

Checking Bracing & Alignment

- ☐ Check alignment and bracing is properly applied to keep panels plumb in the pouring process
- ☐ Check all Tee Junctions are braced adequately
- ☐ Check corners, joints, end closures are installed square and screwed off at 300mm centres
- ☐ Ensure that any variances in slab levels under standard bottom track are sealed
- ☐ Ensure any deviation at joints of panels are brought flush with cleat where necessary
- ☐ Ensure any broken edges are adequately patched and braced
- ☐ Ensure the Rebated Top Track and Rebated Bottom Track are set correctly with uniform joint to provide an even expressed line of 5mm, track mitres and angles are to be cleanly cut
- ☐ Check polyurethane sealant is applied between bottom tracks (water proofing)

Checking Wall Penetrations

- ☐ Check all penetrations (Electric, plumbing, mechanical.) have been accommodated and all form support has been installed

Checking Tool, Equipment and Materials

- ☐ Make sure you have steel trowels for finishing window sills.
- ☐ Make sure you have sponge and bucket for wiping any concrete spills on the Wall panel
- ☐ Make sure you have adequate materials to form up in the case of a blow-out or concrete spill.
- ☐ Ensure there are two shovels and a broom to clean up any concrete spill on formed deck
- ☐ Make sure the specified Ritek® Concrete Mix Design is ordered and is acceptable for the method of placement and engineering requirements.
- ☐ A concrete slump test is recommended with the first concrete delivery to ensure the correct slump of 180mm is being applied
- ☐ Make sure that you have coordinated and confirmed the delivery times for both the boom pump and the concrete.
- ☐ Make sure there is enough man power to supervise the pour. 2 men required at the base, one either side of the wall and 1 man required to supervise the line hand and pump operator.

Checking Jobsite

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Ritek® Wall Systems - **SITE COPY - Post-Pouring Checklist**

Checking walls

- ☐ Make sure walls are straight, plumb, square and level.
- ☐ Ensure all concrete leaks are cleaned off finished walls and door frames.

Checking Openings

- ☐ Check if door frames have remained plumb through the poor process.
- ☐ Check that window sills have been topped up and a steel trowel finish has been applied to concrete surface
- ☐ Ensure that window sill finish is plumb and straight in accordance with the AS3610 (Australian
- ☐ Standard; Formwork for Concrete).

Checking Reinforcing Steel

- ☐ Check if vertical reinforcing steel and cogged bars are inserted to engineers specifications

Strip Bracing and Patches

- ☐ Ensure props remain fixed until the concrete slab above is poured in-situ.
- ☐ Ensure any pre-pour patching is stripped and prepared for following trades

Preparation Work

- ☐ Ensure that all core filled walls are finished in accordance with the AS3610
- ☐ Ensure all patching is removed and areas are prepared for following trades.
- ☐ Ensure that any Tek screws protruding are removed before finishing trades begin.
- ☐ Ensure all screw heads are flush on recesses to allow following trades to apply finishes.
- ☐ Ensure any peaks on panel joins are ground out and are left in an acceptable standard for finishing trades to apply a coating of up to a 400mm trowel width.
- ☐ Ensure all walls are straight and plumb in accordance with the AS3610 and acceptable installation tolerances.
- ☐ Ensure all packers in between the Rebated Bottom Track and Rebated Top Track are removed.

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Ritek® Wall Systems - **Notes**

Ritek Systems Pty Ltd
www.ritek.com.au

1300 152 857

Design, Detailing & Installation Manual
Ritek® Wall System

Version Jan 2025

H CERTIFICATION

The Following Reports are available upon request:

- AS1530.1 Combustibility Test for Materials – Aluminium
- AS1530.4 Ritek Wall Fire Resistance Test on a loadbearing vertical separating element
- Effect of Services on Fire Design
- SLR Consulting Acoustic Assessment
- Ritek Wall Thermal Assessment
- Use of Fibre Cement Linings

Notes

Ritek® - the alternative, innovative & cost-effective building method.

CodeMark Australia | CMI Certification Certificate CM40374

XL Wall Panel

CodeMark Australia | CMI Certification Certificate CM40375

X-Plus Wall Panel

Ritek® Wall Systems

Choose products that meet Australia's highest level of BCA compliance.

XL Wall Panel

X-Plus Wall Panel

CodeMark is a building product certification scheme which supports the use of new and innovative building products by providing a nationally and internationally accepted process for products to be assessed for compliance with the requirements of the building codes of Australia and New Zealand

CodeMark strengthens the entire building supply chain and gives users confidence that their building products comply with the Building Code of Australia (or in New Zealand the New Zealand Building Code). CodeMark certificates are accredited from internationally recognised accreditation bodies, offering increased credibility and acceptance of a certificate holder's CodeMark certified products.

The scheme provides confidence and certainty to regulatory authorities and the market through the issue of a Certificate of Conformity.

How CodeMark Works: Third-party CodeMark certification bodies evaluate and certify products to ensure they meet the specified requirements of the National Construction Code (NCC) and Building Code of Australia (BCA).

Product Certification - The Australian Building Codes Board (ABCB) is committed to ensuring best practice in the building and construction industry. There are two product certification schemes to provide a nationally consistent quality of materials and products; the voluntary CodeMark building product certification scheme which the ABCB owns and jointly manages and the mandatory WaterMark plumbing and drainage product certification scheme which is managed and administered by the ABCB.

A register of CodeMark certified products is maintained by the ABCB and listed on this website. Relevant legislation requires building control authorities to accept CodeMark certified products.

Further information can be found at: http://www.abcb.gov.au/product-certification/codemark

A copy of the Ritek Codemark Certificate is available to view or download on the JASANZ website – (insert web address here)

Ritek® Wall Systems - Notes

Ritek® Wall Systems - Notes

Ritek® Wall Systems - Notes

CERTIFICATION H

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XL Wall Panel

X-Plus Wall Panel

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I TECHNICAL UPDATES




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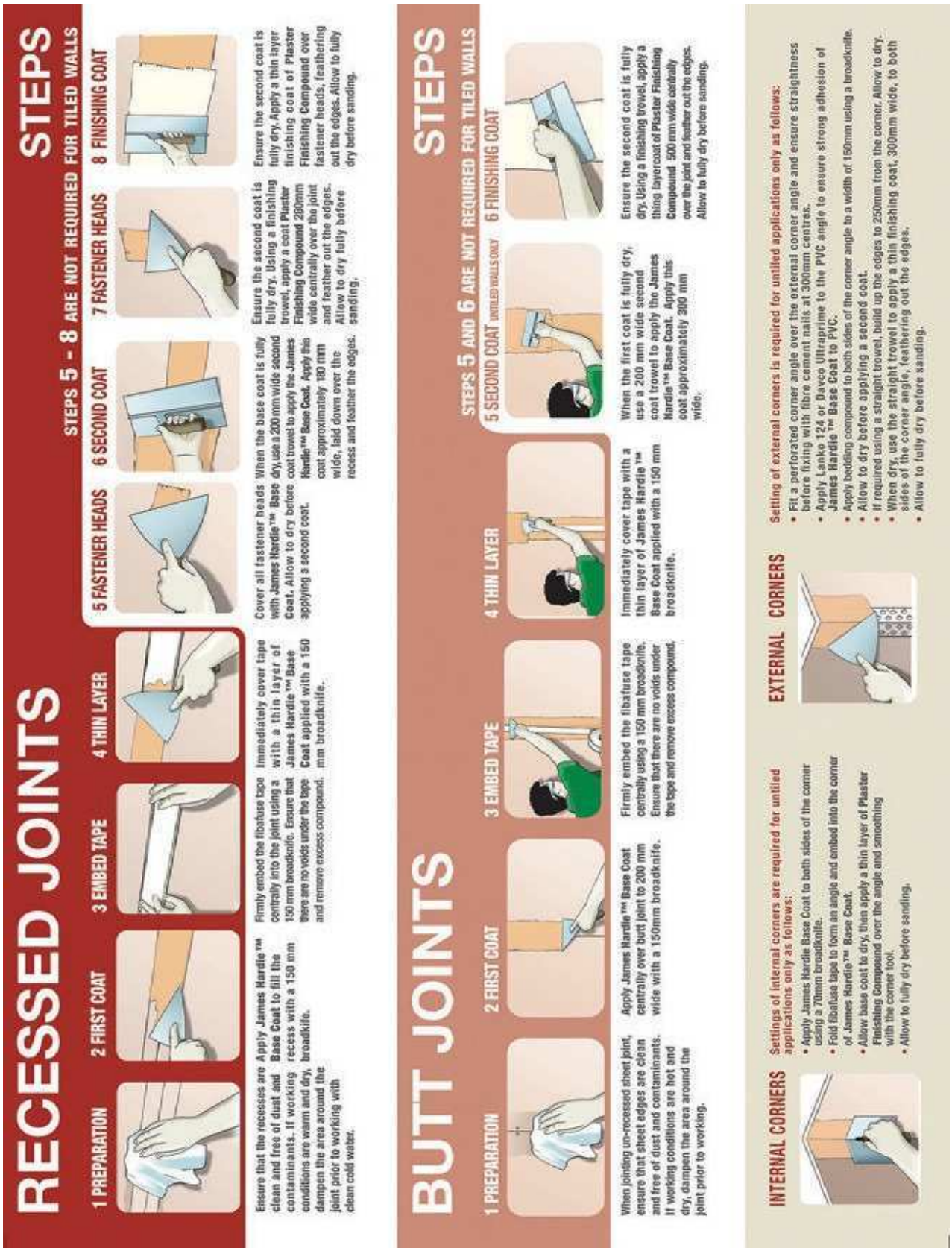
XL Wall Panel

CodeMark Australia | CMI Certification Certificate CM40375

X-Plus Wall Panel

Ritek®

Ritek® Wall Systems - Technical Updates



Intex GROUP
BUILDING EXCELLENCE

Fibafuse

paperless plasterboard tape

- Flat joints, corners & square set
- Stronger joints
- Lighter to handle
- Mould resistant
- Easy to use

PREMIUM
PLASTERBOARD
ACCESSORIES,
TOOLS & EQUIPMENT

Revolutionary Paperless Plasterboard Tape

FibaFuse's open fiber structure allows the joint compound to penetrate the tape, creating a strong bond that dramatically reduces the potential for cracks.

- Mold-resistant – Increased mold protection for a safer environment
- Open fiber design – Fuses with compound to create stronger joints compared to paper tape or fibreglass.
- Pre-creased – For easy installation in corners
- Crack-resistant – Superior to paper tape or fibreglass.
- Smooth finish – Eliminates blisters and bubbles that are common with paper tape.
- Professional-grade performance – A superior option to paper tape or fibreglass for demanding applications

Ritek®

Ritek® Wall Systems - Technical Updates

FibaFuse is easy to work with

- Designed for professional tradesman, and DIY , FibaFuse is a mold-resistant glass mat drywall tape that is ideal for high-humidity and moisture-prone .
- FibaFuse is easy to cut and designed to retain its folds, making it efficient to install by hand on joints and in corners. Taping tools, banjos and automatic tapers also work well in applying FibaFuse and compound to seams.
- FibaFuse is porous, allowing the joints and corners compound to become part of the tape for a stronger bond and reducing the possibility of loose tape and air bubbles.

FibaFuse is a superior option to paper tape for demanding applications

- FibaFuse is mold resistant.
- Testing concludes that FibaFuse scores a perfect "10" rating on ASTM D3273 mold test.
- FibaFuse is lighter than paper tape.
- A 76m roll of FibaFuse is 62% lighter than an equivalent roll of paper tape.
- FibaFuse is stronger than paper tape.
- 24 hrs after applying a second coat of compound, FibaFuse's crack strength is 76% stronger than paper tape.

FibaFuse Weights & Dimensions

INTEX RE-ORDER CODE	Size	Product Description	Color	Case Pack	Case Description	Product Dimension	Product Weight	Case Weight
5FF76	52 mm x 76 m	FibaFuse	White	20	Corrugated Box	230mm x 230mm x 52 mm	200g	5.5 kg

FibaFuse - available in other sizes on reque t

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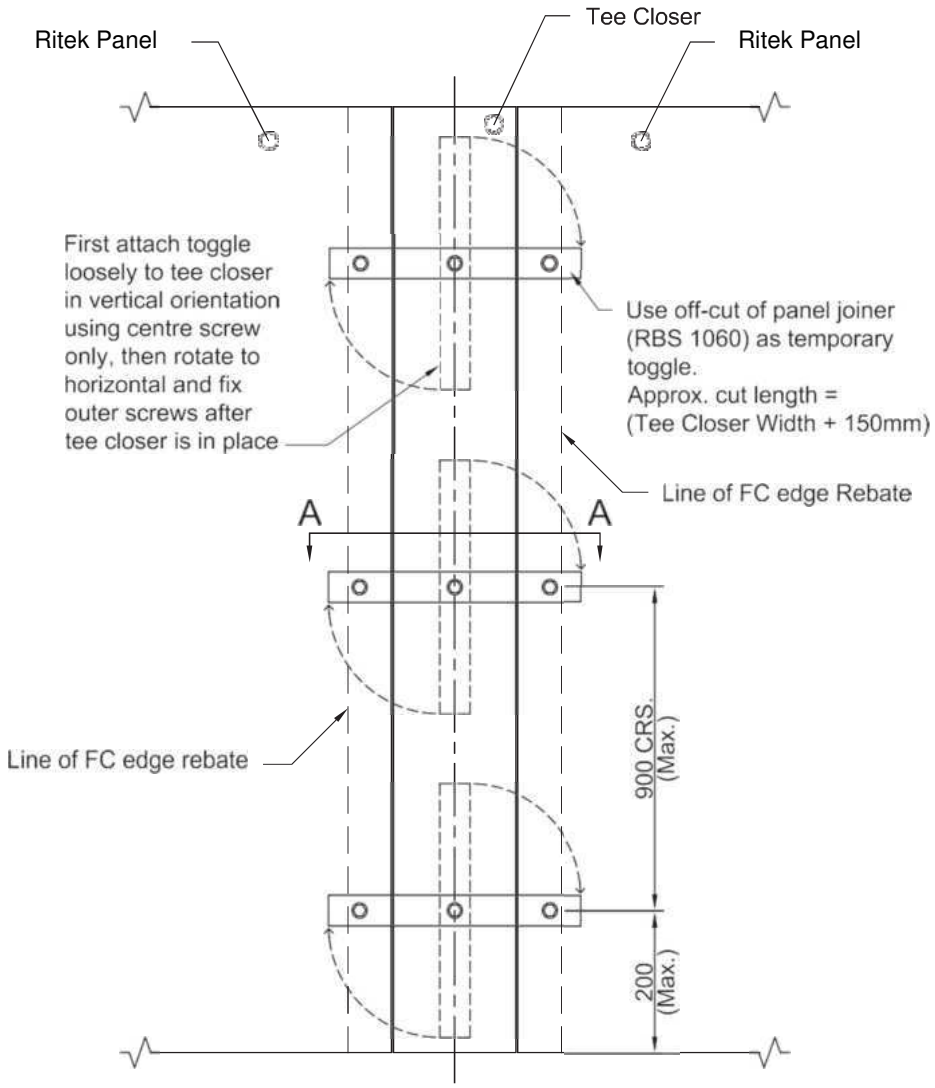
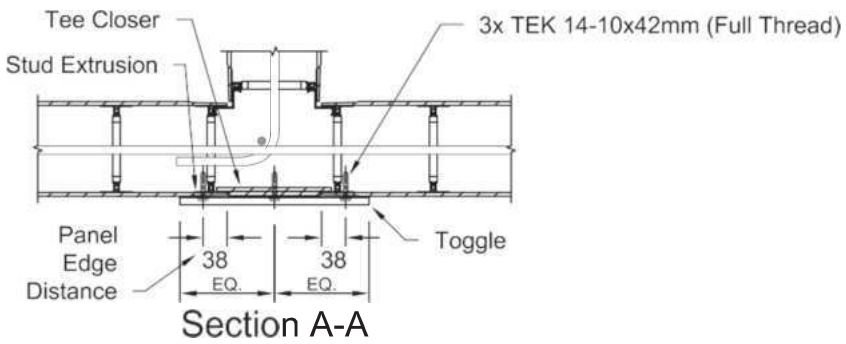
Typical details are shown in Figure 8.1.

TEMPORARY TEE JUNCTION TEE TOGGLE **FIGURE 8.1**

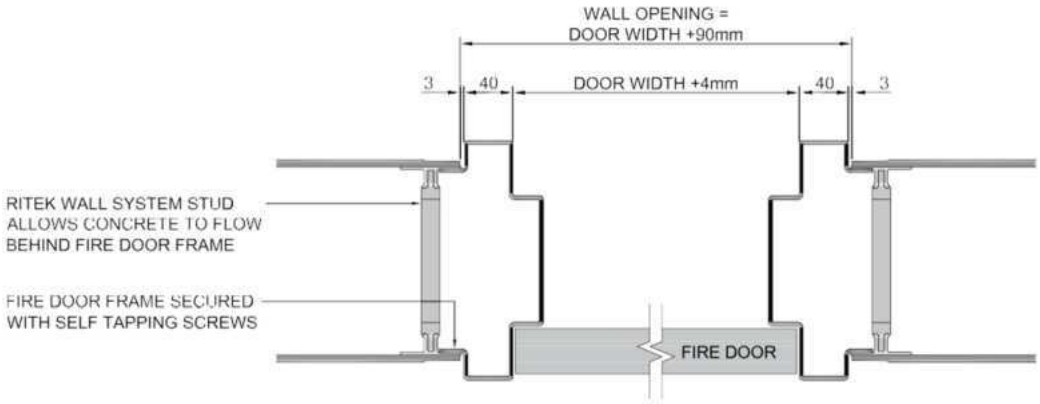




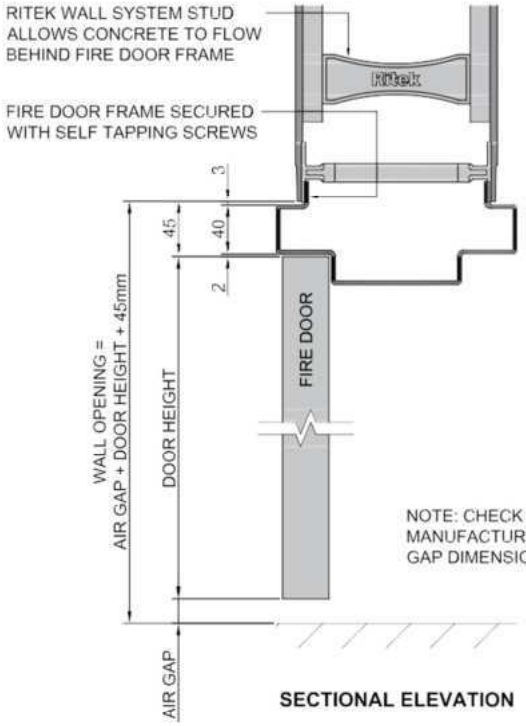
Ritek® Wall Systems - Technical Updates

Standard Details Fire Door Frame [Internal Fit]

Standard details are shown in Figure 8.2 for fire door frame



SECTIONAL PLAN



SECTIONAL ELEVATION

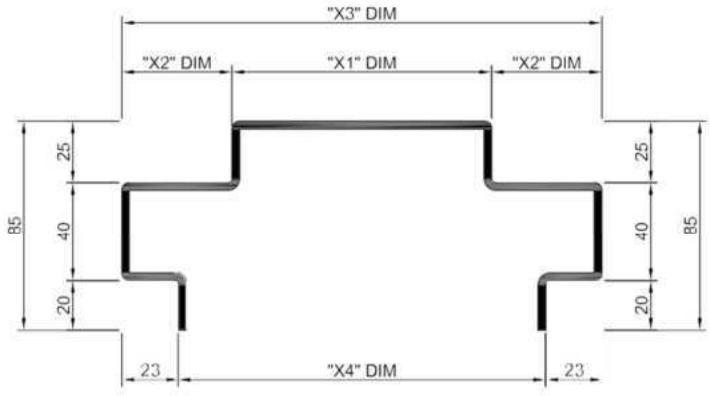
NOTE: CHECK FLOOR COVERINGS, MANUFACTURER TO PROVIDE AIR GAP DIMENSIONS

38mm FIRE DOOR FRAME TABULATED DIMENSIONS

WALL SIZE	"X1" DIM	"X2" DIM	"X3" DIM	"X4" DIM
XL**115** 115mm	56mm	45mm	146mm	100mm
XL**135** 135mm	76mm	45mm	166mm	120mm
XL**150** 150mm	91mm	45mm	181mm	135mm
XL**165** 165mm	106mm	45mm	196mm	150mm
XL**200** 200mm	141mm	45mm	231mm	185mm
XL**265** 265mm	206mm	45mm	296mm	250mm

47mm FIRE DOOR FRAME TABULATED DIMENSIONS

WALL SIZE	"X1" DIM	"X2" DIM	"X3" DIM	"X4" DIM
XL**115** 115mm	44mm	51mm	146mm	100mm
XL**135** 135mm	64mm	51mm	166mm	120mm
XL**150** 150mm	79mm	51mm	181mm	135mm
XL**165** 165mm	94mm	51mm	196mm	150mm
XL**200** 200mm	129mm	51mm	231mm	185mm
XL**265** 265mm	194mm	51mm	296mm	250mm



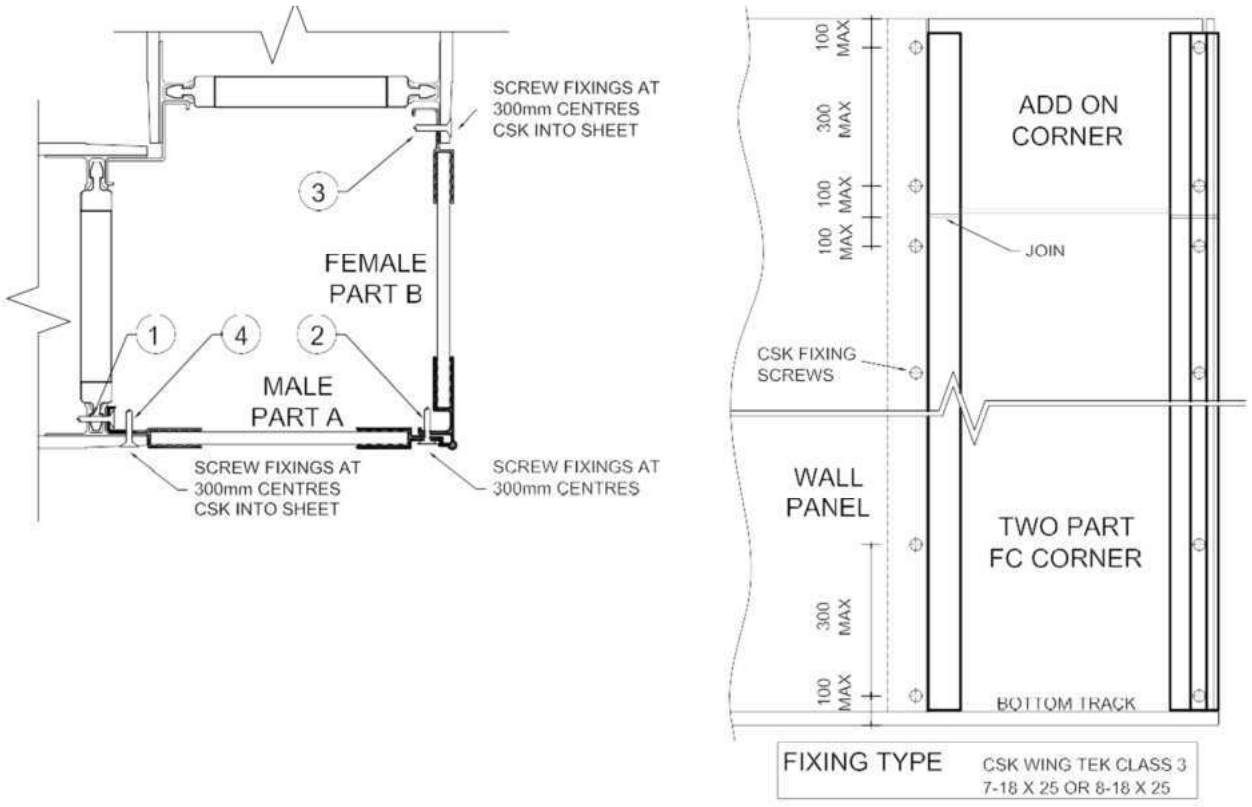
FIRE DOOR FRAME [INTERNAL FIT]
SCALE 1:2

Ritek® Wall Systems - Technical Updates

Ritek® Wall Two Part FC External Corner - Fixing Details

Typical details are shown in Figure 8.3 for Ritek® Wall Two Part FC External Corner - Fixing Details.

XL WALL® TWO PART FC EXTERNAL CORNER - FIXING DETAILS **FIGURE 8.3**



INSTALLATION METHOD

OPTION 1
INSTALL MALE PART A AND SCREW FIX TO ADJACENT PANEL ON INSIDE INTO STUD ALUMINIUM POSITION (1) . INSTALL FEMALE PART B AND SCREW FIX TO BOTH MALE PART A AND ADJACENT PANEL ON OUTSIDE POSTIONS (2) & (3) .

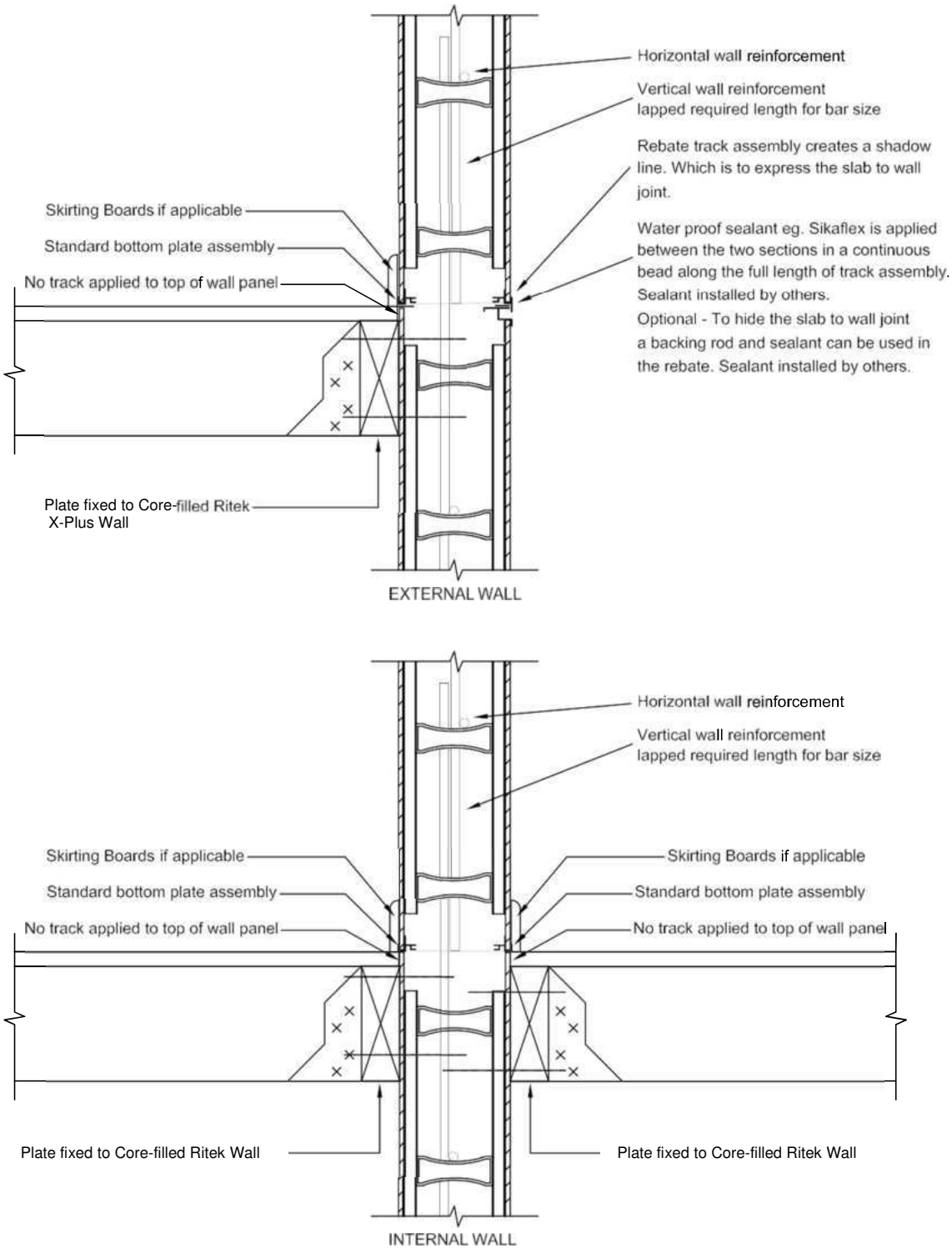
OPTION 2
CORNER PANELS MALE PART A AND FEMALE PART B CAN BE PRE-ASSEMBLED AND SCREW FIXED TOGETHER AT POSITION (2) THEN SLID INTO PLACE FROM ABOVE THE WALL. FIX TO ADJACENT PANELS ON OUTSIDE AT POSITIONS (3) & (4).

Ritek® Wall Systems - Technical Updates

Typical Wall Junctions for Timber Floors

Standard details are shown in Figure 8.4 for typical wall junctions for timber floors

TYPICAL WALL JUNCTIONS FOR TIMBER FLOORS **FIGURE 8.4**



Lintel Installation - Technical Update

- In reference to Ritek Wall (115, 135, 150, 165, 200 & 265 mm widths) with aluminium stud rails and aluminium spacers (Figure 1)

Figure 1

- Lintel panels (e.g., panels above windows, doors & openings) **Change to installation requirements**
- **Change Item:** Lintel panels now manufactured without plastic spacers to the bottom horizontal stud rails (Figure 3)
- Fitment of nib end closer FC and associated aluminium standard track remains unchanged - (Figure 4)
- **Change Item:** Fit track spacers to aluminium standard track 100 mm from end and 600 mm maximum centers (Figures 5) Note: Remove spacers at time of brace removal
- Prop all lintels before concrete placement in wall (Figure 6)
- Concrete placement in lintel and finishing to lintel methodology remains unchanged
- **Change Item:** Minimum Lintel sizes manufactured/supplied apply

Figure 3

Figure 4

Figure 5

Figure 6

Ritek® X-Plus Wall System – Specification Sheet

INTRODUCING THE RITEK DtS NON-COMBUSTIBLE WALL SOLUTION

Ritek® X-Plus™ Wall delivers a high-performance, deemed non-combustible, premium permanent formwork system that is composed entirely of a mix of materials either tested to AS1530.1 or deemed suitable/exempt in accordance with the National Construction Code (NCC).

Tested extensively, Ritek X-Plus includes a specialised two-part metal accessory consisting of an anodised aluminium internal spacer and a galvanised steel insert for strength, durability, corrosion resistance and fire safety. This is then locked into the edges of an aluminium stud rail that is glued to a high-quality fibre cement lining, forming a complete, premium modular panel.

As an interior and exterior wall application, Ritek X-Plus is ideal for applications where a premium finish is required. The quality sanded surface finish of Ritek X-Plus is ready for direct setting by finishing trades where a Level 4 finish is required, thus optimising internal floor space and saving time and money by eliminating the need to batten-out and plaster line internal walls.

All Ritek wall systems feature innovative fibre cement technology for added reassurance of long-term structural strength and stability, as well as superior acoustic, thermal and fire ratings.

Our in-house drafting team creates custom shop drawings, and panels are manufactured to your architect's specifications, meaning fire doorframes can be pre-installed, and electrical services can be cast in. Ritek X-Plus is delivered to your site prefabricated ensuring a quick, easy and highly efficient install with minimal downtime.

Installation of Ritek X-Plus is as per Ritek Technology Design, Detailing and Installation Guide for Ritek XL. Accessories and installation methodology are the same for both products.

Anodized aluminium Space with Galvanised Steel Insert
(Panels must be installed with the steel insert on top of the aluminium spacer)

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Ritek® X–Plus™ Wall System - **Specifications**

RITEK® X -PLUS®WALL SYSTEM – SPECIFICATION			
Wall Panel Thickness	**Concrete Core**	**Surface Density** (Core Filled)	**Typical Panel Weight**
115mm	103mm	> 220 kg/m2	20 kg/m2
135mm	123mm	> 220 kg/m2	21 kg/m2
150mm	138mm	> 220 kg/m2	23 kg/m2
165mm	153mm	> 220 kg/m2	24 kg/m2
200mm	188mm	> 220 kg/m2	26 kg/m2
265mm	253mm	> 220 kg/m2	28 kg/m2
Panel Components 6mm Fibre Cement Sheeting bonded to a Patented Composite Aluminium Stud with Galvanized Steel Insert to Aluminium Spacer. All aluminium components and accessories are protected by chromate coating. Aluminium Spacer is protected by anodized coating			
Internal Finish Set joints and apply a standard paint finish (Level 4)			
External Finish Set joints and apply a standard texture coating system finish			

Panels can be custom specified to increase thermal and acoustic properties. Refer to the Ritek® Wall System Design and Detailing Manual for further information and fire ratings.

Meets the relevant requirements:

- **AS3600:2018** - Concrete structures
- **AS3610.1:2018** - Formwork for structures
- **Deemed non-combustible according to AS 1530.1:1994** - Fire tests on building materials
- **NCC 2022 Vol1 & Vol2** - Building Code of Australia

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Ritek® Wall Systems - Notes

Ritek® Wall Systems – Panel Brace

Wind Loading

The bracing requirements shown in this manual are based on the following ultimate wind loading parameters according to AS 1170.2-2011 for temporary construction supporting a free standing wall:

- Annual Probability of Exceedance = 1/100.
- Terrain Category = 3.
- Net pressure factor Cp,n = 1.2.
- Wind Region = A with Shielding Factor (M_s) = 1.0.
- Wind Region = B with Shielding Factor (M_s) = 1.0.

Bracing for applications outside the above wind loading conditions shall be specified on a per project basis.

Bracing Configuration

Unsupported end walls are outside the scope of this document.

FIGURE 1.A: BRACE POSITIONING

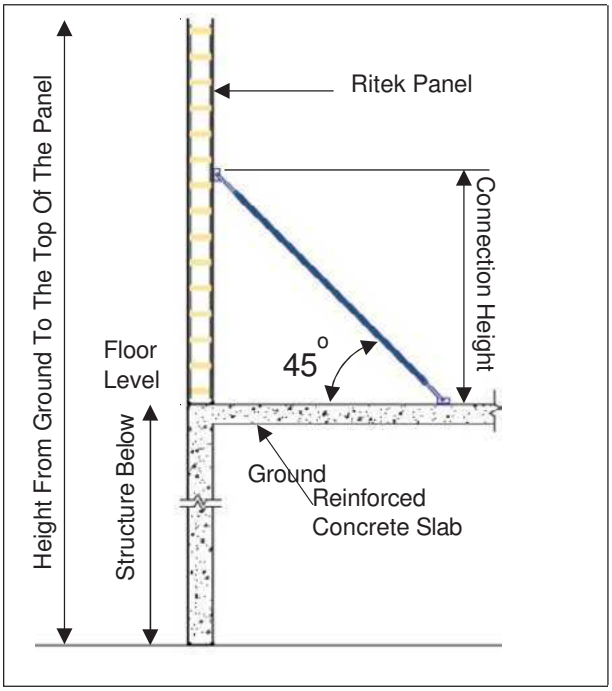
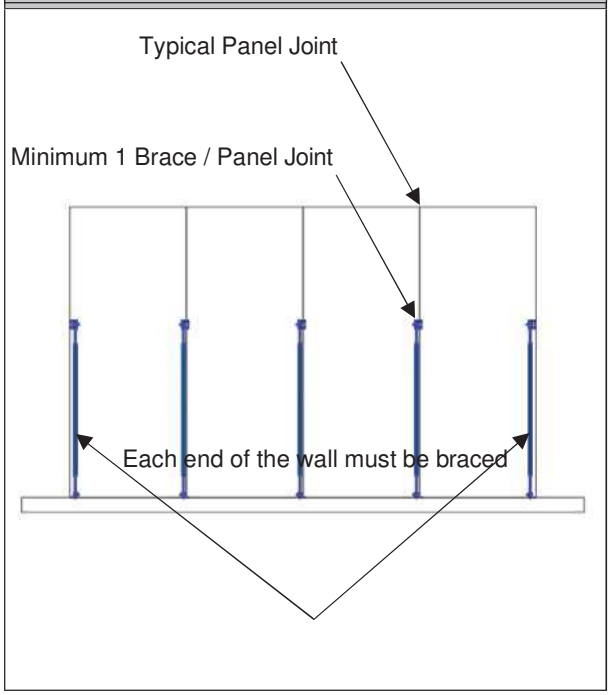


FIGURE 1.B: NUMBER OF BRACE



Fixing Hardware:

Fixing to Slab : 1-off 10mm x 60mm Hex Head Concrete Screw Anchor (Refer to Figure 3).
Direct Fixing to Panel : 4-off ITWProline Zenith 12g-14 x 35mm Hex Head Tek Screws.
Fixing to Panel with Adapter Plate : 4-off ITWProline Zenith 12g-14 x 35mm Hex Head Tek Screws.
Adapter Plate Specification : Refer to Figure 6

Connection Height:

The connection height shall be the minimum as stated in Figure 4.B and 5.B or the top of the panel.

Example 1:

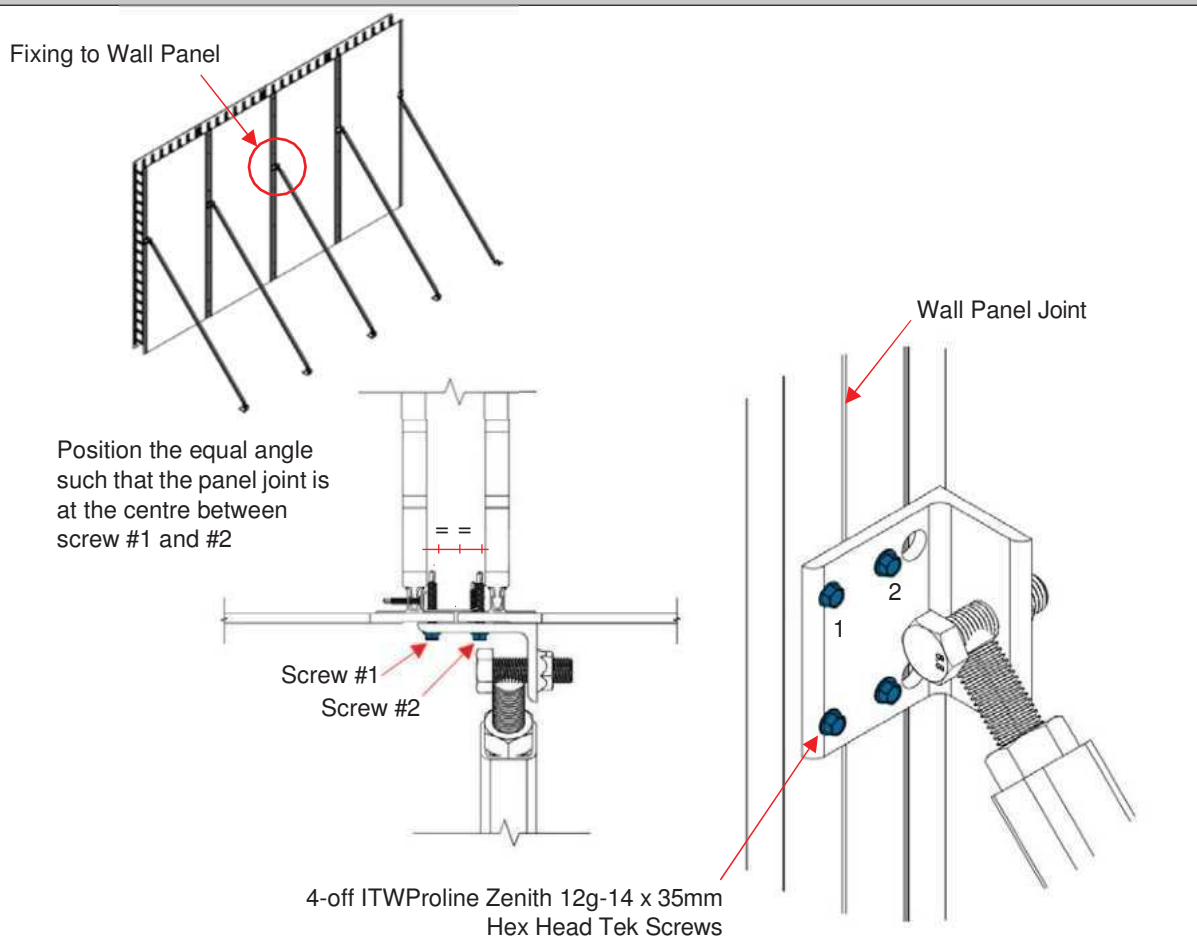
- Wind Region B
- Panel Height = 3.5 metre
- Height from the ground to the top of the panel: 10 metre.
- Minimum brace height according to Figure 5.B = 2.0 metre or the top of the panel.
- Minimum adopted brace height = 2.0 metre because the panel height is more than 2.0m.

Example 2:

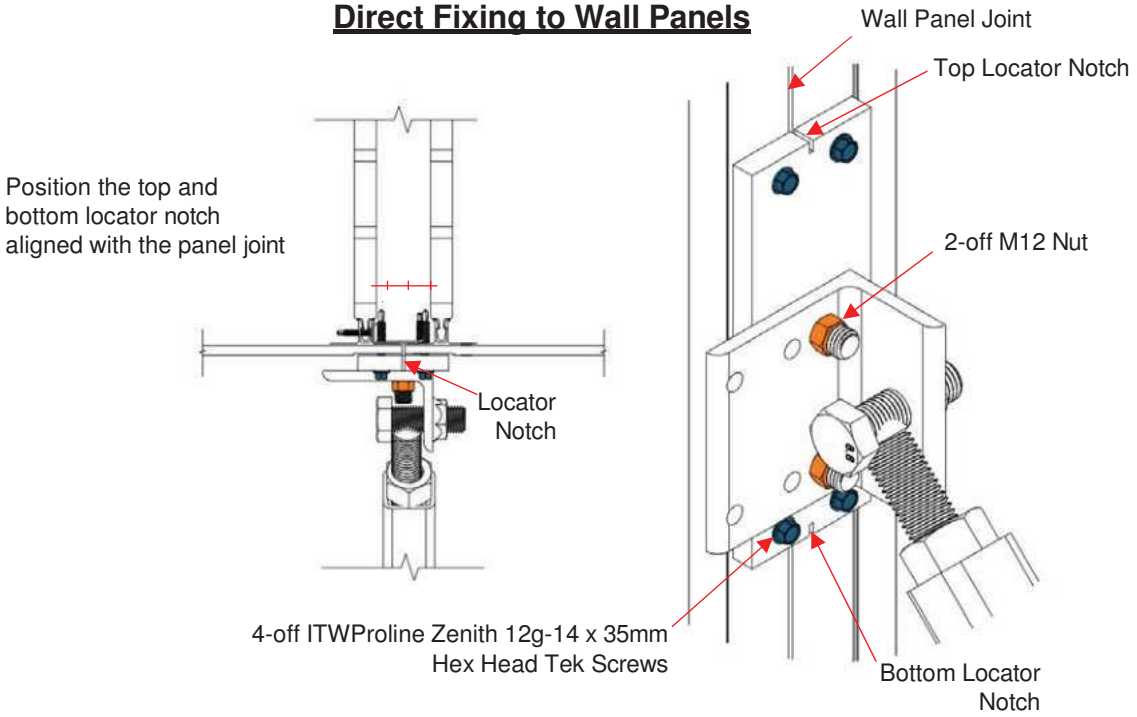
- Wind Region B
- Panel Height = 3.0 metre
- Height from the ground to the top of the panel: 30 metre.
- Minimum brace height according to Figure 5.B = 3.2 metre or the top of the panel.
- Minimum adopted brace height = 3.0 metre (top of the panel) because the panel height is less than 3.2m.

Ritek® Wall Systems – Panel Brace

FIGURE 2: RITEK® WALL SYSTEM - FIXING THE PANEL BRACE TO THE WALL PANEL



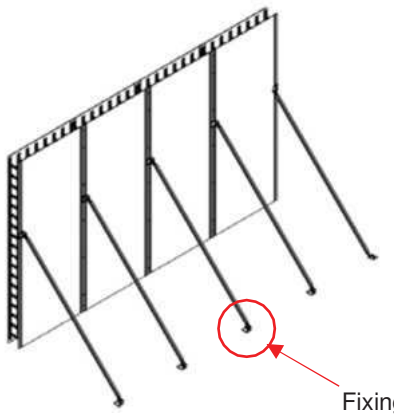
Direct Fixing to Wall Panels



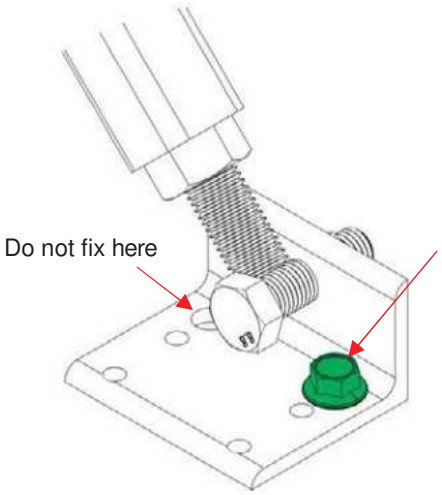
Fixing to Wall Panels with Adapter Plate

Ritek® Wall Systems – Panel Brace

FIGURE 3: RITEK WALL® SYSTEM - PANEL BRACING CONNECTION DETAILS



Fixing to Reinforced Concrete Slab



Fixing to Reinforced Concrete Slab

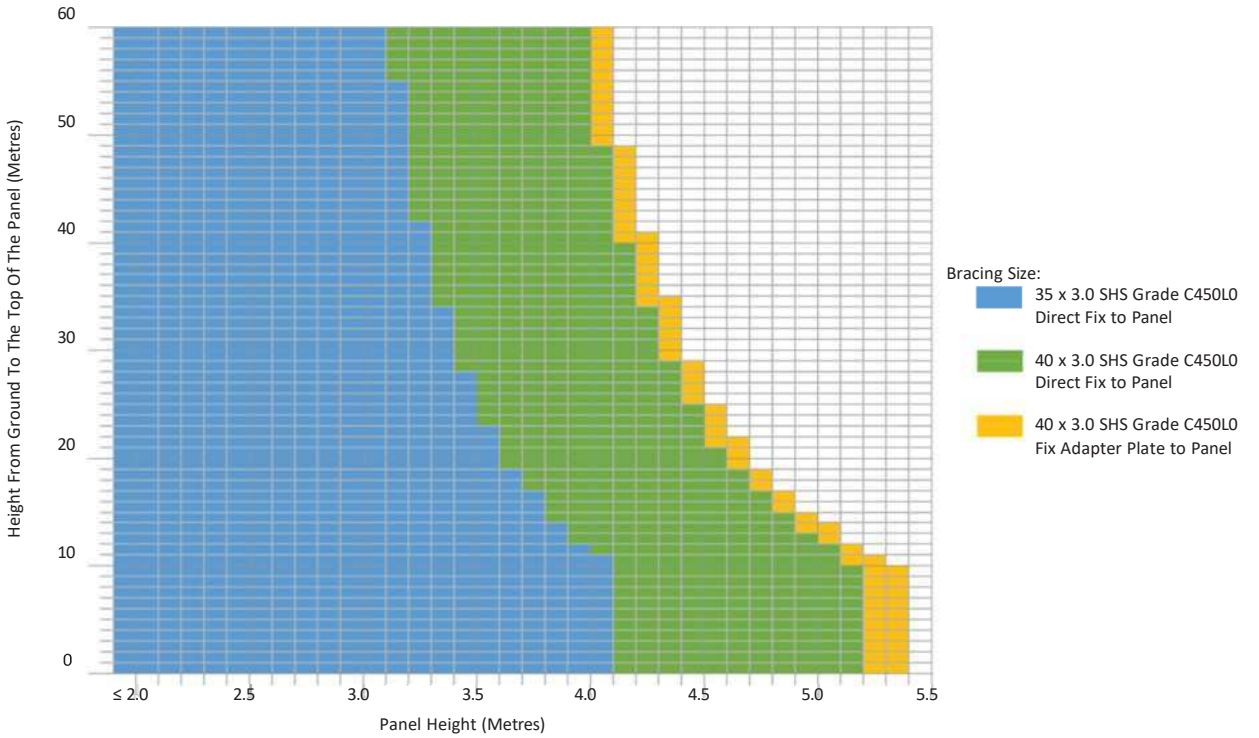
1-off M10 x 60mm Hex Head Concrete Screw Anchor.
Minimum Ultimate Limit State Load:
Shear = 5.5kN Minimum.
Tension = 5.5kN Minimum.

Examples of suitable anchors for minimum 100mm edge distance into 25MPa concrete*:
Ramset™ M10 x 60mm AnkaScrew™ Screw-In Anchor.
Powers M10 x 60mm Hex Head Blue-Tip Screw-Bolt™.

*Always refer to the technical and installation specifications from the concrete anchor supplier.

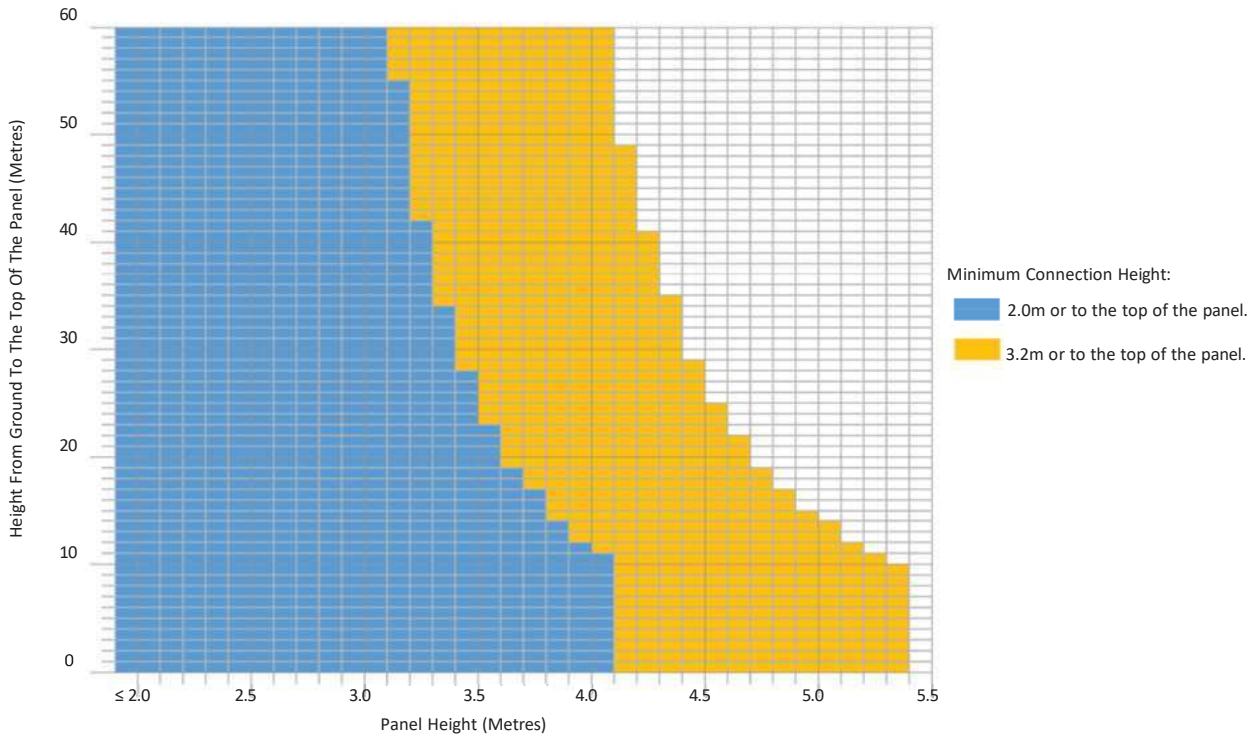
Ritek® Wall Systems – Panel Brace

FIGURE 4.A: Minimum Panel Bracing Size & Connection Type For Wind Region A



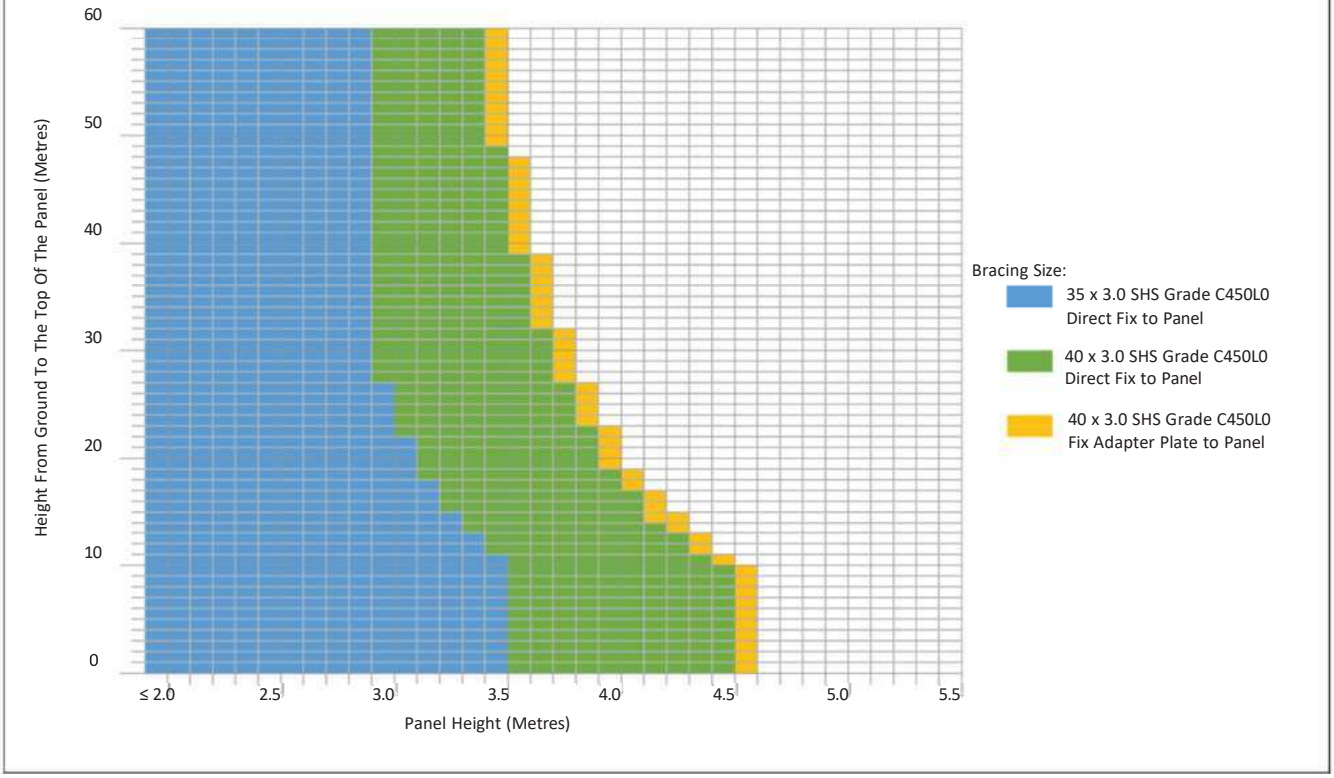
Ritek® Wall Systems – Panel Brace

FIGURE 4.B: Minimum Bracing Connection Height For Wind Region A



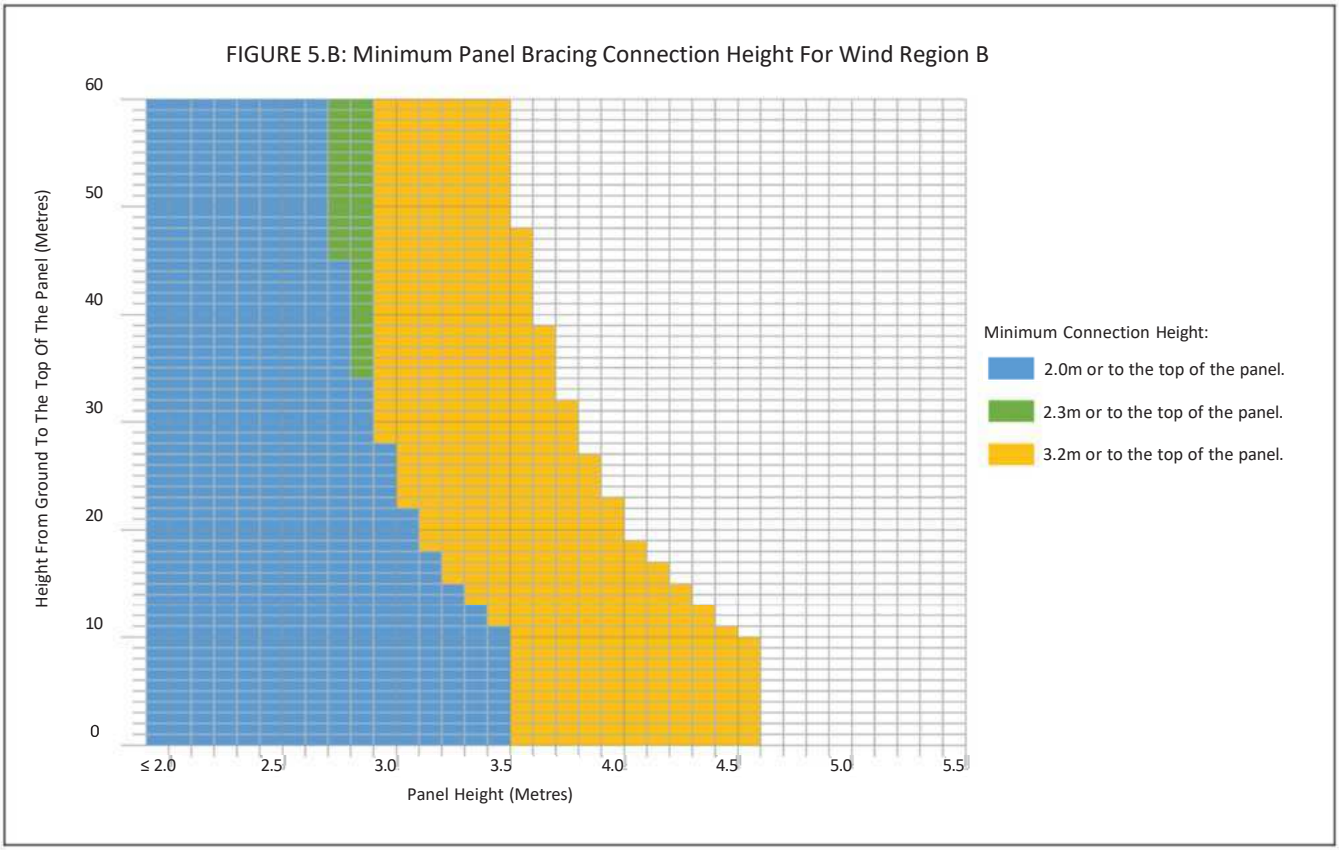
Ritek® Wall Systems – Panel Brace

FIGURE 5.A: Minimum Panel Bracing Size & Connection Type For Wind Region B



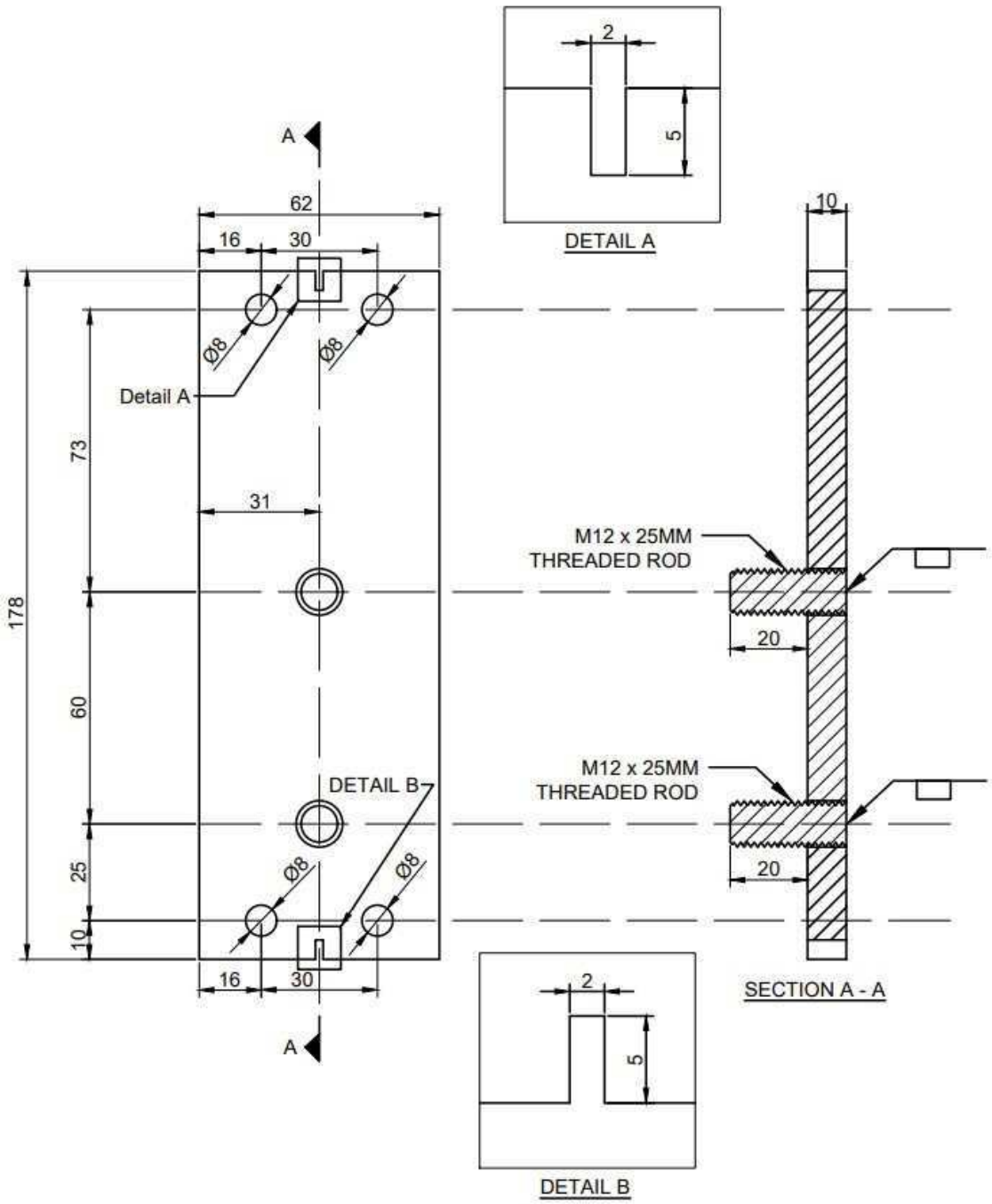
Ritek® Wall Systems – Panel Brace

FIGURE 5.B: Minimum Panel Bracing Connection Height For Wind Region B



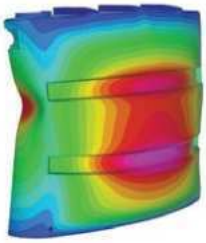
Ritek® Wall Systems – Panel Brace

FIGURE 6: RITEK® WALL SYSTEM – ADAPTER PLATE DETAILS



Notes:

- All Dimensions in Millimetres.
- Plate Material: Grade 350 Min.
- Threaded Rod Material: Grade 4.6 Min.



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2017-42-LO-23

27 March 2018

Steve Terzian
Technology Pty Ltd
19 Lowermill Road
Cooroy QLD 4563

Dear Sir,

CERTIFICATION OF RITEK TEMPORARY BRACING MANUAL
REVISION 1

We certify that we have undertaken a review of the Ritek Bracing Manual (RBM) and in particular Figures 2 and 3 (see Appendix A) which denote bracing requirements for Ritek wall panels of varying heights and distances from ground level.

Our assessment is reliant upon the following information and design standards:

- James Hardie "Ritek Bracing Manual for Certification" dated 8 March 2018.
- James Hardie Ritek Bracing connection test data “180112_Test Post Processing”.
- AS/NZS1170.0-2002 Structural design actions, Part 0: General Principles.
- AS/NZS1170.2-2011 Structural design actions, Part 2: Wind Actions, adopting the following design parameters:
  - Maximum Ritek Wall Panel Width = 1.2m.
  - Annual Probability of Exceedance = 1/100.
  - Terrain Category = 3.
  - Net Pressure Coefficient, $C_{p,n}$ = 1.2.
  - Wind Regions A and B.
- AS 4100-1998 Steel Structures.

We certify that the information contained within Figures 2 & 3 of the RBM have sufficient design capacity to satisfy the abovementioned Australian Standards.

The validity of this certificate shall cease in the following circumstances:

a. Installation of any of the bracing in a manner which is inconsistent with either that specified in the RBM or the associated Technical Specification/product literature.

b. In circumstances where any of the bracing components including the fasteners and connection plates has been manufactured using materials of grades different to that indicated in the RBM or that used during the tests.

c. In circumstances where the bracing system is used in wind regions other than that indicated in the RBM or that mentioned above in this certificate.

d. In circumstances where the bracing system is used for a period of more than 6 months.

It is noted that this certificate only relates to the performance of the Ritek Panel Bracing fixed to the Ritek Panels. The performance of the panel itself is outside the scope of this certification.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

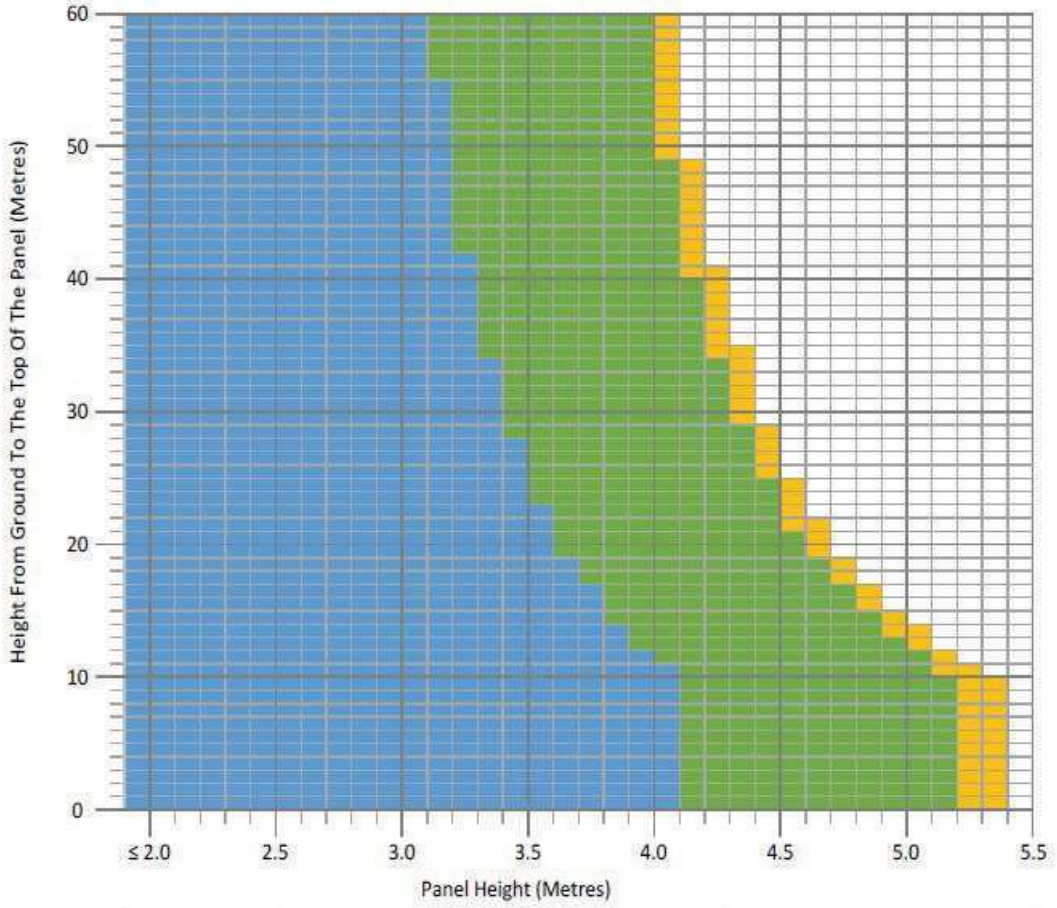
Yours faithfully,

DAVID BENEKE
Director
for David Beneke Consulting Pty Ltd

APPENDIX A

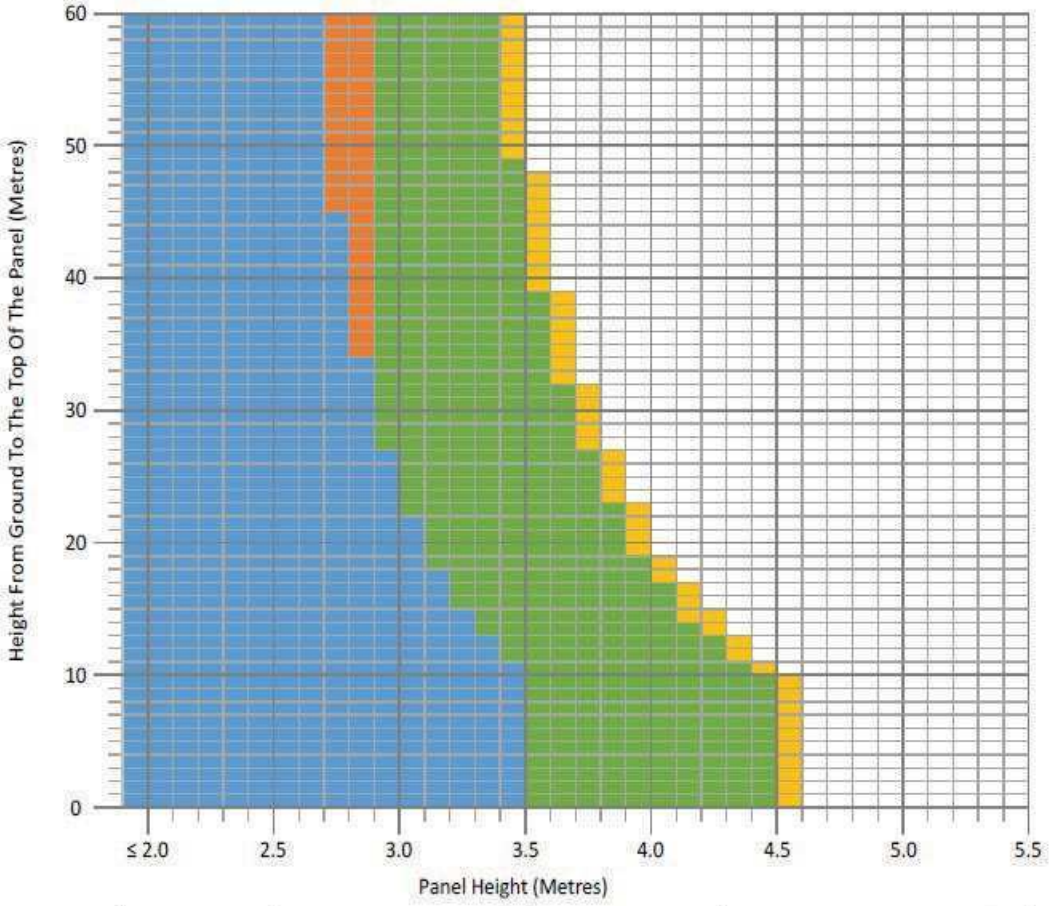
RITEK TEMPORARY BRACING DESIGN TABLES

Figure 2: Minimum Panel Bracing Size, Connection Type, And Connection Height For Wind Region A

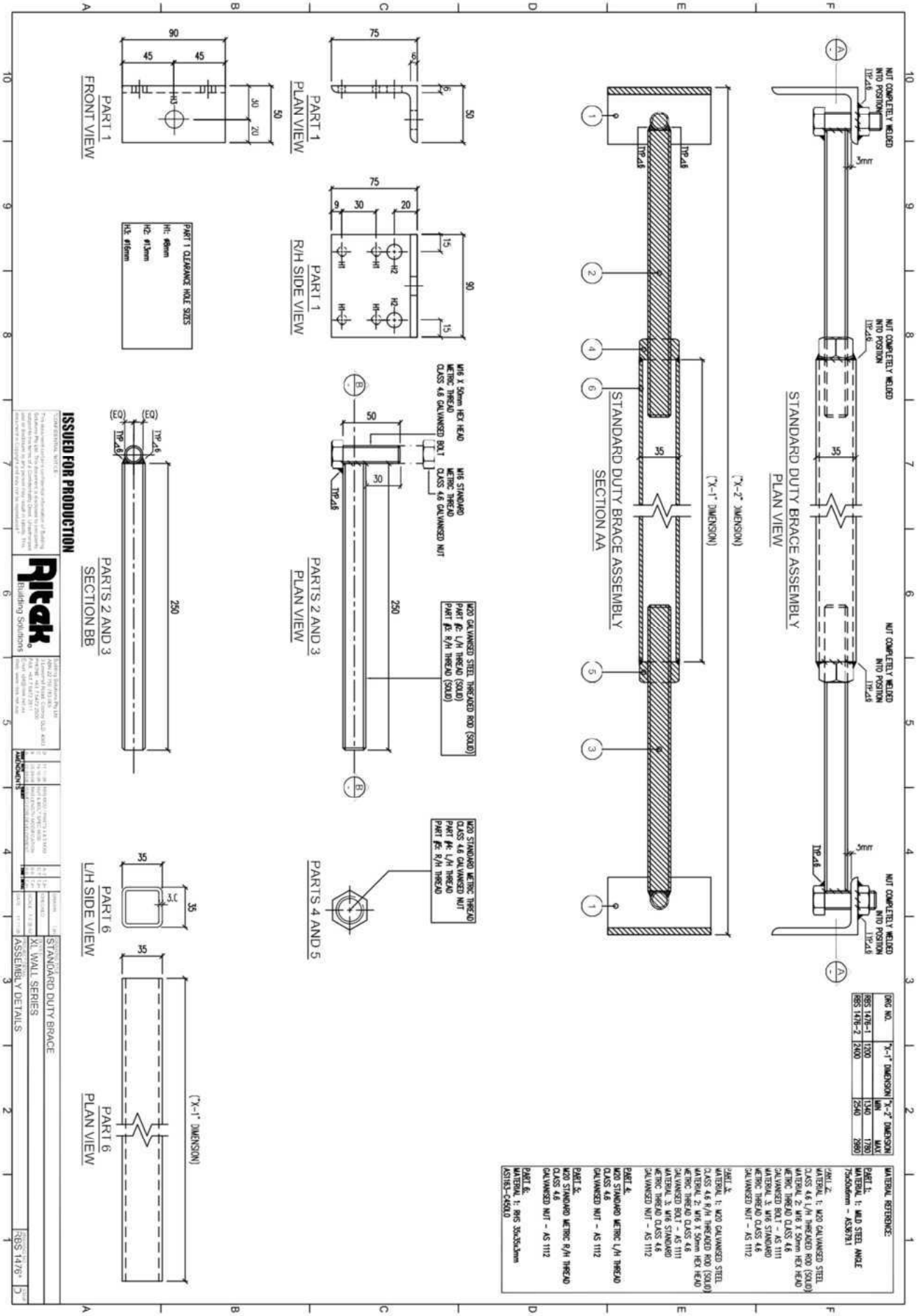


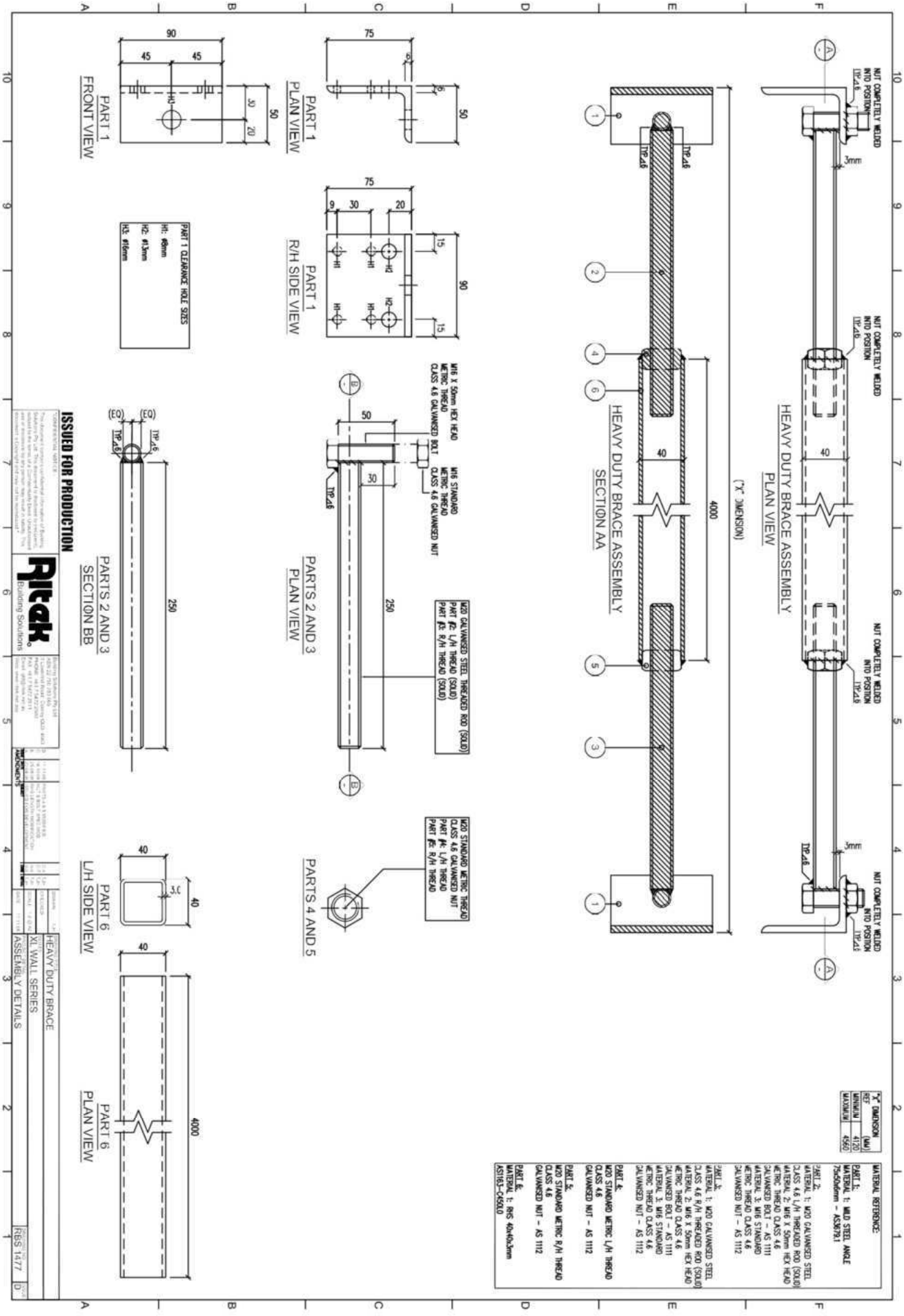
Legend	Bracing Size	Fixing to Panel	Minimum Connection Height
	35 x 3.0 SHS Gr. C450L0	Direct Fix	2.0m or to the top of the panel
	40 x 3.0 SHS Gr. C450L0	Direct Fix	3.2m or to the top of the panel
	40 x 3.0 SHS Gr. C450L0	With Adapter Plate	3.2m or to the top of the panel

Figure 3: Minimum Panel Bracing Size, Connection Type, And Connection Height For Wind Region B



Legend	Bracing Size	Fixing to Panel	Minimum Connection Height
	35 x 3.0 SHS Gr. C450L0	Direct Fix	2.0m or to the top of the panel
	35 x 3.0 SHS Gr. C450L0	Direct Fix	2.3m or to the top of the panel
	40 x 3.0 SHS Gr. C450L0	Direct Fix	3.2m or to the top of the panel
	40 x 3.0 SHS Gr. C450L0	With Adapter Plate	3.2m or to the top of the panel





SLR

19 September 2023

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ACOUSTIC OPINION - REF001
Ritek XL and X-Plus Wall Systems

SLR Consulting Australia Pty Ltd have been retained to provide acoustical ratings for the Ritek XL Wall Systems.

The Ritek wall panels comprise of 6 mm cement sheet each side of a poured concrete core (minimum density 2200 kg/m³), which comes in six different thicknesses; 115 mm, 135 mm, 150 mm, 165 mm, 200 mm and 265 mm.

Various plasterboard wall lining systems have been considered for each panel thickness, as described below.

Wall Lining	Description
A	Plain wall, no plasterboard facings
B	Resiliently mounted furring channel and insulation to one side of wall: 28 mm furring channel resiliently mounted to create nominal 40 mm cavity. 13 mm standard core plasterboard screw-fixed to channels. Acoustic insulation 40-50 mm thick to cavity, 11 kg/m³ glass fibre or 14 kg/m³ polyester fibre insulation. Lining nominally 53 mm thick.
C	Separate stud and insulation to one side of wall: 20 mm gap between wall and 64 mm steel studs to create 84 mm total cavity. 13 mm standard core plasterboard, screw-fixed to studs. Acoustic insulation 70-75 mm thick to cavity, 11 kg/m³ glass fibre or 14 kg/m³ polyester fibre insulation. Lining nominally 97 mm thick. (NOTE: timber studs not less than 70 mm deep can replace steel studs and maintain acoustic rating)
D	Furring channel and insulation to one side of wall: 28 mm furring channels on Beta-Fix bracket to create nominal 50 mm cavity. 10 mm plasterboard min. density 5.7 kg/m² screw fixed to channels. Acoustic insulation 50 mm thick min. 32 kg/m³ R1.5 glass fibre to cavity. Lining nominally 60 mm thick.
E	Direct fixed plasterboard to one side of wall Direct fixed 10 or 13 mm standard core plasterboard on daubs. Lining nominally 23 mm thick.
F	Resiliently mounted furring channel and insulation to one side of wall (2 layers plasterboard): 28 mm furring channel resiliently mounted to create nominal 40 mm cavity. 2 layers of 13 mm standard core plasterboard screw-fixed to channels. Acoustic insulation 40-50 mm thick to cavity, 11 kg/m³ glass fibre or 14 kg/m³ polyester fibre insulation. Lining nominally 66 mm thick.
G	Furring channel and insulation to one side of wall (2 layers plasterboard): 28 mm furring channels on Beta-Fix bracket to create nominal 50 mm cavity. 2 layers of 13 mm standard core plasterboard screw-fixed to channels. Acoustic insulation 40-50 mm thick to cavity, 11 kg/m³ glass fibre or 14 kg/m³ polyester fibre insulation. Lining nominally 76 mm thick.

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www.slrconsulting.com ABN 29 001 584 612

The acoustic performance of each system with the various facing configurations is provided in the table below. Note the XL and X-Plus wall systems are acoustically equivalent, with the only variation being different spacer materials within the core (plastic for XL, steel and aluminium for X-Plus). This has a negligible affect on the acoustic ratings.

Ritek XL & X-Plus Wall Lining Type	Total Wall Thickness, mm	Sound Insulation Rating, Rw, dB	Sound Insulation Rating, Rw + Ctr, dB
115XL-A	115	48	43
115XL-B	168	54	44
115XL-C	212	62	54
115XL-D	175	53	43
135XL-A	135	50	45
135XL-B	188	54	47
135XL-C	232	62	56
135XL-D	195	53	47
150XL-A	150	51	47
150XL-B	203	55	48
150XL-C	247	63	57
150XL-D	200	54	47
165XL-A	165	50* Equivalent to NCC Deemed to Satisfy 150mm concrete wall panel	50* Equivalent to NCC Deemed to Satisfy 150mm concrete wall panel
165XL-B	218	56	49
165XL-C	262	64	57
165XL-D	225	55	48
200XL-A	200	54	50
200XL-B	253	57	51
200XL-C	297	66	59
200XL-D	260	56	50
265XL-A	265	57	52
265XL-B	318	59	52
265XL-C	362	67	60
265XL-D	325	58	51

*Rating not determined, system is considered equivalent to NCC Deemed to Satisfy concrete panel

Selected systems with plasterboard facings to both sides of the panels are provided below, as indicated by the letter codes (B to G).

Ritek XL & X-Plus Wall Lining Type	Total Wall Thickness, mm	Sound Insulation Rating, Rw, dB	Sound Insulation Rating, Rw + Ctr, dB
150XL-BE	226	54	47
150XL-BG	279	64	52
150XL-CE	270	61	56
150XL-DG	286	64	52
165XL-BE	241	55	48
165XL-BF	284	63	50
165XL-BG	294	65	52
165XL-CE	285	62	56
165XL-DG	301	65	53

Wall Lining Above Ceilings

Generally, all walls are required to be constructed from slab to slab and are to be acoustically caulked as per the manufacturer's specifications. The linings on each face of the panels should typically run through to the soffit, but can potentially be eliminated above the ceiling line if all of the following conditions are met:

- Both sides of the wall must include set plasterboard ceilings.
- Any penetrations in the Ritek panel for services or similar are to be acoustically sealed / treated.
- There are no ceiling penetrations within 1.5 m of the separating wall (unless acoustically treated and approved by an acoustical consultant).
- Any ceiling penetrations in either room either side of the separating wall are no greater than 0.4 m^2 in total combined area (sum of areas if multiple penetrations).
- The Ritek panels are 135 mm thick or greater.

Note also that bare 165 mm thick panels (or greater) achieve the minimum BCA requirements and as such can be left unfaced above the ceiling line.

NOTES

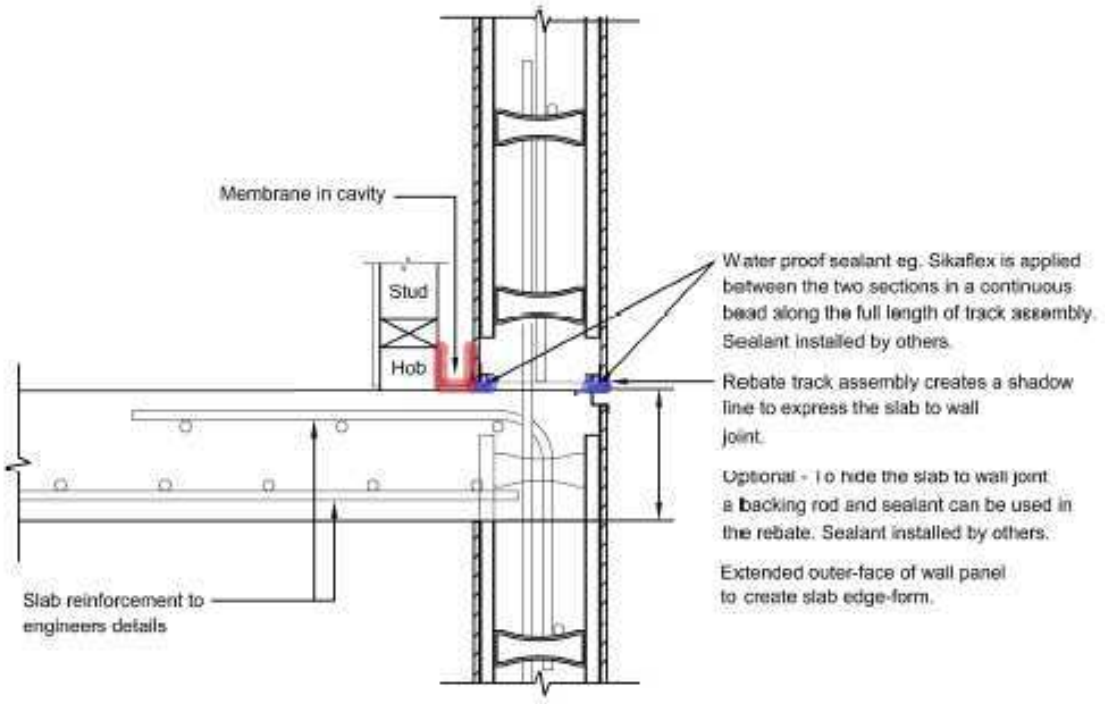
1. The acoustic ratings determined above are based on consideration of laboratory tests of similar systems and other manufacturers, and from theoretical prediction.
2. The Rw (Weighted Sound Reduction Index) is a single number index used to rate the sound insulation of a partition, against noises such as speech, which do not have significant low frequency components. The index given is the expected performance in a laboratory which tests to AS1191 "Acoustics – Method for Laboratory Measurement of the Airborne Sound Transmission Loss of Building Partitions", and determined according to the procedure in AS/NZS ISO 717.1 *"Acoustics - Rating of Sound Insulation Buildings and of Building Elements – Airborne Sound Insulation"*. The rating obtained on a building site, called the Weighted Apparent Sound Reduction Index (R'w) or the Weighted Normalised Level Difference (DnTw) may differ from the laboratory results.

3. C and Ctr are adaptation terms which when applied to the Rw value result in a single number index which provides a more reliable indicator of the ability of the partition to isolate against certain types of noise. In particular, the Rw combined with the Ctr value gives a more reliable indicator of the ability of the partition to isolate against traffic noise, or noise containing low frequency components. Refer also to AS/NZS ISO 717.1 *"Acoustics - Rating of Sound Insulation Buildings and of Building Elements – Airborne Sound Insulation"*.
4. The expected tolerance is ±2dB for Rw and ±3dB for Rw + Ctr. This allows for variations in the test method, the difference between laboratories and the accuracy of the estimating techniques.
5. The opinions are based on the wall being of good construction and assume the face joints finished, the perimeters acoustically caulked and that there are no acoustical weaknesses in the wall etc.

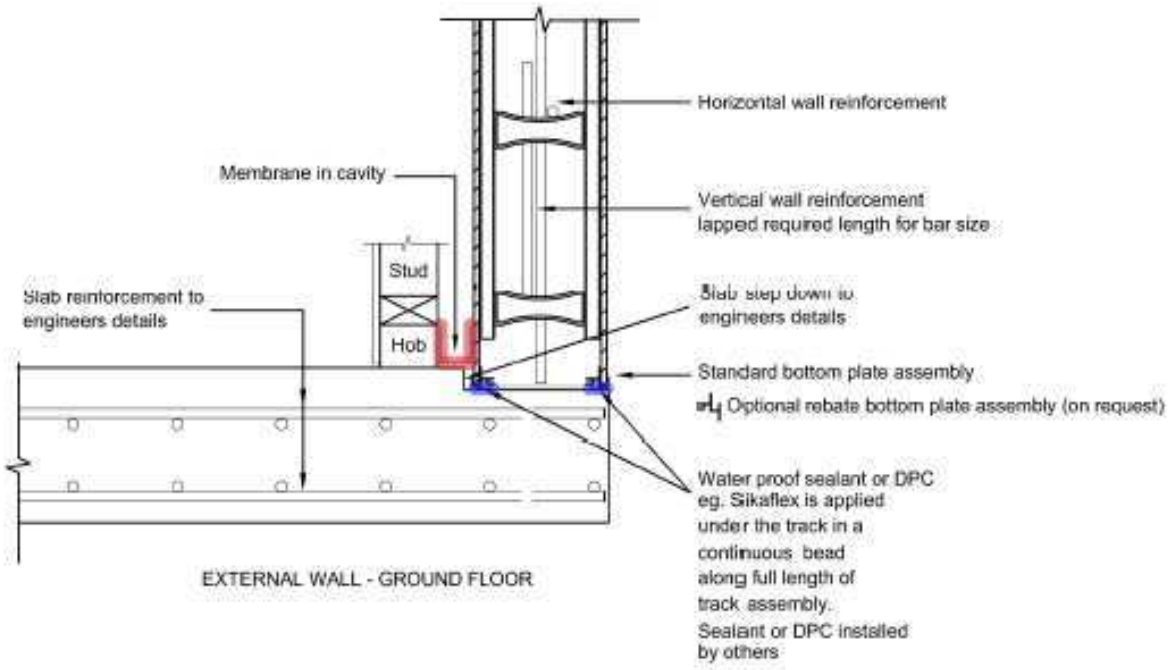
Prepared by:

Jim Antonopoulos, BAppSc, MAAS
Technical Director – Acoustics, SLR Consulting Australia Pty Ltd

Reviewed by: DW/TT



EXTERNAL WALL



EXTERNAL WALL - GROUND FLOOR

Floor/Wall Junctions - Typical Detail

ISSUE	DATE	SUBJECT	
A	19.04.23	ISSUED FOR INFORMATION	JSK

Ritek SYSTEMS

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ABN 18 642 239 585
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PHONE: 1300 152 857
Email: info@ritek.com.au
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DRAWN	JPR
CHECKED	JSK
SCALE	NTS
DATE	19.04.23

SECTIONAL ELEVATIONS

SHEET 69

DRAWING NO. RS 1526-69

ISSUE A

TECHNICAL UPDATES

Ritek Systems Pty Ltd
www.ritek.com.au
1300 152 857

XL Wall Panel

X-Plus Wall Panel

Ritek® Wall System
Multi-residential
Rumba Resort, Caloundra, QLD

The luxury 5-Star Rumba Resort in Caloundra was built using 13,000m^2 of Ritek® Wall System. The main structure consists of three buildings over one podium; two four storey and one five storey. Other structural elements which used the Ritek® Wall System included three levels of basement perimeter walls, lift shafts, balustrades and a suspended pool. The Lower basement was constructed 1.5 metres under the water table and was designed in conjunction with a solid core crack inject

> I am very pleased with the savings I made from the reduced interest (as a result of the speed of construction and being able to construct during 'the wet') which amounted to well over $500k. The building has also been finished beautifully which is a testament to the performance of the new panel design.

Michael Milatos, Director
CENTO Builders and Developers
Project: Oasis on Woods St, Darwin CBD

Ritek Systems Pty Ltd
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Ritek® Wall Systems
Design, Detailing & Installation Manual
Version Jan 2025