



enviro square

KAPO Board Technical Manual

2014 September






enviro square

Introduction	3
Product accessories	4
Specific Requirements of the NZ Building Code	5
Product dimension	6
Product features	6
Verification of compliance	7
The model of safe environmental position	8
Fixing and jointing	8
How to install product	8
Installation drywall	9
1. Jointing internal wall	10
2. Jointing treatment (seaming)	10
3. Jointing partition	11
4. Jointing external wall	11
5. Typical layout of sheet metal framework	13
6. Installation concrete ceiling	15
7. Installation corner joint	14
8. Installation "T" section	16
9. Installation door frame reinforcement	17
10. Window opening frame reinforcement	17
11. Finishing interior wall	18
References	20

INTRODUCTION

Enviro Square Ltd's KAPO mineral board sheet is manufactured from non-toxic minerals that provides excellent fire, sound, moisture and mould resistant properties. Used extensively overseas as an alternative to fibre-cement and plaster based boards, KAPO Board is an ideal choice for interior and exterior lining solutions. The board is supplied in a number of thicknesses 6mm, 9mm and 12mm, allowed number of uses such as; interior wall lining, partition walls, soffits and exterior cladding. Due to the nature of the manufacturing process and the product itself, one side of the board is smooth while the other is slightly rough enabling easy installation and correct placement. This smooth finish, with its low moisture absorption value allows KAPO Board to be used in wet areas, such as bathrooms and kitchens.

KAPO Board is deemed a Light Wall Cladding material based on NZS3604, being approximately 10kg/m² (~30kg for a 2.4m x 1.2 sheet 10mm thick). Board sizes are typically supplied as 2.4m x 1.2m in size, covering the complete range of 6, 9 and 12mm thicknesses. Also with a density of 1.03, KAPO Board is easy to cut to size using wood saws and drills enabling quick installation. Fixing is by way of galvanized clouts or Fibre Tek screws onto timber or lightweight steel framing, with joints then either flush filled or taped prior to application of the finishing surface. For interior use the board joints are usually filled with an Enviro Square approved jointing product to suit the bevelled edge.



KAPO CALCIUM S

PRODUCT ACCESSORIES

Products below has been tested and approved by vendors and Enviro Square.

Joinery from Wholesale Insulation Ltd (Palmerston North):

Ace Water proof jointing tape*

Finishing from KAPO Easy Mix Plaster lime finish 25KG* (manufactured by Nu Age, Hamilton).

Adhesive products from CEMIX, Auckland:

Rubberflex*

highly flexible, polymer engineered and rubber modified, cement based adhesive used for most internal external wall and floor applications

Hiflex White*

Multi-purpose highly flexible tile adhesive

Enviroflex*

Premium grade highly flexible polymer engineered recycled rubber modified grey cement based water resistant adhesive

Cemlastic*

Latex primer & additive

Rocket Adhesive*

is a one part, highly flexible, polymer engineered and cement based adhesive, with a rapid setting time of 2 hrs

Super Primer*

Solvent free specialty primer

*Data sheets available online at www.kapoboard.com/finishing

SPECIFIC REQUIREMENTS OF THE NZ BUILDING CODE

Clause B1.3.3 - Structure The KAPO Board when used as part of an exterior cladding that is designed and installed in accordance with the manufacturer's instructions must meet Performance B1 of the NZBC . In other words, the building and building elements shall withstand the combination of loads that they are likely to experience during construction or alteration and throughout their lives.

Clause B2.3.1 (a) - Durability The KAPO Board, when used as part of an interior lining or interior cladding that is designed and installed in accordance with the manufacturer's instructions must meet Performance B2 of the NZBC. In other words, the building system will satisfy the performance requirements of the code for not less than 50 years.

Clause E2.3.2 – External Moisture The wall system, when used as part of an exterior cladding that is designed and installed in accordance with the manufacturer's instructions must meet Performance E2 of the NZBC. In other words, roofs and exterior walls must prevent the penetration of water that could cause undue dampness, damage to building elements, or both.

Clause F2.3.2 – Hazardous Building Materials Building products must not contain hazardous materials, to comply with clause F2.3.2 of the Building Code.

Clause G6.3.1 – Airborne and Impact Sound Walls, floors and ceilings must not have transmission class of less than 55.

SCOPE & LIMITATIONS

FRAMING KAPO Board must be used in conjunction with timber framing and other components of a wall assembly that comply with NZS3604 or in place of timber framing, with lightweight steel framing that complies with NASH 3405, in all respects except as varied herein, in order to meet the Performances of the Building Code claimed in this Appraisal.

INTERIOR FINISHES KAPO Board has been appraised to be used as an interior lining relying on 400mm or 600mm stud centres or ceiling joist centres for framing and using either 6 or 9mm thick board.

This appraisal is limited to the boards and nominated jointing systems only and excludes any finishing system, such as plastered finishes or tiling systems, which must comply with the relevant clauses of the New Zealand Building Code.

EXTERIOR FINISHES KAPO Board has been appraised as a Light Wall Cladding as defined in NZS3604 relying on 400mm or 600mm stud centres or soffit joist centres for framing and using either 9 or 12mm thick board.

This appraisal is limited to the boards and nominated jointing systems only and excludes any finishing system, which must comply with the relevant clauses of the New Zealand Building Code.

The KAPO Board is to be installed by trade qualified builders.

TECHNICAL DATA

PROPERTIES	KAPO BOARD	UNIT	TEST METHOD
Normal density	1.03	g/cm ³	CECS95:97
Surface alkalinity	Between 10-11	pH	
Mass-loss in water	5.5	%	CECS95:97
Water absorption	29.6	%	CECS95:97
Bending strength	18.2	MPa	CECS95:97
Asbestos	100% Free	%	
Moisture exposure expansion rate	<0.07	%	
Heat exposure deformation rate	0.4	%	

PRODUCT DIMENSIONS

	Weight	Width (mm)	Height (mm)	Thickness (mm)
Partition wall & Ceiling		2400	1200	4.5 - 18
Suspended ceiling		610	610	6 - 9
		1200	610	6 - 9
Roof Eaves facial Board		2400	250	12 - 18
		2400	250	12 - 18
Tolerance		+ - 0.5	+ - 0.5	+ - 0.5

PRODUCT FEATURES

Fire rated, non Combustibility The advantages of KAPO BOARD are light, fireproof and waterproof.

Superior Moisture and Mold Resistance KAPO will not rot, physically deteriorate, highly resistant to the effects of moisture. It absorbs moist and regains its full strength upon drying without changes to the long term performance of the board.

Chemically stable Board are produced from natural, inorganic raw materials and chemical reaction is irreversible which results in a chemically stable board that is hard but flexible, a strong board that maintains its strength over time.

Tool friendly Can be sawed and drilled.

Good thermal properties KAPO Board has less ability to transmit heat and is efficient thermal insulation. Safe to work with, containing no hazardous materials and 100% Asbestos free.

Resistant to climatic conditions and moisture Tested to many cycles of soaking, freezing, heating (freeze/thaw test method). The boards to showed no cracking, crumbling nor disintegration for applications within normal specifications, the life span of the board is limited only by the durability of the supporting structures and the materials used in fixing.

Easy to work and fix KAPO Board has excellent workability that can be cut, drilled, sanded and worked with proper tools and machinery. Can be nailed or screw. Can be tiled and easily decorated.

Highly resistant and termite attack free Unlike plywood or wood based boards that harbors insect, mildews, molds, fungus and bacteria. KAPO BOARD maintains the beauty, cleanliness and healthy surroundings in your particular application.

20 Years durability Must adhere to manufacturer recommended maintenance programme.



VERIFICATION OF COMPLIANCE

Methods Used for Verification

- Testing and assessment by BEAL Testing Services
- In service history - over 10 years overseas.

BEAL Testing Service’s Appraisal C820 uses the in-service history provided by the manufacturer, together with the Compliance Verification Procedure – a method for demonstrating compliance with the performance requirements of the NZ Building Code - as the ‘methods’ for demonstrating compliance with the relevant clauses of the Building Code. [Methods suggested by the Department of Building and Housing]

Test	Method	Criteria	Result
Board strength (bending)	AS/NZS 2908.2	< 0.5% w/w	Pass
Moisture Permeability	AS/NZS 2908.2	< 0.5% w/w	Pass
Drying Shrinkage	AS/NZS 2908.2	< 0.5% l/l	Pass
Warm Water	AS/NZS 2908.2	< 0.5% w/w	Pass
Freeze-Thaw conditioning of board	Ad hoc method	No deterioration	Pass
Wet & Dry Fixing Pull-through testing	Ad hoc method	<10% reduction	Pass
Compatibility with tile adhesives (tensile adhesion test)	ASTM C297 (mod)	>0.5MPa	Pass

NOTE: For information about AS/NZS Test Methods, refer to www.standards.co.nz

Reference Information

- AS/NZS 2908.2, Cellulose-cement products Part 2: Flat boards
- ASTM C297-94, Standard Test Method for Flatwise Tensile Strength of Standard Constructions
- NZS3604, Timber Framed Buildings
- NASH 3405:2006, Steel Framed Buildings
- Peer review report from Redco Chartered Professional Engineers
- Peer review by Marshall Day Acoustic Engineers
- Technical literature provided by the manufacturer
- BEAL Test Report TR080829d Wet & Dry Pull-through properties
- BEAL Test Report TR080919a Fixing strength properties
- BEAL Test Report TR080919b Water resistance properties
- BEAL Test Report TR081103 Compatibility with render properties
- BEAL Test Report TR081208a Fixing strength properties
- BEAL Test Report TR090126 Expansion properties
- BEAL Test Report TR090213c Suitability for tiling over properties

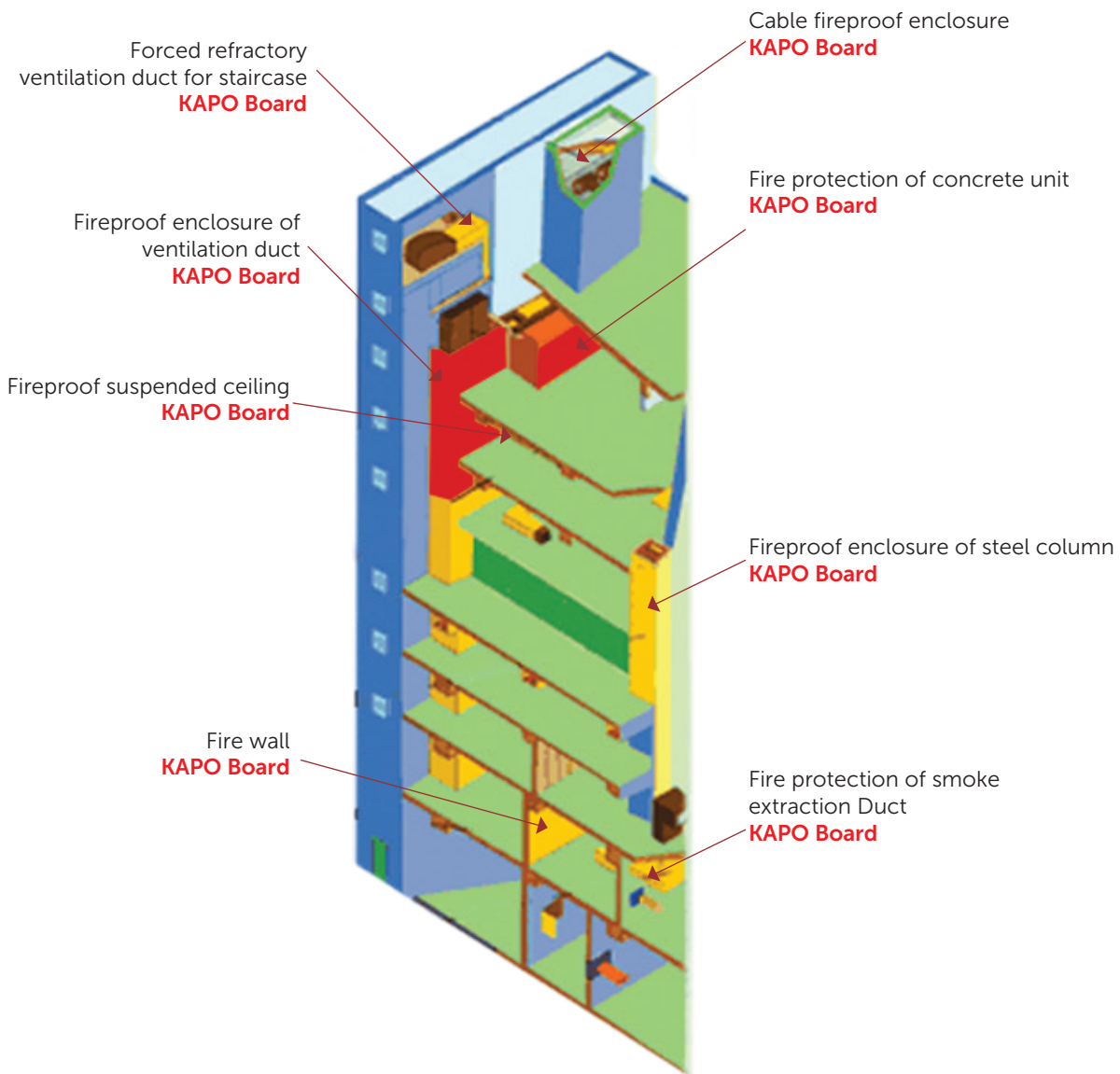
STORAGE AND HANDLING

Storage and handling The KAPO Board is supplied shrink wrapped stacked on pallets and can be stored indefinitely when kept dry and out of the weather and safe from accidental damage. - External moisture

Safe handling Individual boards should be stacked and handled carefully to avoid damage. RMS boards should be lifted from the pallet by sliding board sideways and carrying on long edges.

Storage and transport Keep dry and store in dry and covered area, if product becomes wet allow to dry before fixing is recommended. KAPO is supplied on wooden pallets with support timbers at maximum 400mm centres. Ensure product is stored on EVEN ground.

THE MODEL OF SAFE ENVIRONMENTAL PROTECTION



KAPO Board can be use in hospital, Hotel, Condominium or Warehouse

KAPO Board can be apply as Basement carpark air Ducting, Ceiling, Roof insulator and Roof Eaves facial board

FIXING AND JOINTING (BASIC INSTALLATION DETAIL)

Fixing Method Fixing to timber framing shall be by way of 40mm galvanised clouts complying with NZS 3604 at 200mm centres. Fixing to steel framing shall be by way of 20mm Fibre Tek screws. It is essential that the fixings are not closer than 12mm from the edge of the sheets and not over tightened.

Power Tools Both manual or power tool methods of fixing the nail into the sheet are acceptable using a flat head stainless steel nail. The diameter should be 2.2mm or 3.1mm with a length of 3 to 3.5 times the panel thickness. Set the power tools to 3 to 4 BAR and fine tuned to achieve required penetration. It is essential to align the sheet edge onto the center of the timber or steel structure. KAPO Boards should be installed on studs at a maximum of 600 mm.

Cutting Cutting can be done either longitudinally or traverse. A cut should be made on the top side of the board by means of a cutter or knife. The boards should then be pressed with both hands, cut and then snapped over a straight edge. For smooth, clean cuts use a circular saw (at least 120 carbide teeth) and set the speed above 3000 rpm.

Sawing Can be easily cut using a normal saw, fret saw or an electric saw. When large quantities of the boards are to be cut, the use of circular hand saw is advisable. Appropriate safety equipment should be worn.

Drilling Use masonry drills to countersink or drill screws. Place the boards on a solid support for a clean hole.

Sheet Joints KAPO Boards are suitable for mounting to both timber and metal framing. Studs are recommended at a minimum of 400mm centres. A sufficient gap between the joint 2 boards is required, nominally 4 mm.

Support Structures KAPO Board sheets shall be supported by framing members spaced at no more than 600mm centres for both 6mm and 9mm thickness.

HOW TO INSTALL THE PRODUCT

Fixing to timber framing shall be by way of 40mm galvanised clouts (complying with NZS 3604) at 200mm centres. Fixing to steel framing shall be by way of 20mm Fibre Tek screws. It is essential that the fixings are not closer than 12mm from the edge of the sheets and not over tightened. It is essential that the fixings are not closer than 12mm from the edge of the sheets and not over-tightened. All details of the construction and installation of the KAPO Board as an interior or exterior lining, must comply with NZS3604 except where varied by this Technical Manual. Joints between boards are to be filled using Enviro Square approved jointing product, which may be applied by machine or by hand tool to a smooth finish Where an external render system is to be applied, the joints may be sealed in both the vertical and horizontal directions by way of Ace Water proof jointing tape. There is a Technical Manual describing the correct method of installation of this tape

FRAMING KAPO Board must be used in conjunction with timber framing and other components of a wall assembly that comply with NZS3604 or in place of timber framing, with lightweight steel framing that complies with NASH 3405, in all respects except as varied herein, in order to meet the Performances of the Building Code described in this Technical Manual.

INSTALLATION DRY WALL

Galvanised steel channel sections, 30mm x 67mm x 30mm x 0.8mm thick, shall be fixed on the floor and ceiling, using 22mm anchor fixings, set at 600mm centers and inset 305mm from the vertical edges do the partition.

Galvanised steel studding, 35mm x 65mm x 35mm x 0.8mm thick, Shall be installed vertically in the top and bottom track at 2400mm interval, allowing a 15mm gap at the top of each stud for expansion. The stud forming the restrained edge of the partition, shall fixed to frame using 22mm anchor fixings at 1,220mm centers inset 600mm ad 610mm from the top and bottom of the partition fixed (unstrained edge) as required by the standard.

One layer of KAPO Board shall be fixed onto each face of the steel frame, with the joints on each face staggered by countersunk self-tapping screws, 4mm diameter x 25mm long, at nominally 400mm intervals. The boards shall not be fixed by any screws on the bottom frame on the floor.

Slabs of mineral wool fiber shall be then cut to size and interference fitted into the steel channel sections such that original faces of Rock wool slab shall be parallel to the clad exposed face boards.

Two layers of nominal 30mm thick mineral wool slabs shall be then interference fitted between the studs to give total thickness of 60mm (2x30mm) and a vertical displacement between horizontal joints.

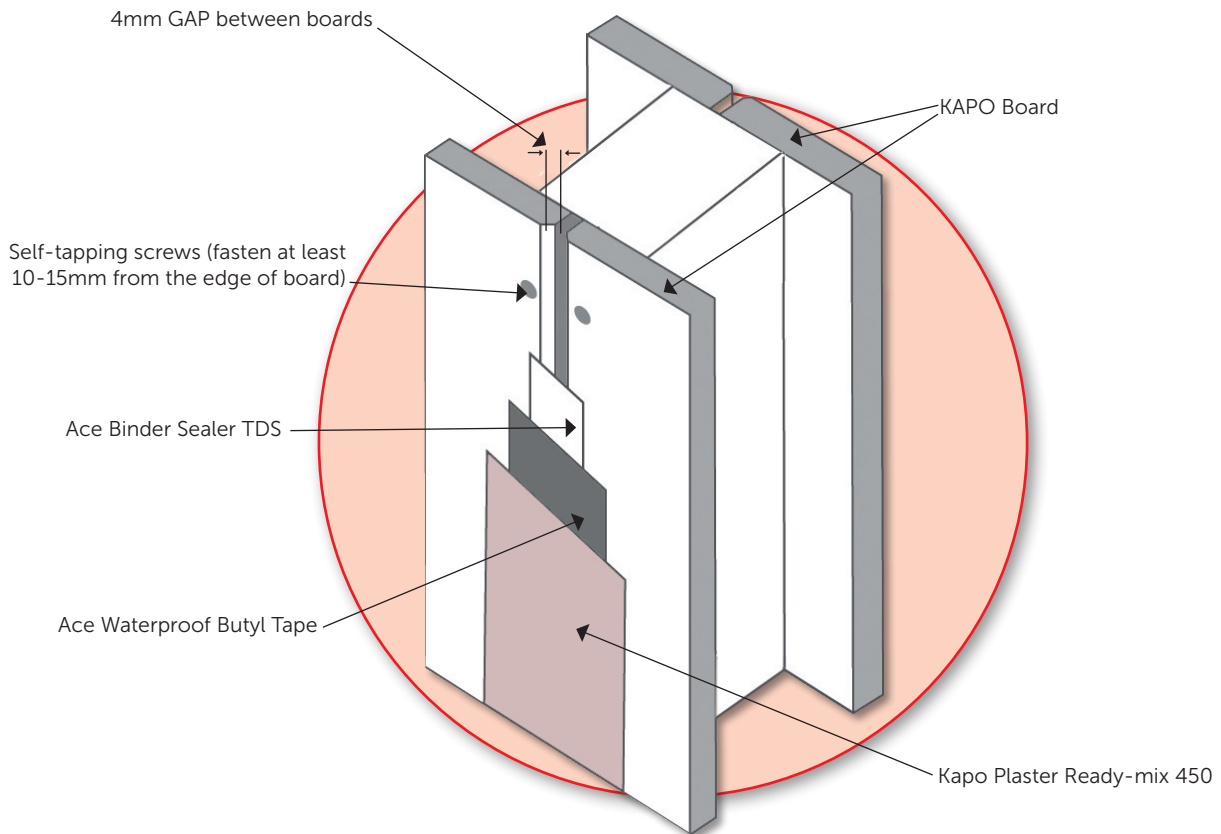
The unexposed face of the partition shall be then clad with nominal KAPO Super Mineral Board giving a lateral displacement between vertical of 610mm, and a vertical displacement of horizontal boards joints of 2440mm.

Gaps at all board joints, plus screw fixings at joint and intermediate position, shall be in filled and covered with fibrous adhesive, applied to give a board covering approximately 0.5mm thick in the immediate vicinity of the joints and fixings.

1. Marking
2. Fix the upper and bottom steel stud. (Fix the upper and bottom steel Stud)
3. Installation of steel channel
4. Installation of KAPO Board
5. Finishing wall for interior partition

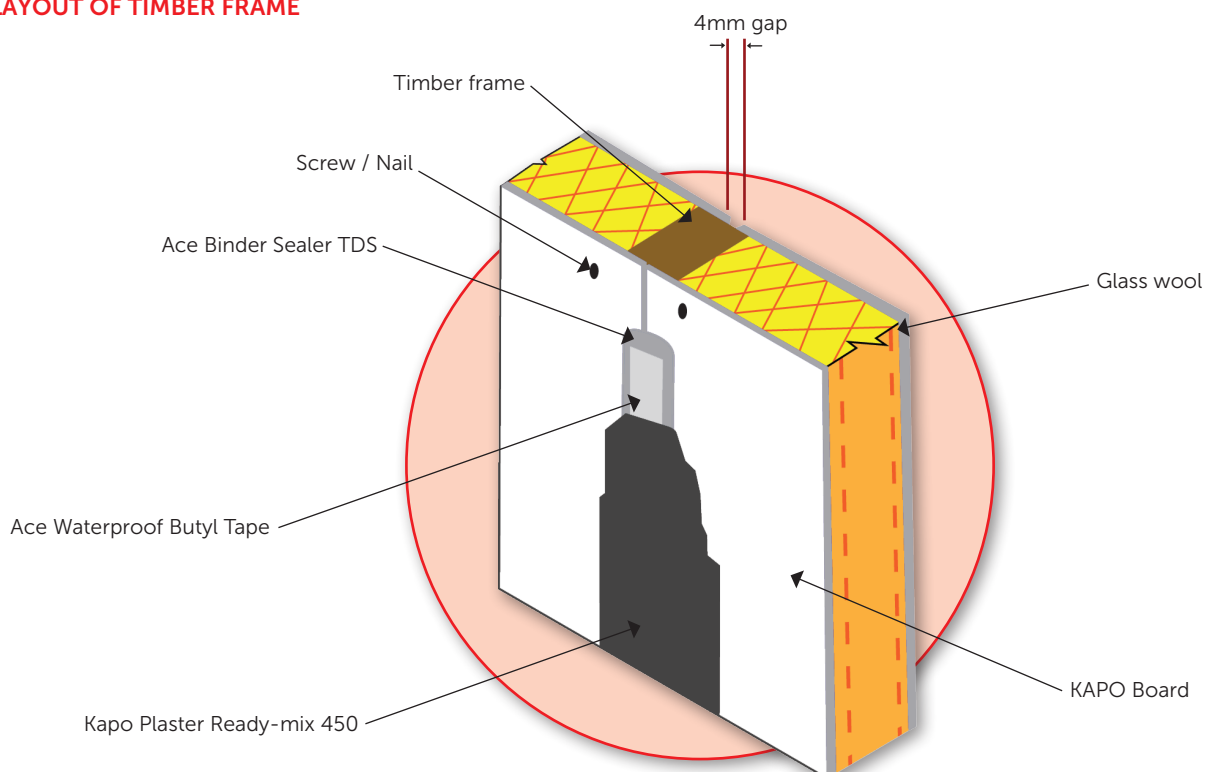
1. JOINTING INTERNAL WALL

LAYOUT OF STEEL FRAME



2. JOINTING TREATMENT (SEAMING)

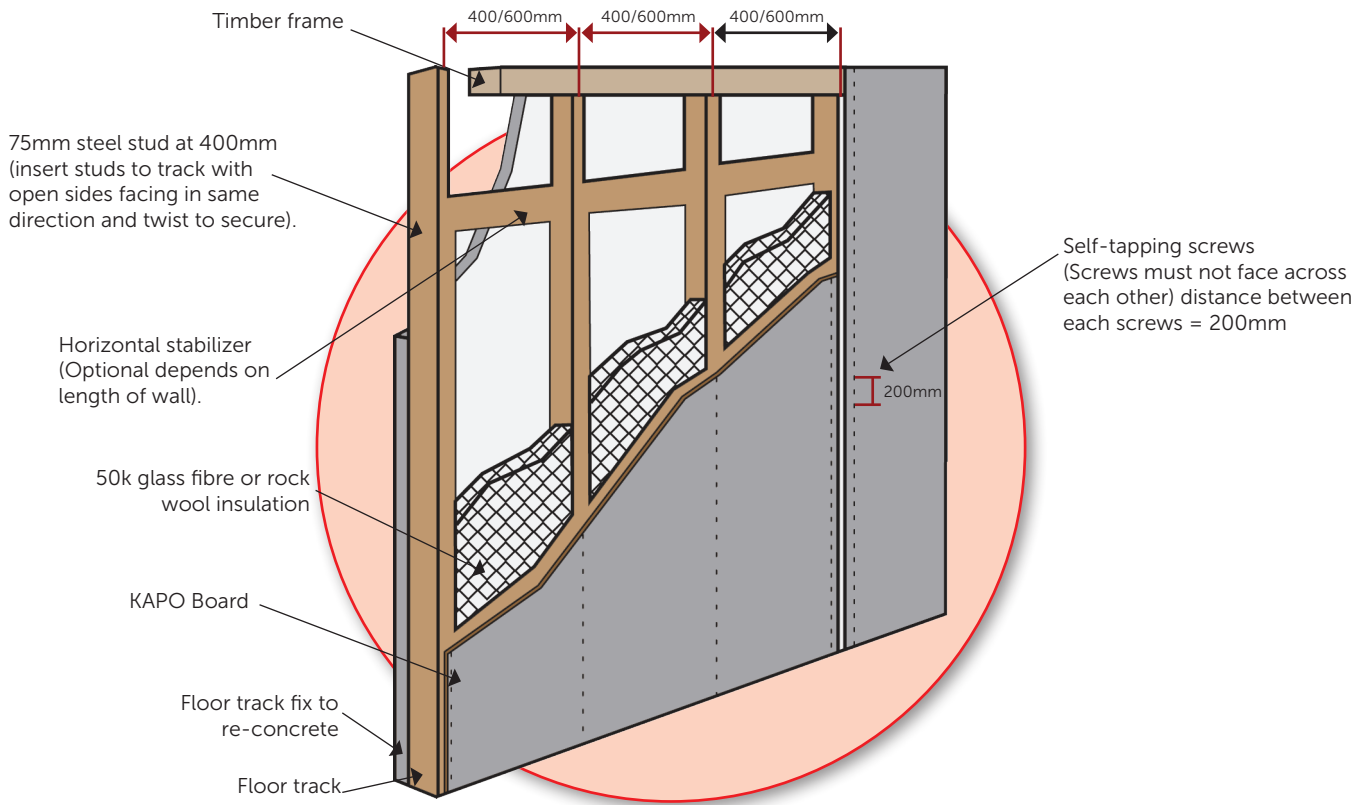
LAYOUT OF TIMBER FRAME



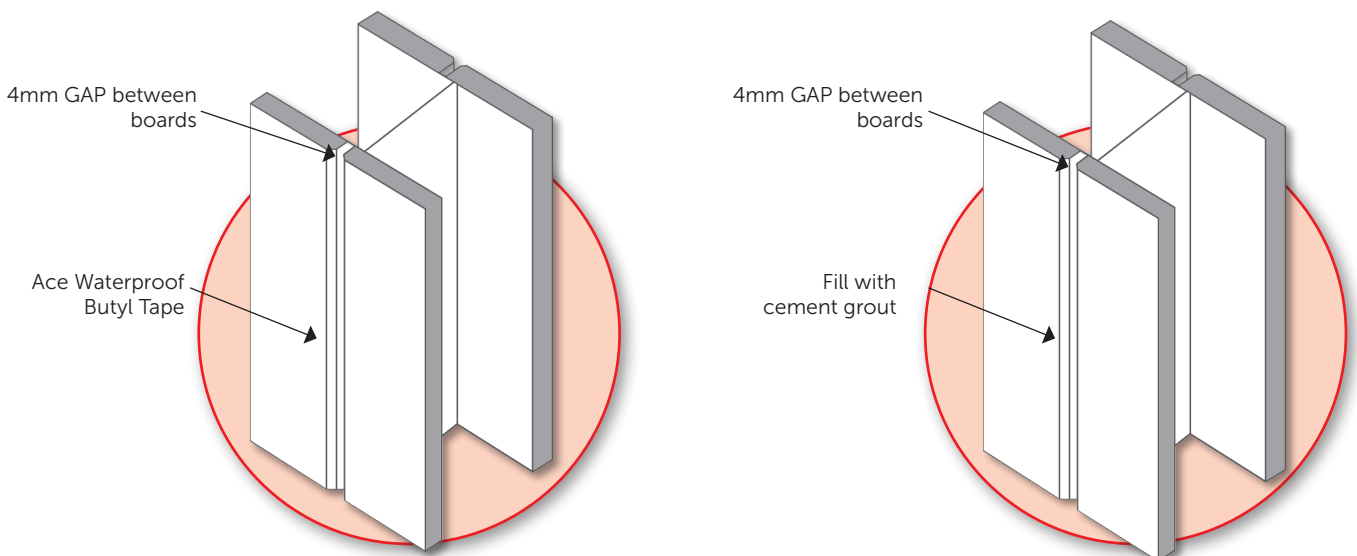
*(Materials for nails and screws shall comply with NZS 3604:2011 depending on the severity exposure zones. Refer to building code Section 4 Table 3 for Zone descriptions)

3. INSTALLATION PARTITION

Layout of Partition Wall



4. JOINTING EXTERNAL WALL



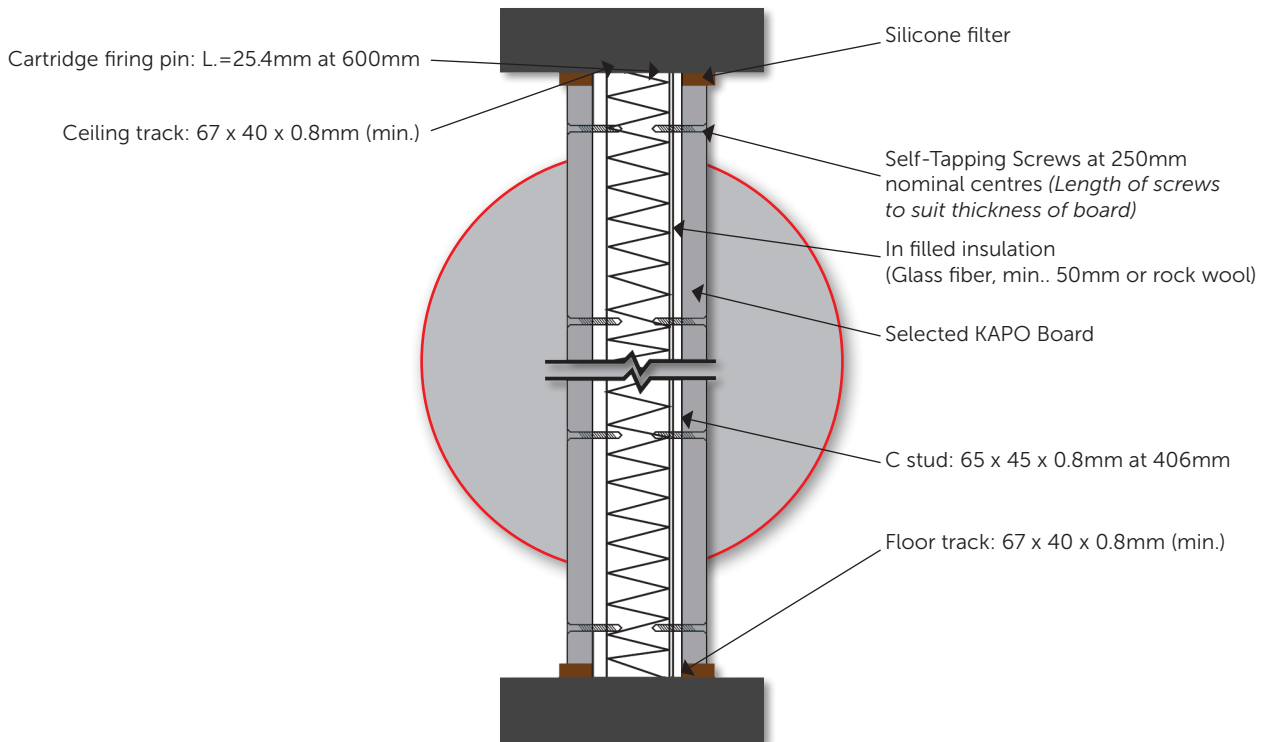
Exterior Finishes KAPO Board has been appraised as a Light Wall Cladding as defined in NZS3604 relying on 400mm or 600mm stud centres or soffit joist centres for

Framing and using either 9 or 12mm thick board. This appraisal is limited to the boards and nominated jointing systems only and excludes any finishing system, which must comply with the relevant clauses of the New Zealand Building Code. The KAPO Board is to be installed by trade qualified builders.

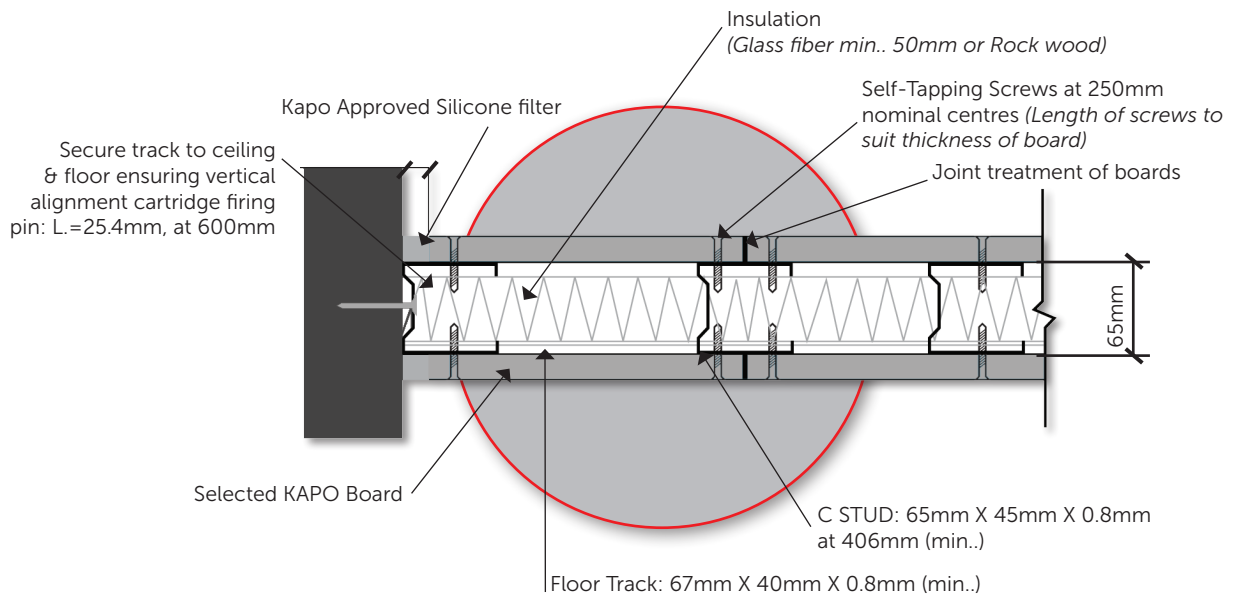
**(Materials for nails and screws shall comply with NZS 3604:2011 depending on the severity exposure zones. Refer to building code Section 4 Table 3 for Zone descriptions)*

5. TYPICAL LAYOUT OF SHEET METAL FRAMEWORK

PARTITION LAYOUT



(CROSS SECTION HORIZONTAL VIEW)



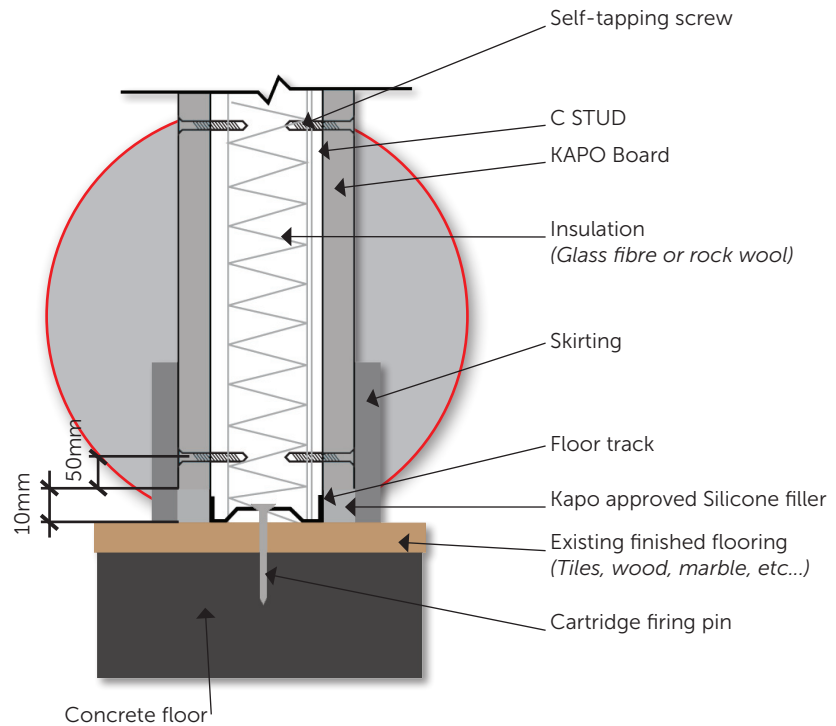
Interior Finishes

KAPO Board has been appraised for use as an interior lining relying on 400mm or 600mm stud centres or ceiling joist centres for framing and using either 6 or 9mm thick board. This appraisal is limited to the boards and nominated jointing systems only and excludes any finishing system,

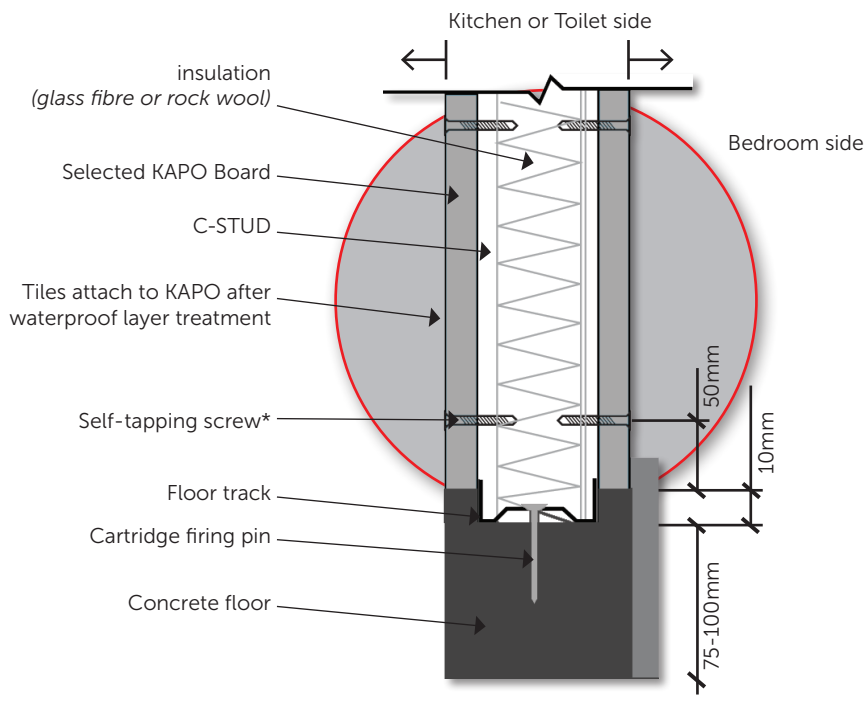
such as plastered finishes or tiling systems, which must comply with the relevant clauses of the New Zealand Building Code.

**(Materials for nails and screws shall comply with NZS 3604:2011 depending on the severity exposure zones. Refer to building code Section 4 Table 3 for Zone descriptions)*

PARTITION & EXISTING FLOOR



PARTITION OF BEDROOM & TOILET FLOOR



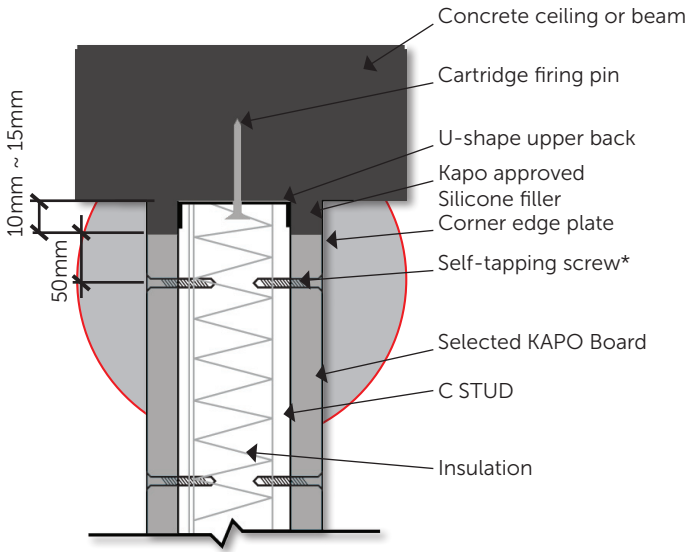
NOTE: For Time Underlayment

1. Steel tub must be more than 1.2mm thick, distance between each studs below 300mm.
2. Use self tapping stainless steel screws fix at 150mm centres below, screw head must be wider than screw hole.
3. Reinforcement steel must be place at the back of the board if the tiled walls will be hanged with other materials (cannot be directly fix only on the board without (reinforcement)).
4. Sealants must be applied to cover adhesion must be strong enough to avoid delimitation and stripping.
5. It is recommended to use boards in 12mm and above thickness.

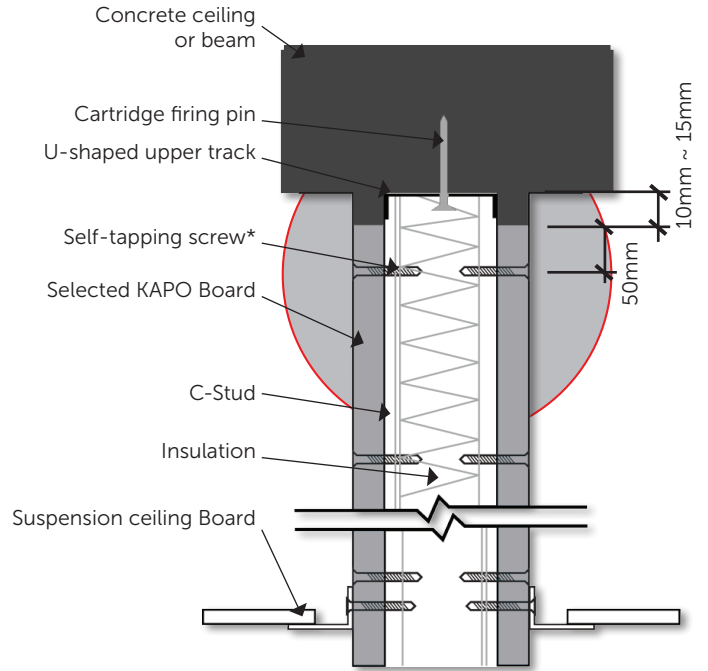
*(Materials for nails and screws shall comply with NZS 3604:2011 depending on the severity exposure zones. Refer to building code Section 4 Table 3 for Zone descriptions)

6. INSTALLATION CONCRETE CEILING

Partition Wall & Ceiling

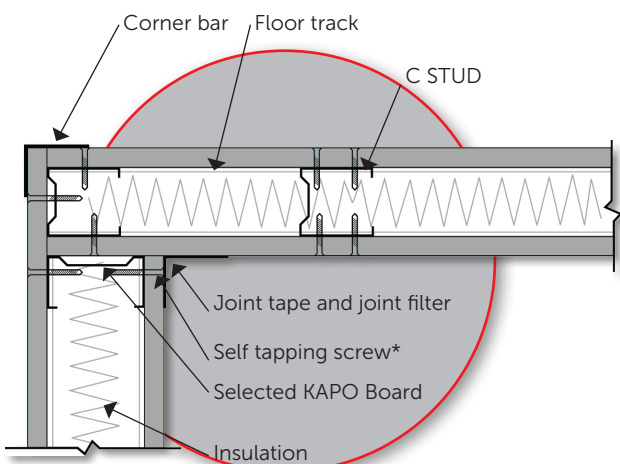


Partition wall + Suspension Ceiling

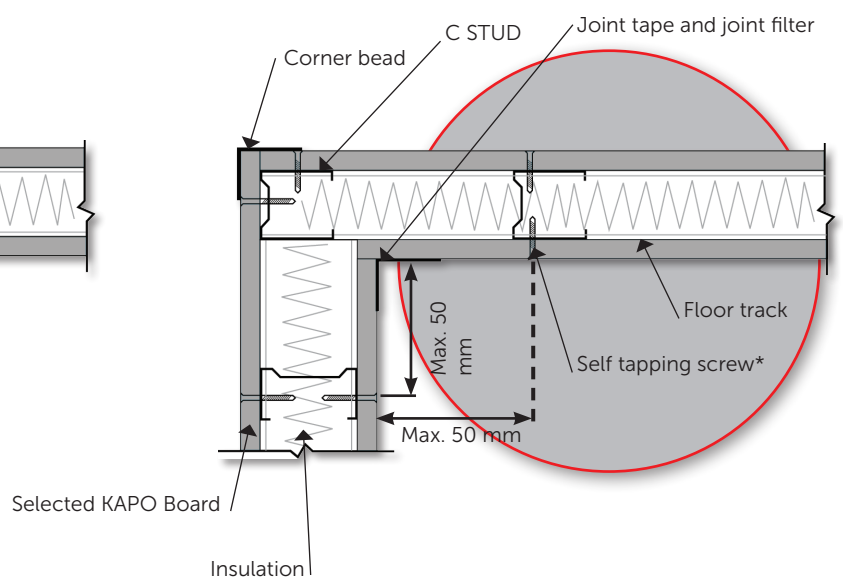


7. INSTALLATION CORNER JOINT

L-Corner Joint Cross Section 1



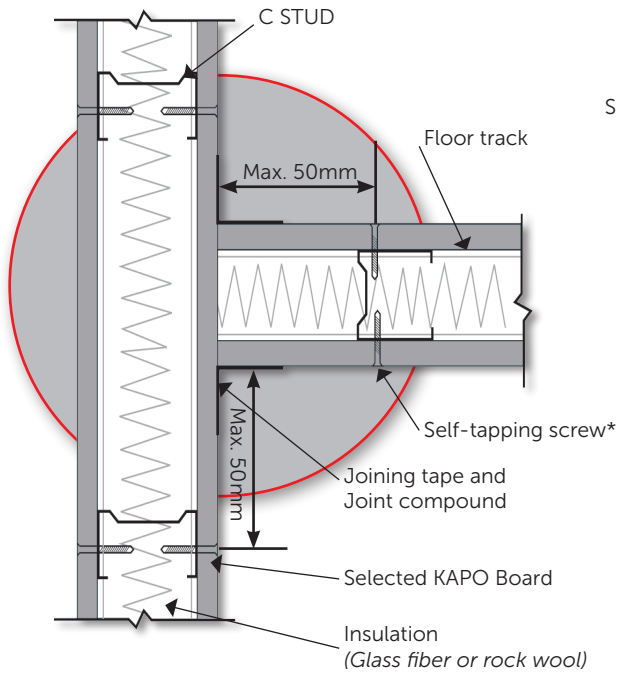
L-Corner Joint Cross Section 2



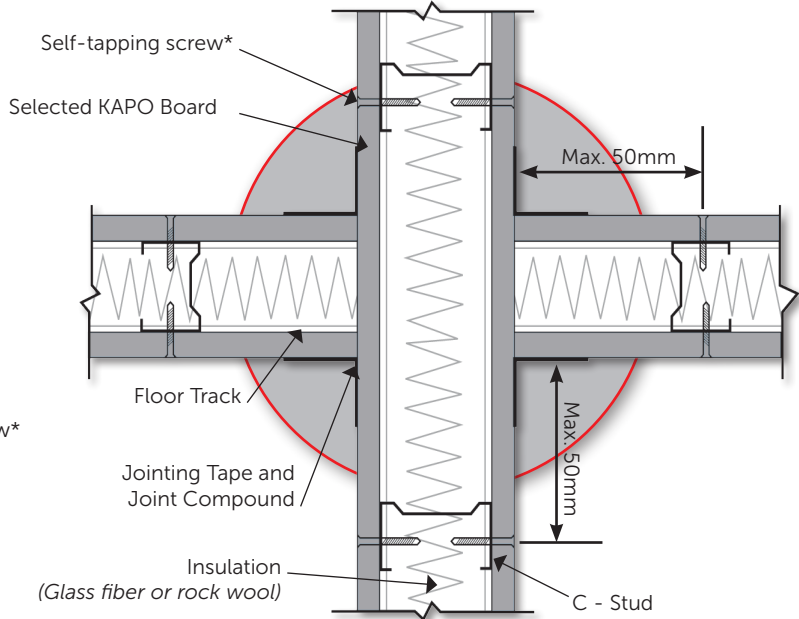
**(Materials for nails and screws shall comply with NZS 3604:2011 depending on the severity exposure zones. Refer to building code Section 4 Table 3 for Zone descriptions)*

8. INSTALLATION "T" SECTION

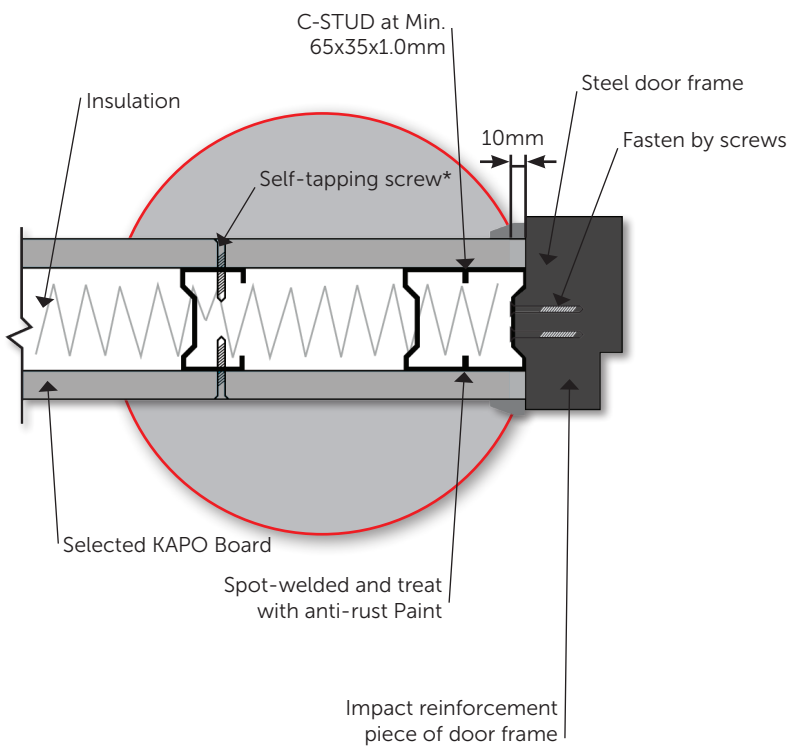
T - SECTION OF PARTITION WALL



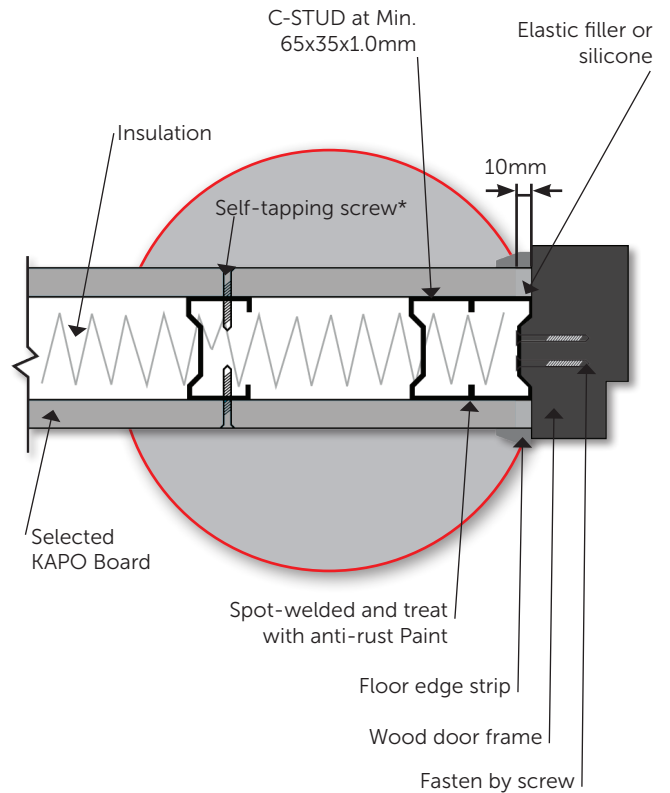
CROSSWISE SECTION OF PARTITION



FIX TO STEEL DOOR FRAME

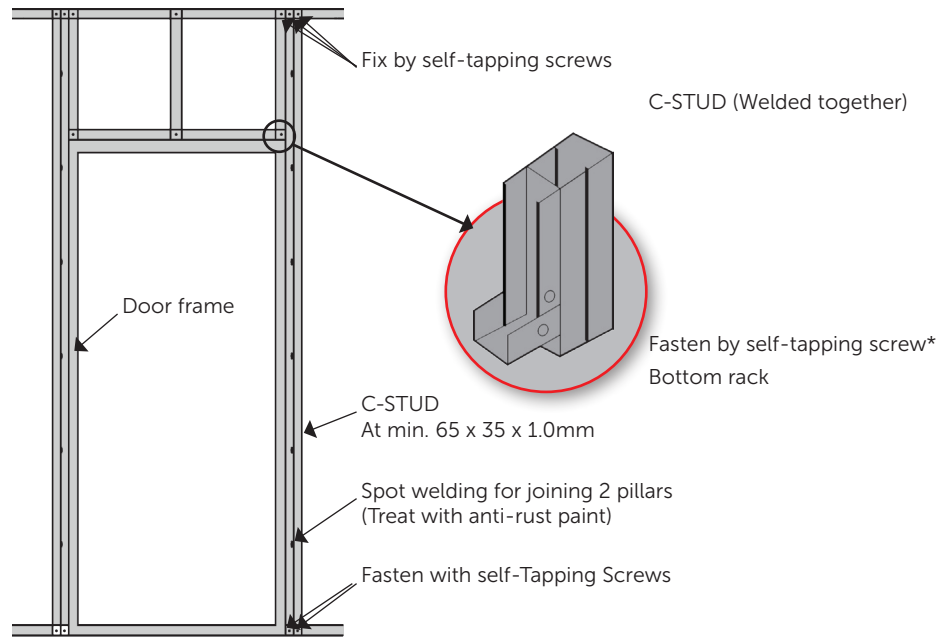


L-Corner Joint Cross Section 2

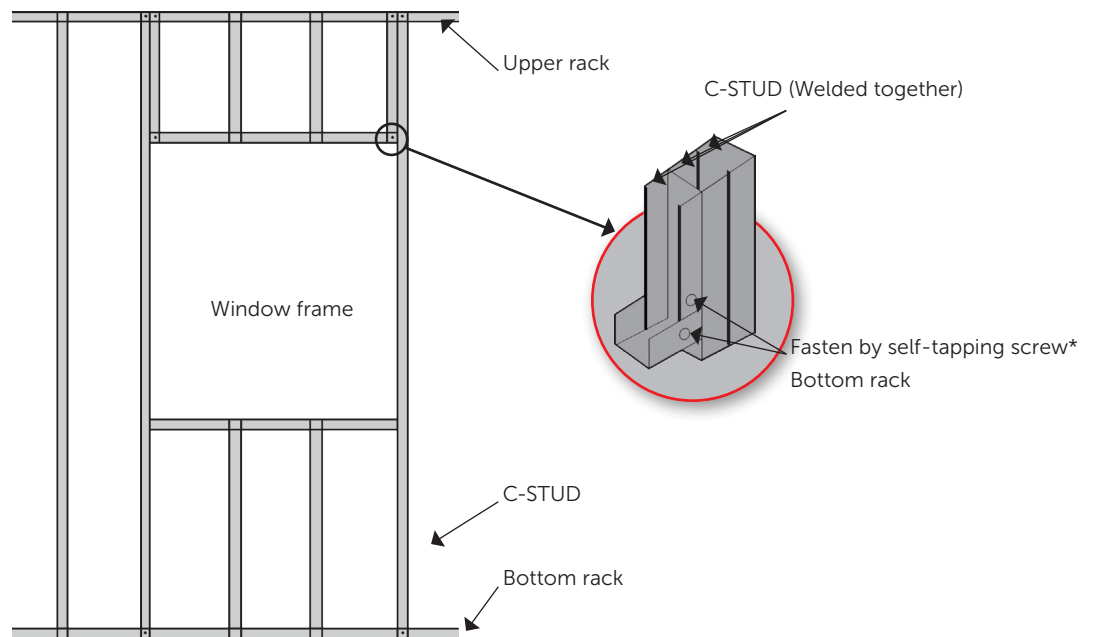


**(Materials for nails and screws shall comply with NZS 3604:2011 depending on the severity exposure zones. Refer to building code Section 4 Table 3 for Zone descriptions)*

9. DOOR FRAME REINFORCEMENT (DOUBLE PILLAR TYPE)



10. WINDOW OPENING FRAME REINFORCEMENT



**(Materials for nails and screws shall comply with NZS 3604:2011 depending on the severity exposure zones. Refer to building code Section 4 Table 3 for Zone descriptions)*

11. FINISHING FOR INTERIOR WALL

Kapo ready-mix 450 (manufactured in New Zealand)

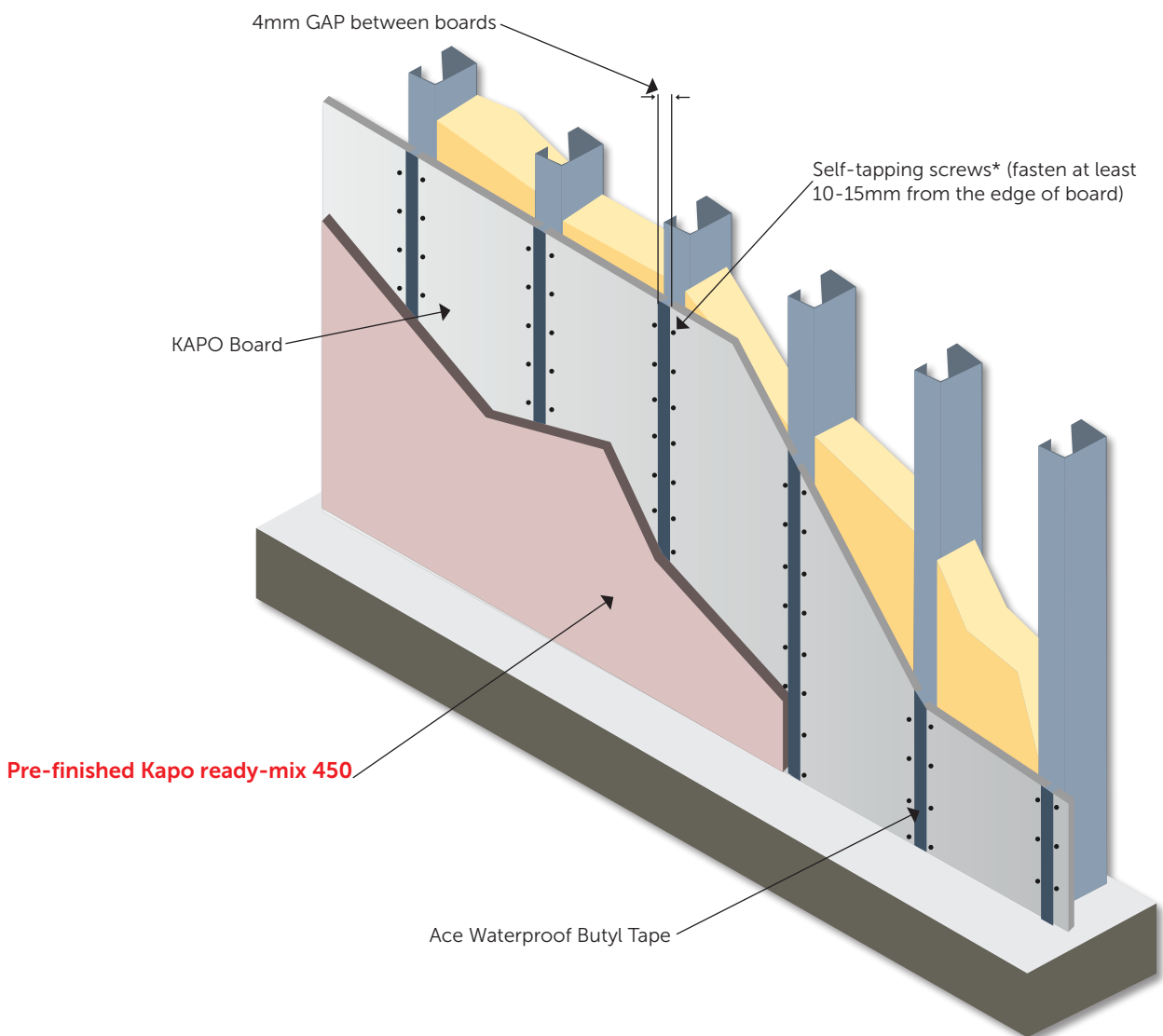
Mixing

Sprinkle **KAPO Ready-mix Lime Finish 450** into the required amount of water and allow to soak for up to 30 minutes prior to use. Drill well, ensuring no un-mixed material or lumps are present. It is very important that all tools, mixing equipment and buckets are totally clean and that during mixing or application no sand particles are introduced into the **KAPO Ready-mix Lime Finish 450** which may affect the performance of the material.

Over coating

Ready-mix Lime Plaster products may be over coated if required using a suitable 'breathable' paint system or clear coating. We would suggest to add a 5mm square alkali resistant mesh about half way through the coating, this will strengthen and also aid cracking.

1: Pre-finished Lime Plaster



IMPORTANT: Do not re-use mixed material for following coat. Re-Mix fresh material. Over-trowelling of the **KAPO Ready-mix Lime Finish 450** may result in bubbles appearing under the surface. If General Product Description.

**(Materials for nails and screws shall comply with NZS 3604:2011 depending on the severity exposure zones. Refer to building code Section 4 Table 3 for Zone descriptions)*

Kapo ready-mix 450 (manufactured in New Zealand)

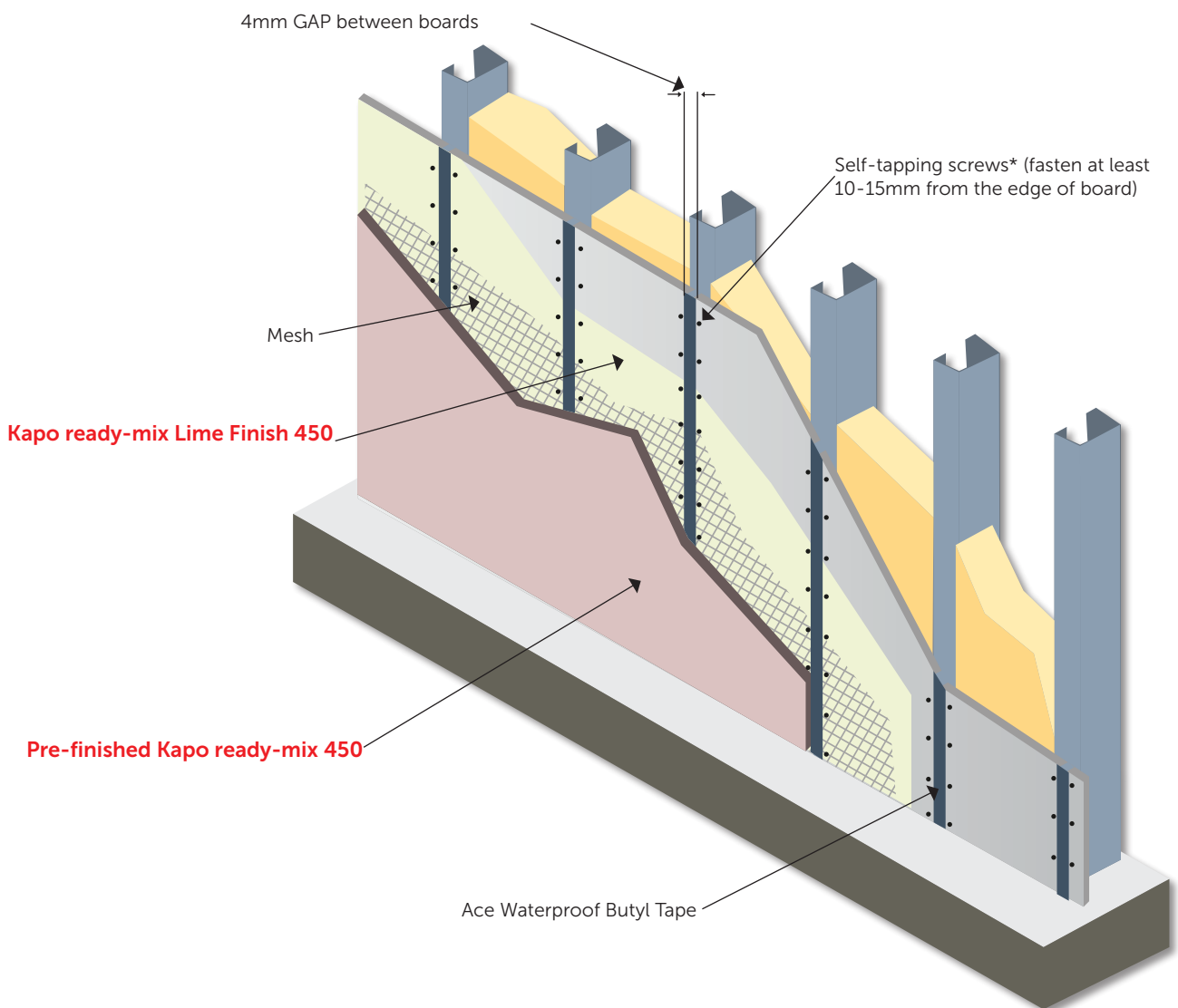
Mixing

Sprinkle **KAPO Ready-mix Lime Finish 450** into the required amount of water and allow to soak for up to 30 minutes prior to use. Drill well, ensuring no un-mixed material or lumps are present. It is very important that all tools, mixing equipment and buckets are totally clean and that during mixing or application no sand particles are introduced into the **KAPO Ready-mix Lime Finish 450** which may affect the performance of the material.

Over coating

Ready-mix Lime Plaster products may be over coated if required using a suitable 'breathable' paint system or clear coating. We would suggest to add a 5mm square alkali resistant mesh about half way through the coating, this will strengthen and also aid cracking.

2: Pre-finished Lime Plaster with mesh for better strength



**(Materials for nails and screws shall comply with NZS 3604:2011 depending on the severity exposure zones. Refer to building code Section 4 Table 3 for Zone descriptions)*

REFERENCE 1



Shenzhen Futian Library



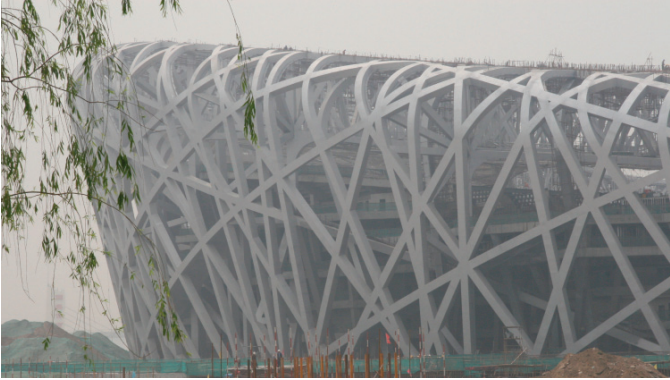
Shenzhen Futian Library: In production



Shenzhen Futian Library: In production



Shenzhen Futian Library: In production



National Stadium(The Bird's Nest) - In Production



National Stadium(The Bird's Nest) - In Production



National Stadium(The Bird's Nest) - In Production



National Stadium(The Bird's Nest) - In Production

REFERENCE 2



Sheraton Hotel



Sheraton Hotel: Interior



Sun Yat-Sen University Cancer Center



Sun Yat-Sen University Cancer Center



enviro square

Contact us

e: enquiry@envirosquare.com

p: +64 21 328 839

w: www.envirosquare.com

