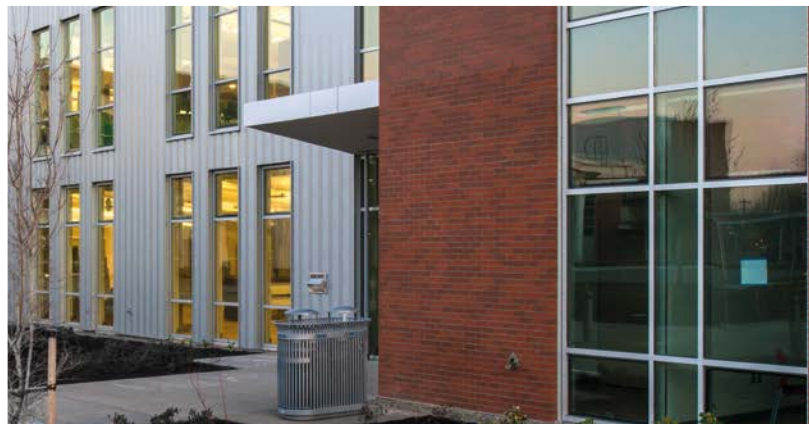


Insulated Panel Systems
North America

Installation Guide

KarrierPanel® Wall System



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Disclaimer

This installation guide is only to be used in conjunction with panel installation drawings and Kingspan recommended details. Details shown in project shop drawings take precedence over any similar information in this manual. Shop drawings may be prepared either by Kingspan or by the panel contractor. Kingspan's Technical Service Department is available to assist the panel contractor in the review of shop drawings.

This guide is intended to provide the panel contractor with recommended methods, procedures and guidelines for the installation of the KarrierPanel system for commercial and architectural applications. Information presented is accurate but may not cover all situations, building conditions and/or details of your specific project. Consult Kingspan Technical Services where this guide does not cover your unique construction requirements. It is the sole responsibility of the project engineer and panel installer to ensure specified air and weather tightness of a building by good design and workmanship in accordance with approved drawings using only the appropriate type of sealants. It is the sole responsibility of the owner's representative and panel installer to maintain quality workmanship in accordance with approved shop drawings to ensure the best performance of the wall system. Kingspan recommends installers read this document fully before receiving the panels on the job site. Installation classes are available through Kingspan's Technical Services Department. Please call 1-888-332-5862 for more information.

Follow the architect's approved shop drawings and engineering calculations for your project specific fastening patterns. The engineer of record is responsible for verifying applicable design loads and panel fastening requirements.

All safety procedures, including adequate fall protection, are the responsibility of the panel contractor.

IMPORTANT!

Please read all information related to your project before receiving materials at the job site and before starting the installation.

1 Introduction

1.1 Features

Welcome to Kingspan, global leaders in the design and manufacture of insulated metal panels. Insulated panels serve as energy efficient, state-of-the-art alternative to traditional construction. This document serves as installation guidelines for the KarrierPanel wall system.

The KarrierPanel product range is suitable for large scale commercial and architectural projects and is available in either horizontal or vertical applications.

- 1 Single component wall panels provide a robust long lasting weather barrier, insulating core and interior vapor barrier all-in-one.
- 2 Polyisocyanurate or QuadCore® foam core retains original insulating value over time.
- 3 Unique KarrierRail™ replaces the panel clip system and does not penetrate the air vapor barrier.
- 4 Panels are lightweight, easy to install under most weather conditions.
- 5 KarrierPanel is adaptable to a wide variety of rainscreen profiles. (Where brick facade is used, Kingspan's KingTie is utilized in lieu of the KarrierRail™).
- 6 Panels are available in lengths of up to 53' to minimize the number of stack or butt joints required.
- 7 Accessory items including metal flashings are available (contact Kingspan for more information).

1.2 Insulation Values

KarrierPanel panels are available in the following configurations:

Thermal Performance at 75°F		Thermal Performance at 35°F	
Thickness	R-Value	Thickness	R-Value
2	14.4	2	16
2.5	18.0	2.5	20
3	21.6	3	24
4	28.8	4	32
5	36.0	5	40
6	43.2	6	48

KarrierPanel panels offer the building designer R values of approximately 7.2 per inch (PIR) or 8.0 per inch (QuadCore®), as well as the ability to balance initial cost versus long-term energy savings.

To complete the wall system a full range of integrated accessories including attachment clips, metal trims and aluminum extrusions are available.

1.3 Warranties

Kingspan can furnish various performance warranties as required by project specifications. The items covered by these warranties include weathertightness, corrosion, structural performance and finish performance.

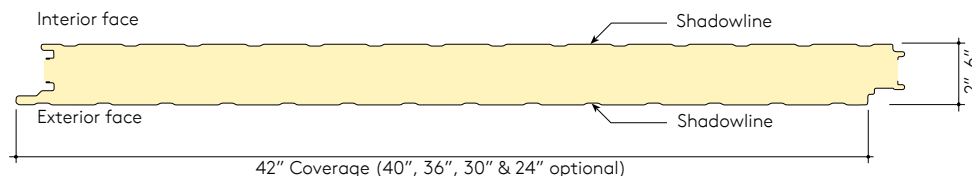
Weathertight warranties require the use of Kingspan Authorized Installers. In addition, these projects require several jobsite inspections, so be sure to schedule inspections in advance.

Kingspan requires that all specifications and shop drawings are reviewed prior to warranty issuance. In addition, warranties are limited to materials supplied by Kingspan, and are not issued until full payment for all services and material provided is received.

Contact Kingspan Customer Service for more information on our warranty programs.

1.4 Installer Qualifications

Kingspan recommends that our panels are installed under the direct supervision of an experienced installation contractor trained in the proper application of our products. Please contact Kingspan for information regarding our Authorized Installer training programs.



2 Technical Information

KarrierPanel wall panels have been thoroughly evaluated and tested by independent third-party laboratories to determine all aspects of their performance.

The results of these tests, in combination with our comprehensive engineering analysis, enable us to provide design assistance for nearly every project. This includes complete panel analysis of wind, live, seismic and thermal loading as well as allowable spans, deflection and recommended fastening.

2.1 Deflection

Current industry standards for insulated metal wall panels specify a deflection of L/180. The project designer and/or engineer of record should always check the applicable code(s) for deflection limits. Applications with brick rainscreen facades will need to be designed to L/360. For deflection limits other than L/180, please contact Kingspan Technical Services for evaluation.

2.2 Compliance

KarrierPanel wall panels are compliant with the relevant codes and requirements for a range of suitable applications.

2.3 Panel Diaphragm

Insulated panels should NOT be relied upon to provide significant diaphragm strength. Instead, cross bracing (cables, rods, angle iron etc.) should be used to provide diaphragm. Insufficient bracing for the walls may result in damage to the panels, and will void the panel warranty.

2.4 Seismic

KarrierPanel wall panels are mechanically attached on one side only, with the other side free to slide along the tongue and groove joint configuration. In addition to this built-in slip joint design, the panels are very light (approx. 3-4 psf). As a result, they are ideal for use in seismically sensitive projects.

2.5 Fire Performance

KarrierPanel wall panels have been thoroughly evaluated by independent third-party testing laboratories and are covered under various product approval listings.

2.6 Air and Water Infiltration

Air and Water Infiltration testing has been successfully conducted on the KarrierPanel wall panels in accordance with ASTM E283, ASTM E331 and AAMA 501.1.

For more information on any of the above items, please contact Kingspan Technical Services.

For installation assistance:
installation@kingspanpanels.com

For engineering assistance:
technicalservice@kingspanpanels.com

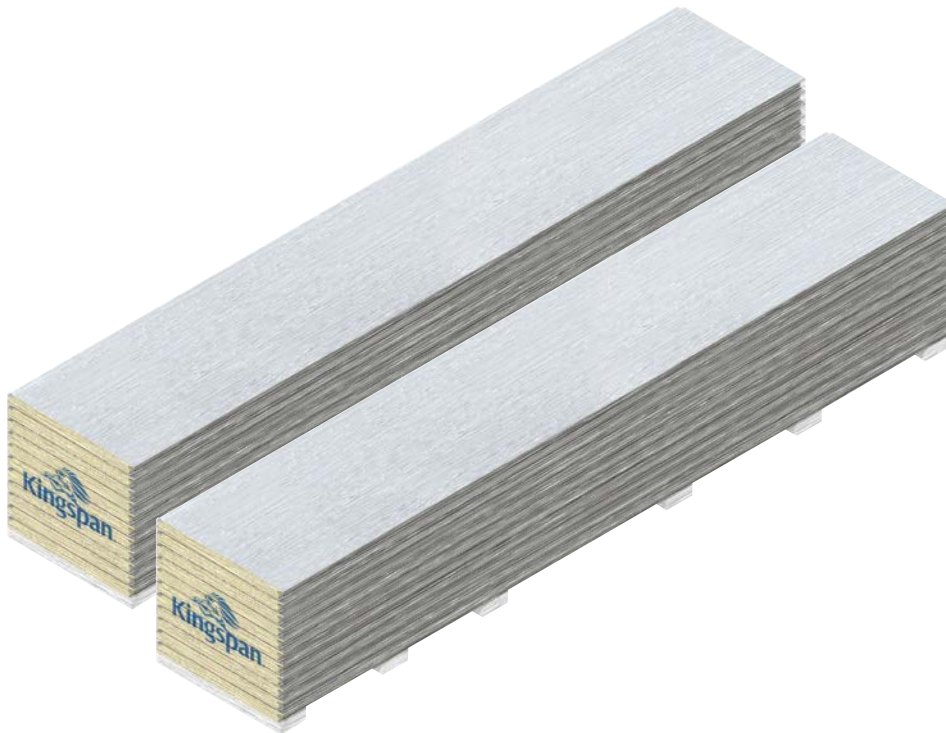
The information contained in this guide is thought to be reliable and correct, but is subject to change without notice.

For all the latest information on testing, certification and approvals, please visit www.kingspanpanels.com.

3 Inspection upon Delivery

Panels are carefully packaged in large shrink-wrapped bundles, then shipped on flat bed trailers to the construction site. When a shipment is received, check all items against the shipping document for quantities, dimensions, colors, transit damage, etc. Document any shortage of panels and accessories or panel damage on the bill of lading and have it signed by the driver. It is the receiver's responsibility to make any damage claims immediately.

Please note that although every effort is made to prevent shipping damage, Kingspan is not responsible for damage which may occur during transportation, delivery, storage or on-site handling.



4 Panel Handling

4.1 Panels Handled by Forklift

4.1.1 The recommended loading / unloading method for bundles less than or equal to 30' is to use a single forklift with widely spaced forks placed under the center of the bundle as shown in Figure 4.1a. Panel bundles over 30' in length may be moved by using two forklifts spaced equally along the length of the bundle as shown in Figure 4.1b. Inspect travel route to assure a reasonable level and compacted surface free of ruts and excavations.

4.1.2 To prevent panels from damage while lifting, carefully pick up bundles one at a time.

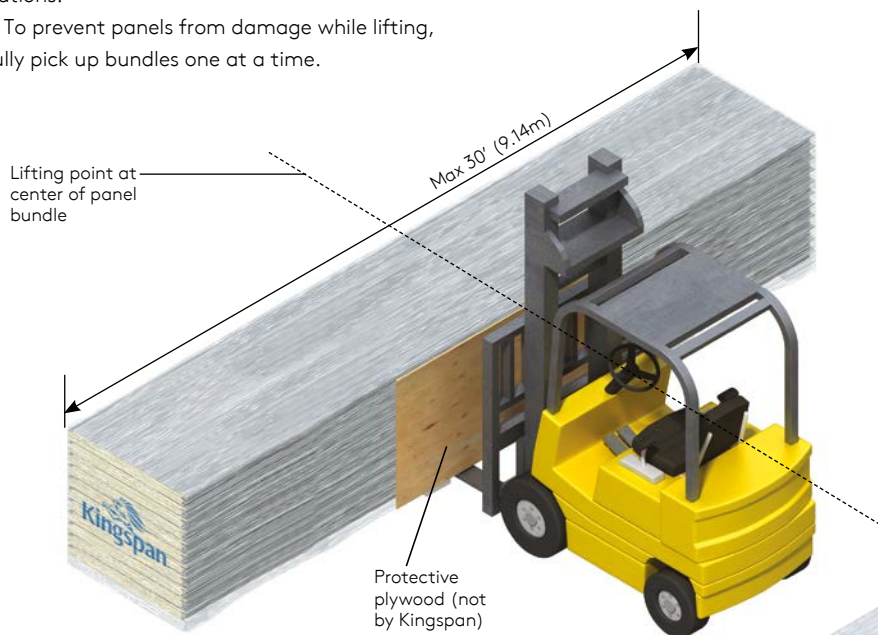


Fig. 4.1a

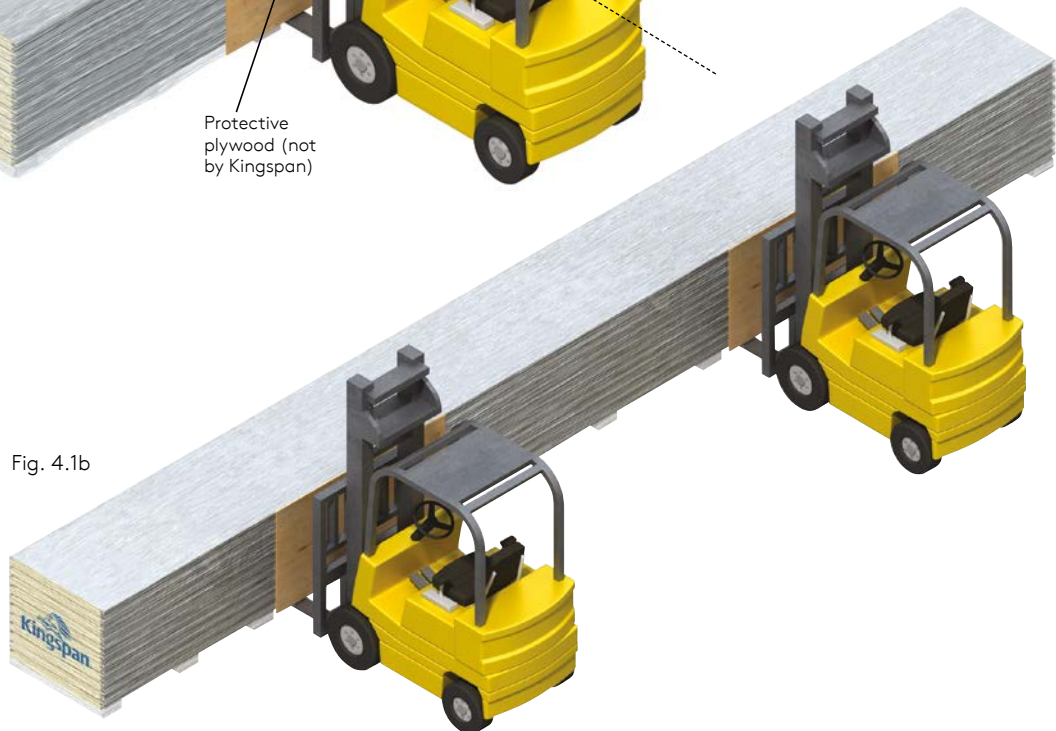


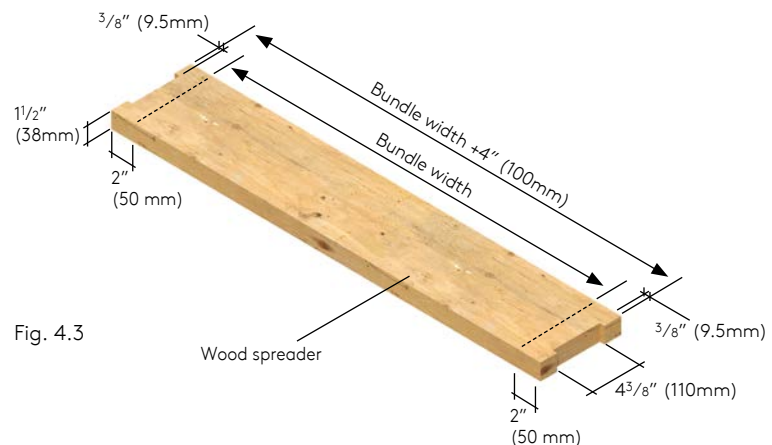
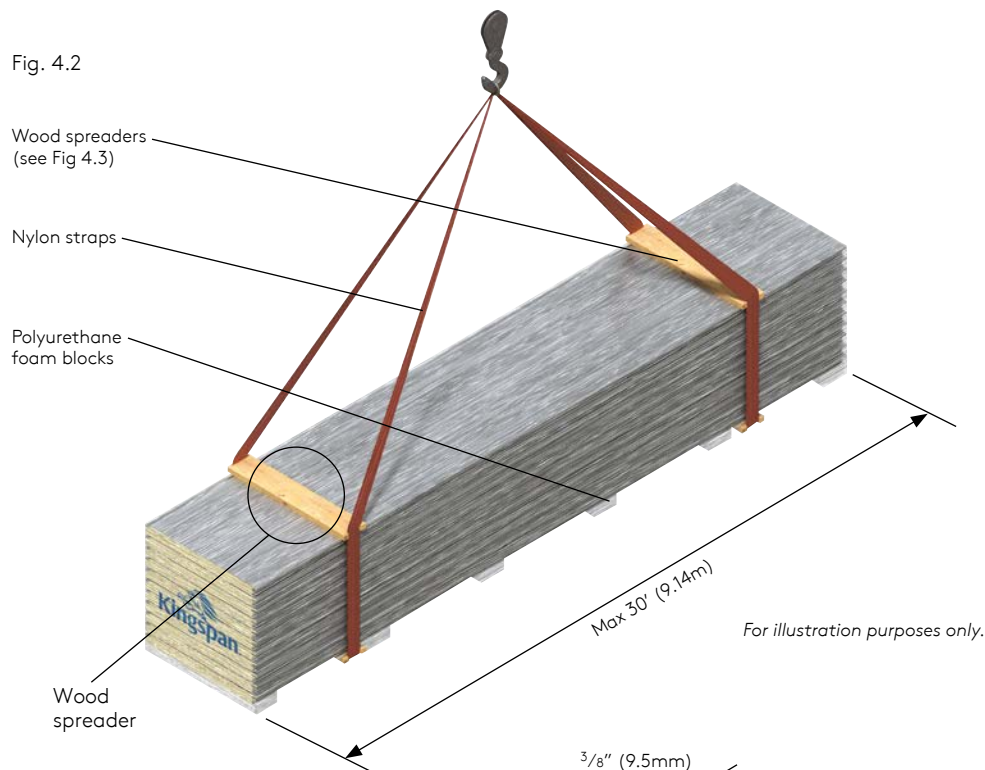
Fig. 4.1b

4 Panel Handling

4.2 Panels Handled by Crane

4.2.1 The recommended crane lifting method is to use nylon straps positioned at a minimum of two points along the length of the bundle. Suitable wood spreaders should be used and located at the top and bottom of the bundles at the strap positions to protect the edges of the upper and lower panels. Extreme care should be taken to avoid bumping and snatching of the bundles when lifting.

4.2.2 Panel bundles with a total length of not more than 30'-0" (9.14m) can be handled with a crane by using nylon straps and wood spreaders as shown in Fig. 4.2. For suggested wood spreader dimensions, see Fig. 4.3.



4 Panel Handling

4.2.3 When lifting bundles with a crane longer than 30' (9.14m), three points of support are required from lifting beam to bundle, as shown in Fig. 4.4. To prevent damage from nylon straps, use wood spreaders at top and bottom at lifting locations as shown in Fig. 4.4 and Fig. 4.5.

Fig. 4.4

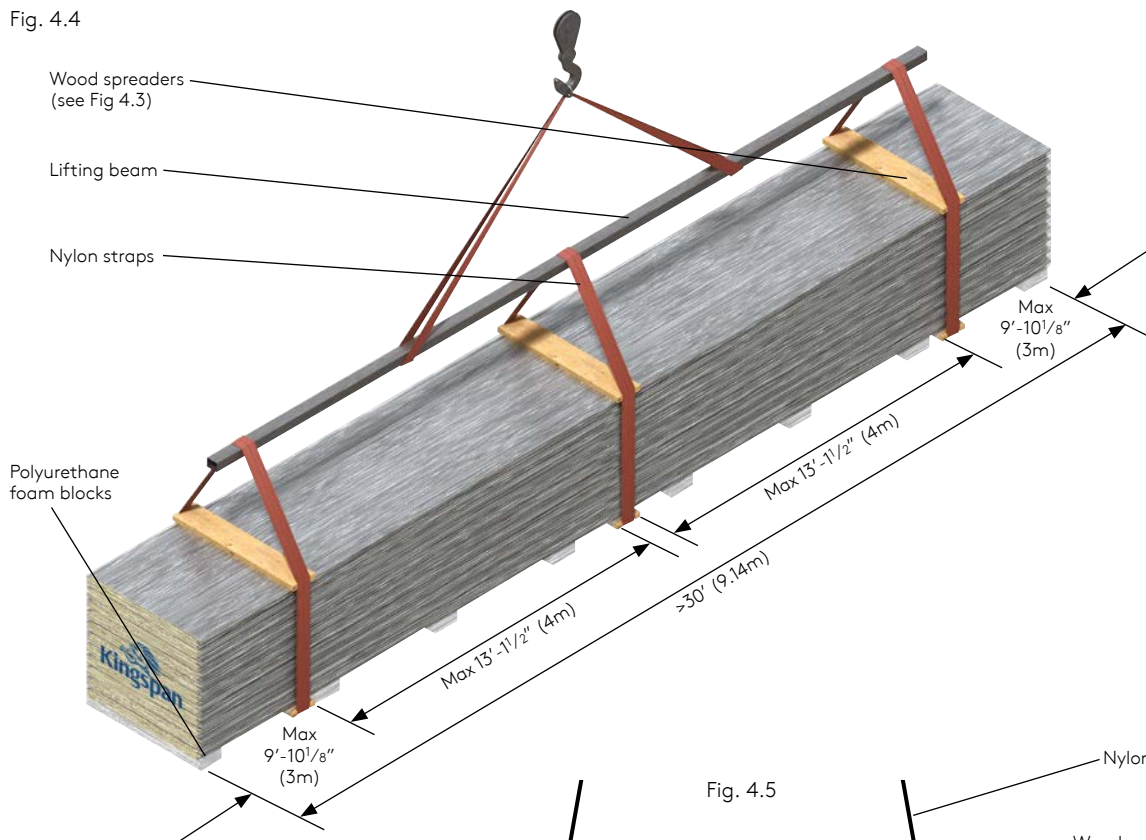
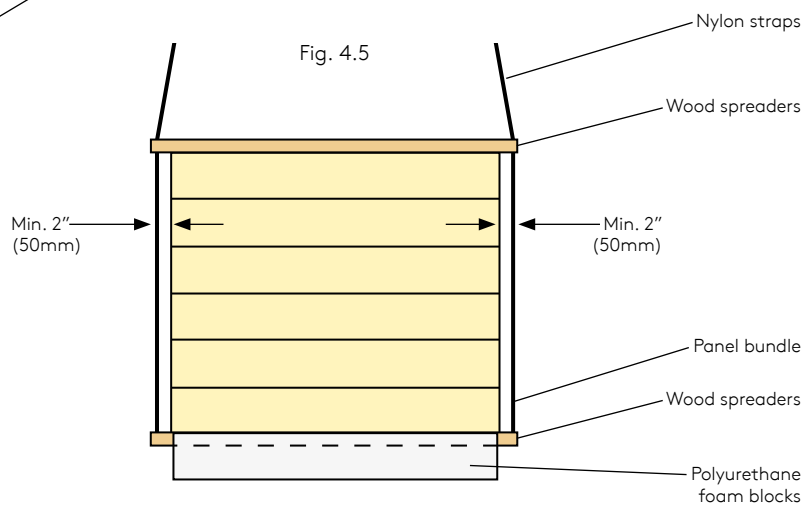


Fig. 4.5



4 Panel Handling

4.3 Handling Individual Panels

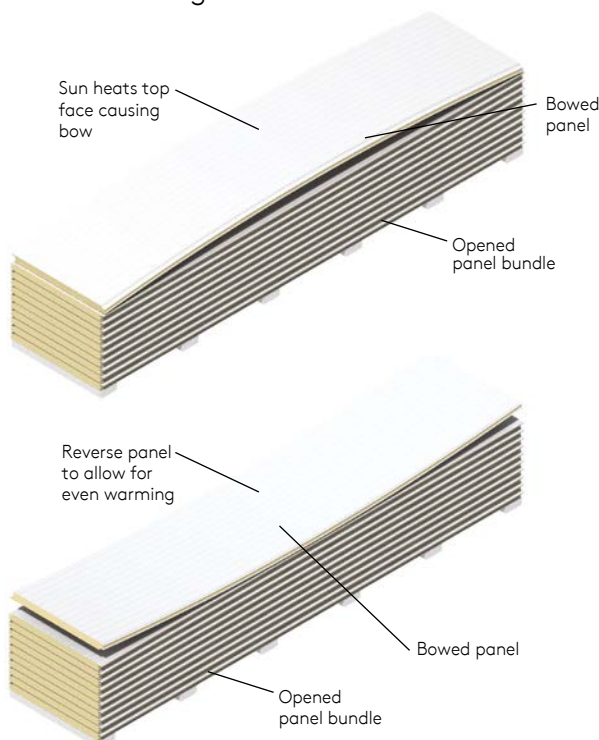
CAUTION

4.3.1 Workers must wear appropriate protective gear at all times when handling panels. Failure to do so may cause injury.



Correct and Incorrect Panel Handling

Thermal Bowing



CAUTION

4.3.2 Individual panels should never be moved in a flat position as excessive flexing may result. Excessive flexing ruptures a panel's core, permanently distorts the facings and may lead to thermal blistering. When moving a panel, it must be turned on its edge first, then supported at each end with as many men as necessary to safely handle.

NOTE

Panels exposed to direct sunlight may exhibit thermal bow, which can hinder panel engagement. This can be corrected by either placing the panels in a shaded area, or by flipping the panels over exposing the cool side of the panel to the sunlight for approximately 15 minutes.

Panels are to be fastened at every support unless otherwise indicated on the shop drawings. Fastener requirements at each clip are based on design loads. Refer to the shop drawings for the correct fastening, or contact Kingspan Technical Services for assistance.

4 Panel Handling

CAUTION

4.3.3 To prevent joint damage and possible delamination, never lift a panel from the top sheet only. Lift from underneath the entire panel.

CAUTION

4.3.4 Never drag a panel from a bundle or across other surfaces. It will scratch and damage the panel coating/finish. Always lift panels when removing from bundle.

4.4 Panels Lifting using Vacuum Equipment

Panel installation time can often be reduced by using vacuum lifting equipment. The following items need to be verified by the equipment supplier prior to use: lifting equipment must be adequate for panel lengths and weights, and provide sufficient mobility and reach for the project conditions.

Vacuum heads (cups) must be suitable to safely lift panels with profiled and / or embossed surfaces. Fluted profiles may require specific vacuum heads.

Kingspan recommends using Rotaboy and Cladboy vacuum lifting systems. For equipment parameters and availability, please contact:

AutoMak Assembly Inc. at 1-219-310-8458 /

info@automakassembly.com vacuum lifting systems.



5 Panel Storage on Site

5.1

Site must have adequate storage space to receive and store the panel bundles. This space must be level, firm, clean and free from standing water. Bundles should be stored in a dry condition, with one end slightly elevated to facilitate moisture drainage.

5.2

Panels should be inspected upon delivery for presence of moisture. If moisture is present, bundles should be slit open immediately to allow ventilation and drainage, slits should be approx. 12" intermittently placed near the bottom of the wrapped bundle.

5.3

If panels are to be used immediately, bundles should be placed at pre-planned strategic locations around the building perimeter, as close as possible to the specific work areas. Review installation shop drawings to determine the best locations.

5.4

Panels in opened bundles should be covered by a plastic sheet or tarp at the end of the working day. The covering and bundles must be securely fastened to prevent wind damage (see Figure 5.1).

5.5

When handling panels and / or panel bundles, ropes, steel cables or chains must not be used.

5.6

Avoid outdoor storing for longer than 60 days. Moisture between panels can cause corrosion or staining. Staining of any kind is not considered to be a cause for rejection.

5.7

If panels are not to be used immediately, then they should be stored under a temporary shelter with the plastic removed from the top and sides of the bundles. Recover the bundles with a protective tarp and adequately secure both tarp and panels to prevent wind damage (see Figure 5.1).

NOTE

When stacking bundles (maximum two high) limit storage time to 30 days to prevent panel damage.

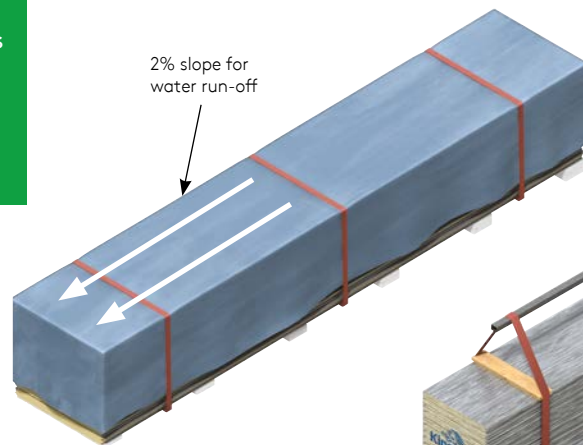


Fig. 5.1

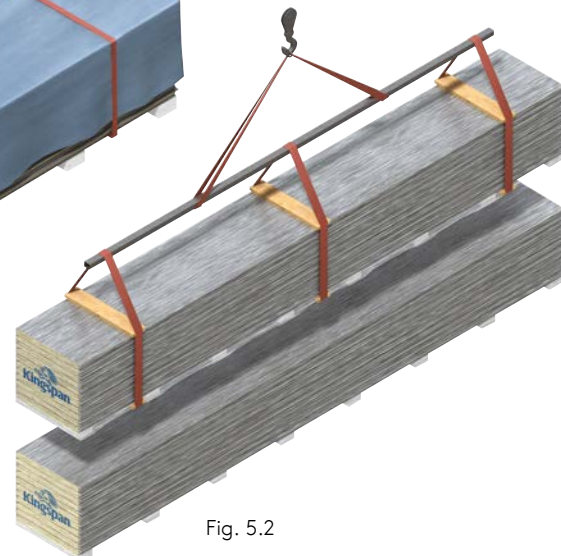


Fig. 5.2

6 Handling and Storage of Items and Accessories

6.1

Care should be taken during unloading and storage to prevent damage to small items, ie. trims fasteners, clips, sealants, etc.

6.2

Cover all pallet crates or boxes to protect materials from weather but allow for ventilation to prevent condensation. Temperature sensitive items such as butyl tapes and sealants should be stored under controlled conditions to maintain suitable application characteristics.

7 Removal of Protective Film

7.1

IMPORTANT!

If panels will not be installed within 60 days of receipt, the bundles should be unstacked and the protective film removed from each panel. Carefully restack the panels and protect from the elements. Failure to remove the film within this time period may result in excessive film adhesion and breakdown of the plastic, making removal extremely difficult. In addition, failure to remove the film as instructed may result in a buildup of adhesive residue.

Kingspan is not responsible for either of these conditions. Film removal and panel cleaning is the responsibility of the installation contractor.

7.2

It is recommended to remove protective film as panels are installed. Film on installed panels should be removed by the end of each day.

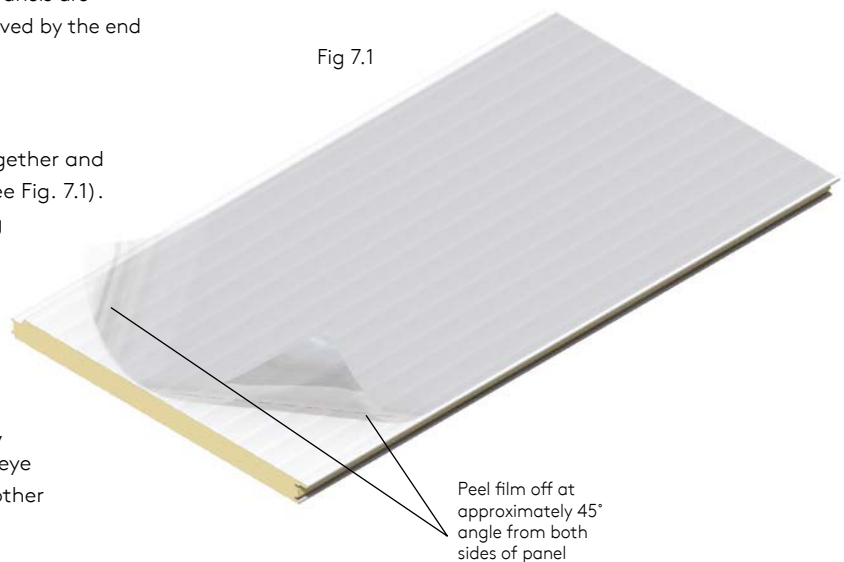
7.3

Loosen film along both edges, grab corners together and peel off while walking down length of panel (see Fig. 7.1). Also remove protective film from along leading edge of panel before placing the KarrierRail™.

7.4

If adhesive residue remains on panel surfaces after the protective film is removed, panels may be cleaned with a rag soaked in Formula 409, SFR or equivalent. After cleaning, rinse thoroughly. For safety, provide adequate eye and skin protection, ventilation and follow all other manufacturer's instructions.

Fig 7.1



8 Structural Steel Framing

NOTE

The building's structural steel alignment is extremely important with the KarrierRail™ system. The rail system will reflect the contours of the underlying wall supports. This in turn will impact the fit and finish of the rainscreen system.

8.1

Review shop drawings prior to installation to verify that structural members are in the correct location.

8.2

Installer must examine the alignment of the structural steel before installation of the wall panels. The walls must be square, and support members to which panels are attached must be in the same plane, flat and free of obstructions such as weld marks, bolts or screw heads.

For vertically installed panels, support members shall be:

- a. Plus or minus 1/8" (3.17 mm) in 5 feet (1524 mm) in any direction along plane of framing
- b. Plus or minus 3/8" (9.525 mm) in 20 feet (6096 mm) cumulative in any direction along plane of framing
- c. Plus or minus 3/4" (19.05 mm) from framing plane on any elevation. Panel supports must extend to the outer extremities at all panel terminations.

8.3

For horizontally installed panels, support members shall be:

- a. Plus or minus 1/8" (3.17 mm) in 5 feet (1524 mm) in any direction along plane of framing
- b. Plus or minus 1/4" (6.35 mm) in 20 feet (6096 mm) cumulative in any direction along plane of framing
- c. Plus or minus 1/2" (12.7 mm) from framing plane on any elevation. Panel supports must extend to the outer extremities at all panel terminations.

Any variance from tolerances can affect both performance and aesthetics and must be reported to the architect and general contractor, and corrected by the responsible party before panel installation begins.

9 Panel Cutting Procedures

9.1

Personnel working with panel cutting equipment should wear respiratory and eye protection at all times.

9.2

Panel cutting should take place prior to panel installation whenever possible.

9.3

Use the appropriate cutting tools with extreme care to avoid panel delamination. Do not use a cutting disk, torch, and other high heat producing methods for cutting. Hot filings may damage the painted surface of the panel. Kingspan recommends use of a circular saw

with a fine tooth carbide tip blade (40 tooth minimum). A band saw with a suitable metal cutting blade may also be used.

9.4

For small penetrations, a Dremel type router may be used to cut each face of the panel, and a serrated bread knife may be used to cut the foam core.

9.5

Power snips, nibblers or hand snips may be used to cut trims and flashings.

9 Panel Cutting Procedures

NOTE

Do not use an electric grinder, reciprocating saw, or any tool that may cause serious delamination which affects aesthetics, performance and panel warranty.



9.6

Step 1: Mark the cut line on the interior and exterior panel facings.

Step 2: Leave protective film in place during cutting. If film has already been removed, apply masking tape adjacent to the area to be cut.

Step 3: Recheck measurements and proceed with cutting operation. Cut the interior face of the panel and about $\frac{1}{4}$ of the foam thickness using a circular saw with a fine toothed carbide tipped blade. Then carefully turn panel over and cut the exterior face and the remainder of the foam.

Step 4: For panels located at framed opening locations where 50% or more of the panel width is removed, cut interior face and foam to a depth of approx. $\frac{1}{4}$ ". Flip panel over and cut exterior face and foam to a depth of approx. $\frac{1}{4}$ ". Then cut through the joints on the edge of the panel that is to be removed for the opening. Lift the panel into place, secure with fasteners as required, then use a serrated bread knife to fully cut through the foam and remove the cut section of panel.

Step 5: File or sand off any burrs or rough spots at the cut line. Sweep off all metal shavings etc. Best practices include use of touch up paint on any cut edge. The panel is now ready to be erected.

Fig. 9.1



10 Sealant Placement

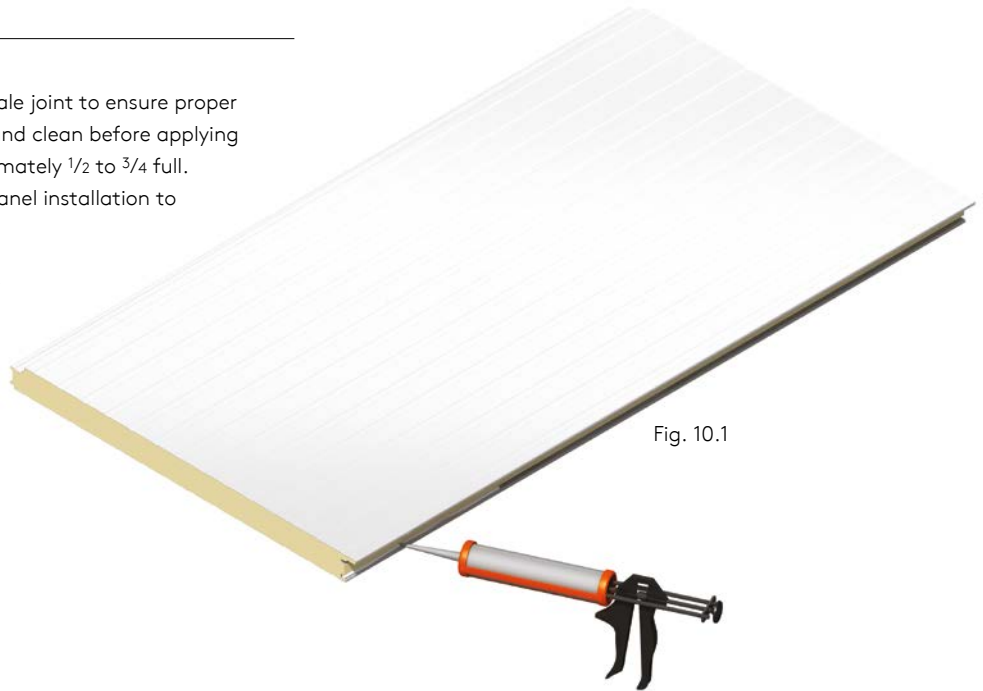
10.1

Apply butyl sealant to interior female joint to ensure proper vapor barrier. Joint should be dry and clean before applying sealant. Fill female pocket approximately $\frac{1}{2}$ to $\frac{3}{4}$ full. Add / delete as necessary during panel installation to maintain proper panel seal.

Applying sealant on site (Fig. 10.1).

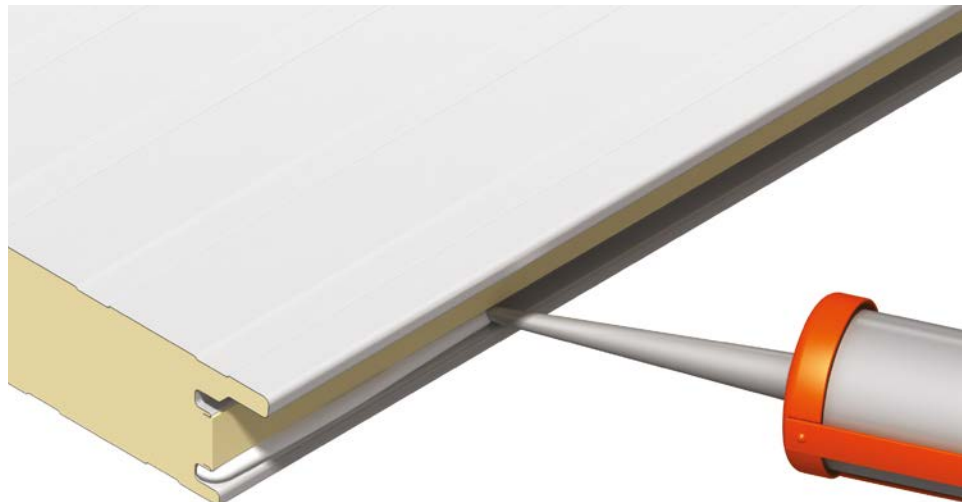
NOTE

Pull (not push) caulk tube along length of side joint for more uniform sealant bead.



NOTE

In extreme cold weather locations, it may be advisable to caulk both interior and exterior joints. It is also advisable to keep sealants in a warming bin until ready for use to ensure proper viscosity. Contact Kingspan Technical Services for more information.



11 Panel Touch-up Paint

11.1

The panel erector is to touch up all exposed field cut edges with touch up paint. Contact Kingspan Customer Service for information on appropriate touch up paint.

12 Panel Cleaning and Maintenance

12.1

Proper installation and maintenance are extremely important in obtaining the very best service and appearance from pre-painted metal insulated panels.

12.2

All dirt, oil, grease, fingerprints, metal filings or other contaminants should be removed to assure proper service life of the paint system. The installer should wipe-down the panels as they are erected.

12.3

Dirt pickup may cause apparent discoloration of the paint after prolonged exposure. Slight chalking from strong sunlight exposure may also cause a change in appearance. A thorough cleaning will usually restore the original appearance of the panels.

12.4

In many cases, a simple low pressure wash of the building with plain water will be adequate. In areas of heavy dirt deposits, a solution of water and detergent (1/3 cup liquid Tide per gallon of water) may be used. Use a rag, sponge, or soft bristle brush to clean. A clean water rinse should follow.

12.5

Mildew may occur in areas subjected to high humidity. To remove mildew, use the following solution followed with a clear water rinse: 1/3 cup of detergent (Tide), 2/3 cup of tri-sodium phosphate (Soilex), 1 quart sodium hypo chlorite 5% solution (Clorox), 3 quarts water.

12.6

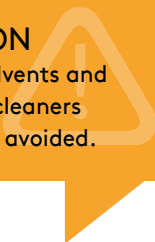
Caulking compounds, oil, grease, tars, wax and similar substances can be removed by wiping with a cloth soaked with WD-40 lubricant or Oil-flo 141. Test on an inconspicuous area first. Do not rub excessively or damage to the finish may result. Wipe only contaminated areas and follow with detergent cleaning and thorough rinsing.

12.7

To remove oxidation and tough stains, use a household cleaner recommended for use on porcelain skins and bathtubs. This should be followed with a thorough rinsing. Wire brushing or any abrasive material may damage the painted surface and should not be used.

12.8

Contact Kingspan Customer Service to receive a copy of the complete Kingspan Panel Maintenance Manual.



CAUTION
Strong solvents and
abrasive cleaners
should be avoided.

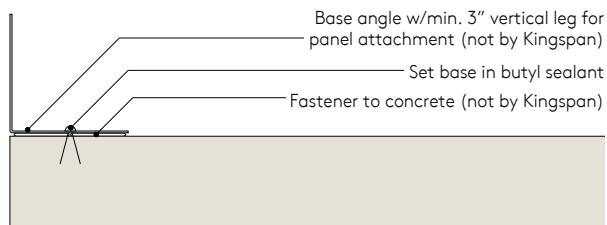
Vertical Panel Installation

Inspect panels to be installed on the elevation to be sheeted. Set aside panels with damaged sidejoints, surface dents or scratches. Remove excess foam (if any) from panel joints to allow proper panel engagement.

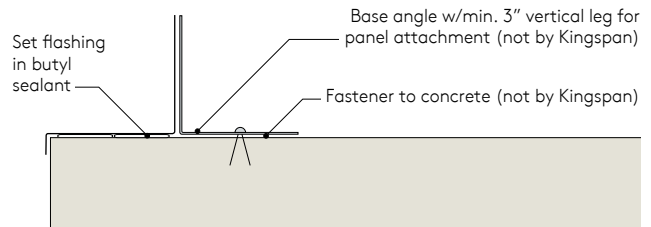
A Verify that the structural supports are properly aligned **before** installing panels (refer to Section 8 Structural Alignment).

B Install base support and associated drip flashings per project details.

Bypass Condition

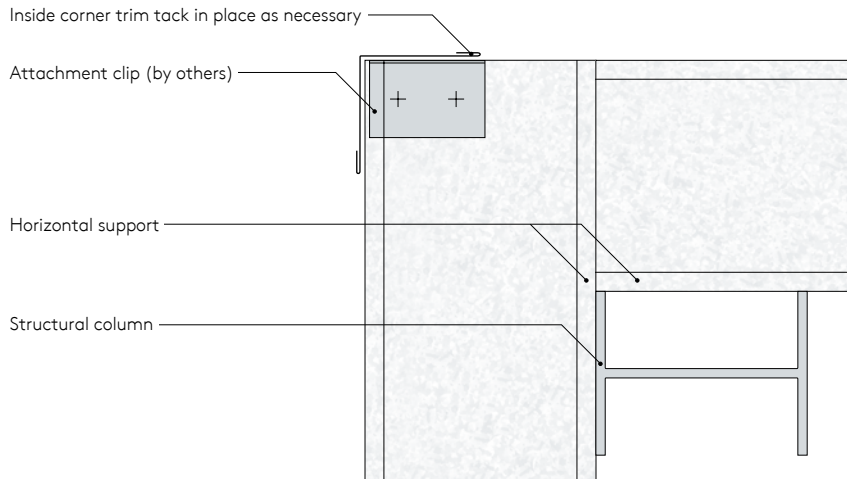


Flush Condition



(Typical base conditions)

C Install inside corner trim and associated structural supports per project details.



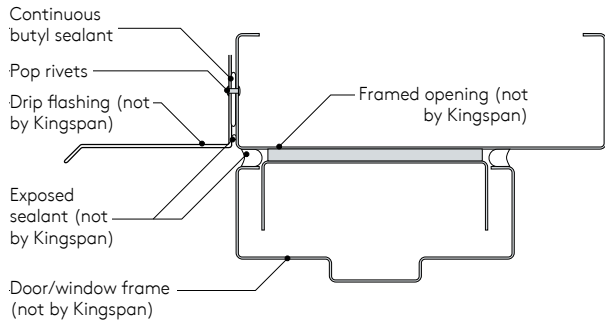
NOTE

All structural supports are by others (not by Kingspan) and are shown for illustrative purposes only.

Vertical Panel Installation

- D** Install *interior portion only* of two piece framed opening trims as indicated on project details.
Tack in place as necessary using pop rivets or similar.

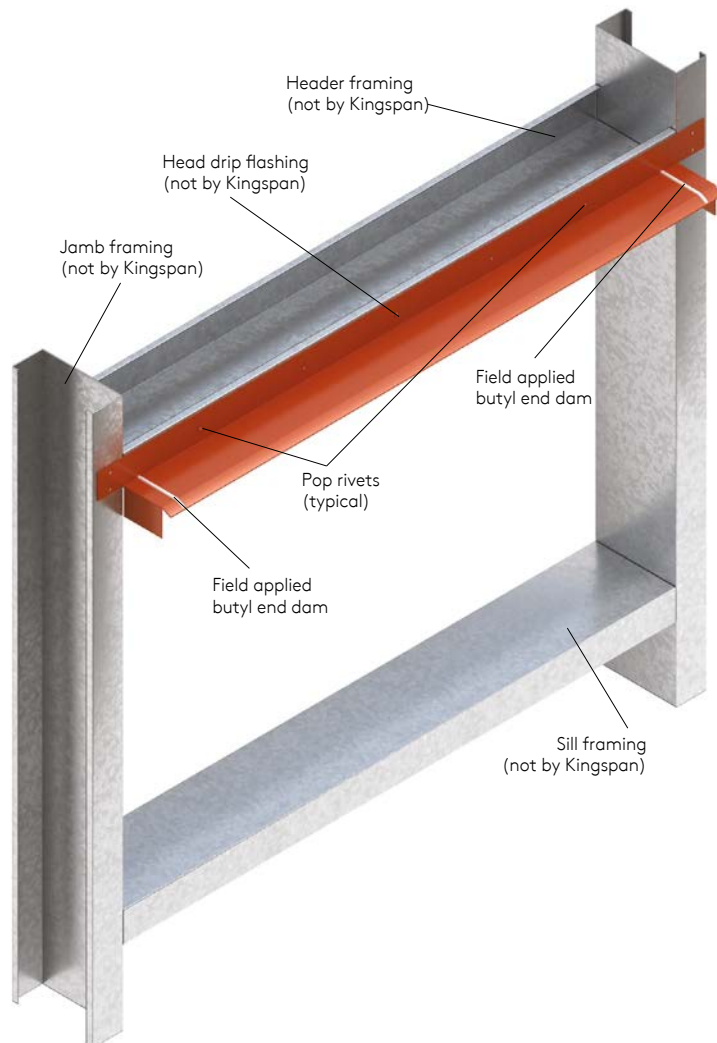
Two Piece Head Detail with Drip Edge



(Typical framed opening head conditions)

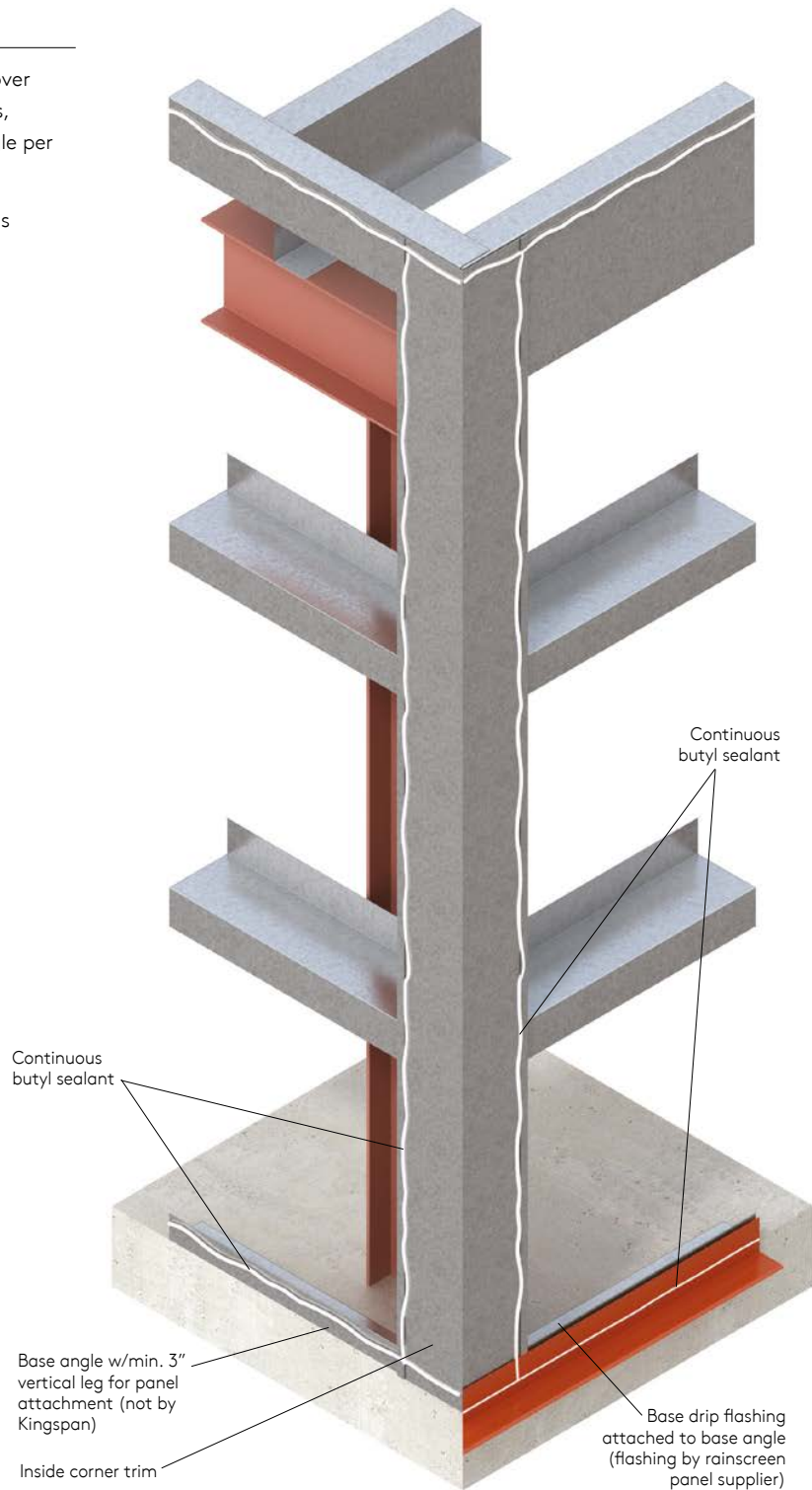
NOTE

One piece sill trims / extrusions to be installed AFTER panel installation, but BEFORE exterior header and jamb trims / extrusions are installed.



Vertical Panel Installation

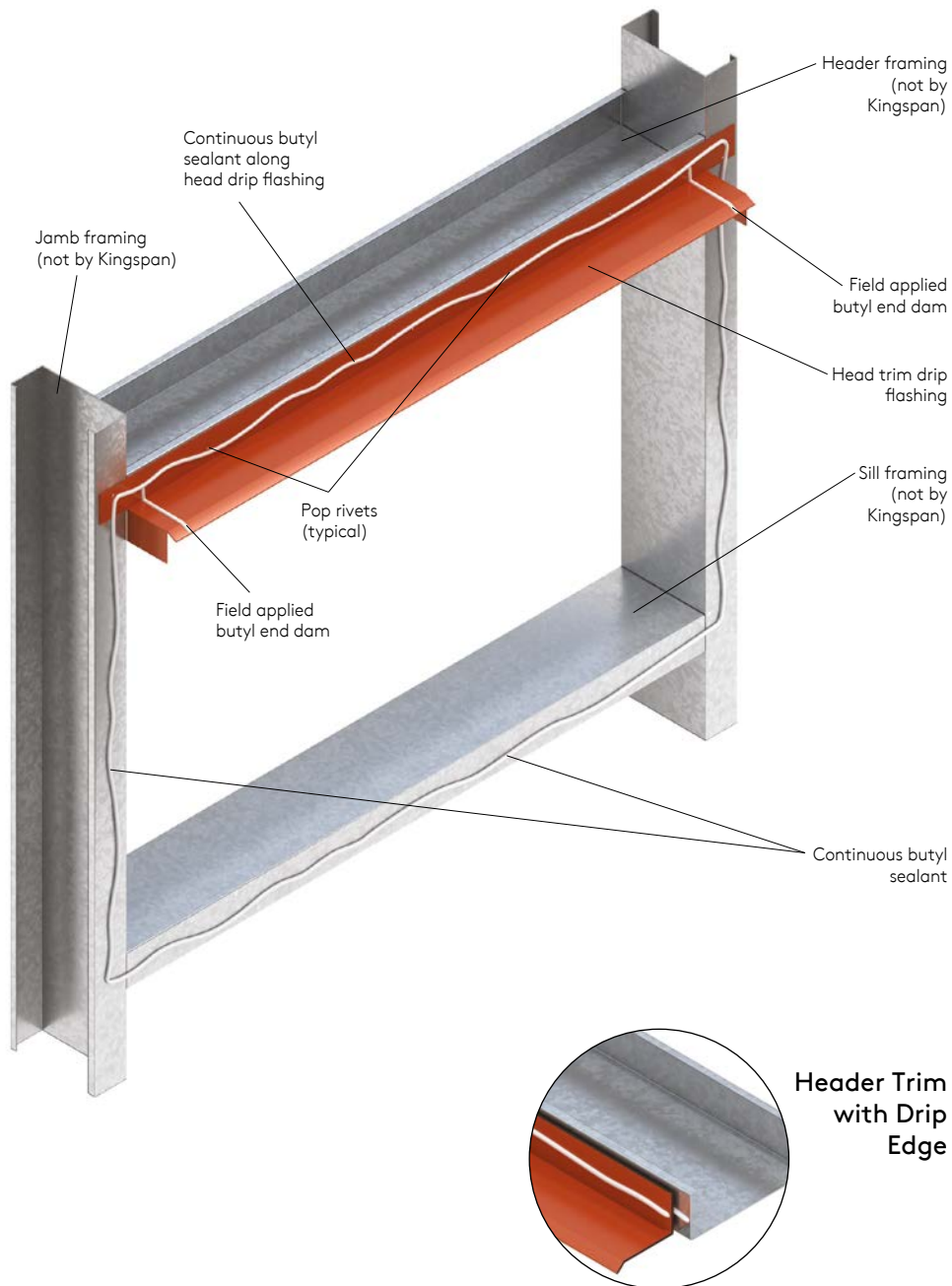
- E** Install butyl sealant (vapor barrier seals) over base support/flashings, inside corner trims, framed openings, eave strut and rake angle per shop drawing details.
- F** Install base drip flashing per shop drawings



(Bypass base condition shown)

Vertical Panel Installation

- G** Install butyl sealant on head drip trim, jambs and sill framing as shown.

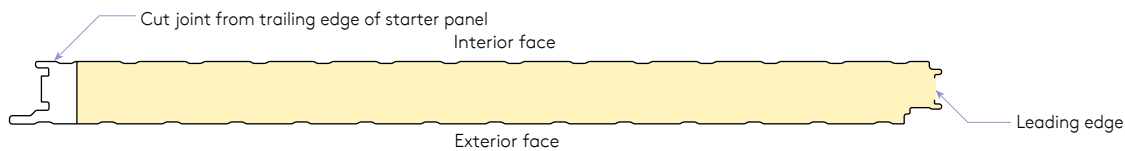


Vertical Panel Installation

- H** Sheeting is typically installed from left to right. (Sheeting direction may be changed by rotating panels 180° to change direction of joints).
- I** Cut the joints off *trailing* edge of the starter panel as shown. Be sure to cut first panel to proper width so that panel joints at framed openings are properly aligned.

NOTE

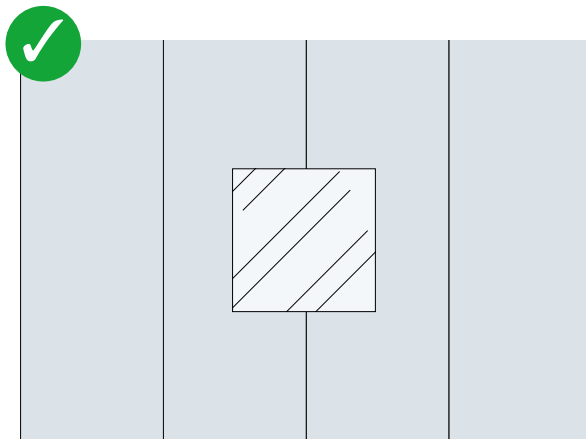
The leading edge is defined as the side of the panel with the hidden KarrierRail™ edge and fasteners.



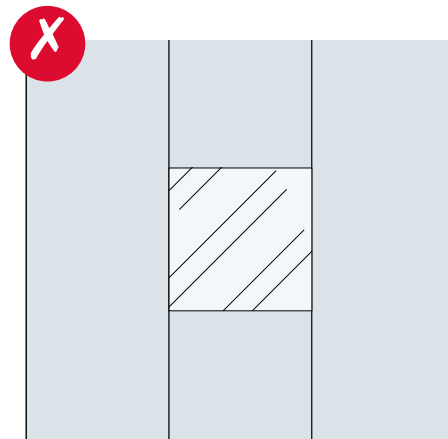
IMPORTANT INSTALLATION NOTES!

Panel layouts on the shop drawings should be drawn so that the vertical joints of the panel **DO NOT** line up with edges of framed openings. Lining up the vertical joints at penetrations does **NOT** allow proper weather seals due to the offset joint configuration of the KarrierRail™.

Framed Opening Locations



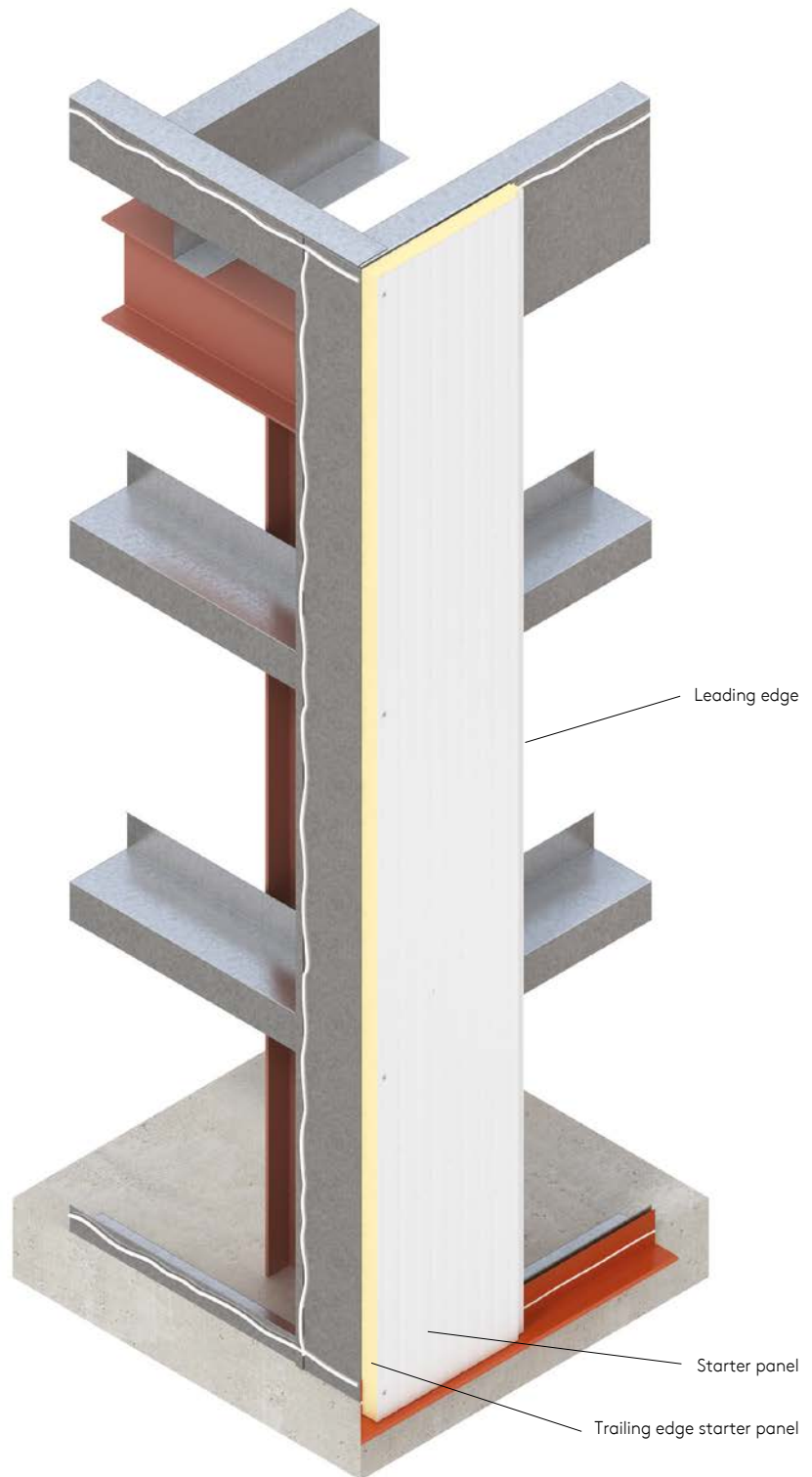
Panel joints offset from jamb
(preferred condition for better seal at jamb conditions)



Panel joints align with jamb

Vertical Panel Installation

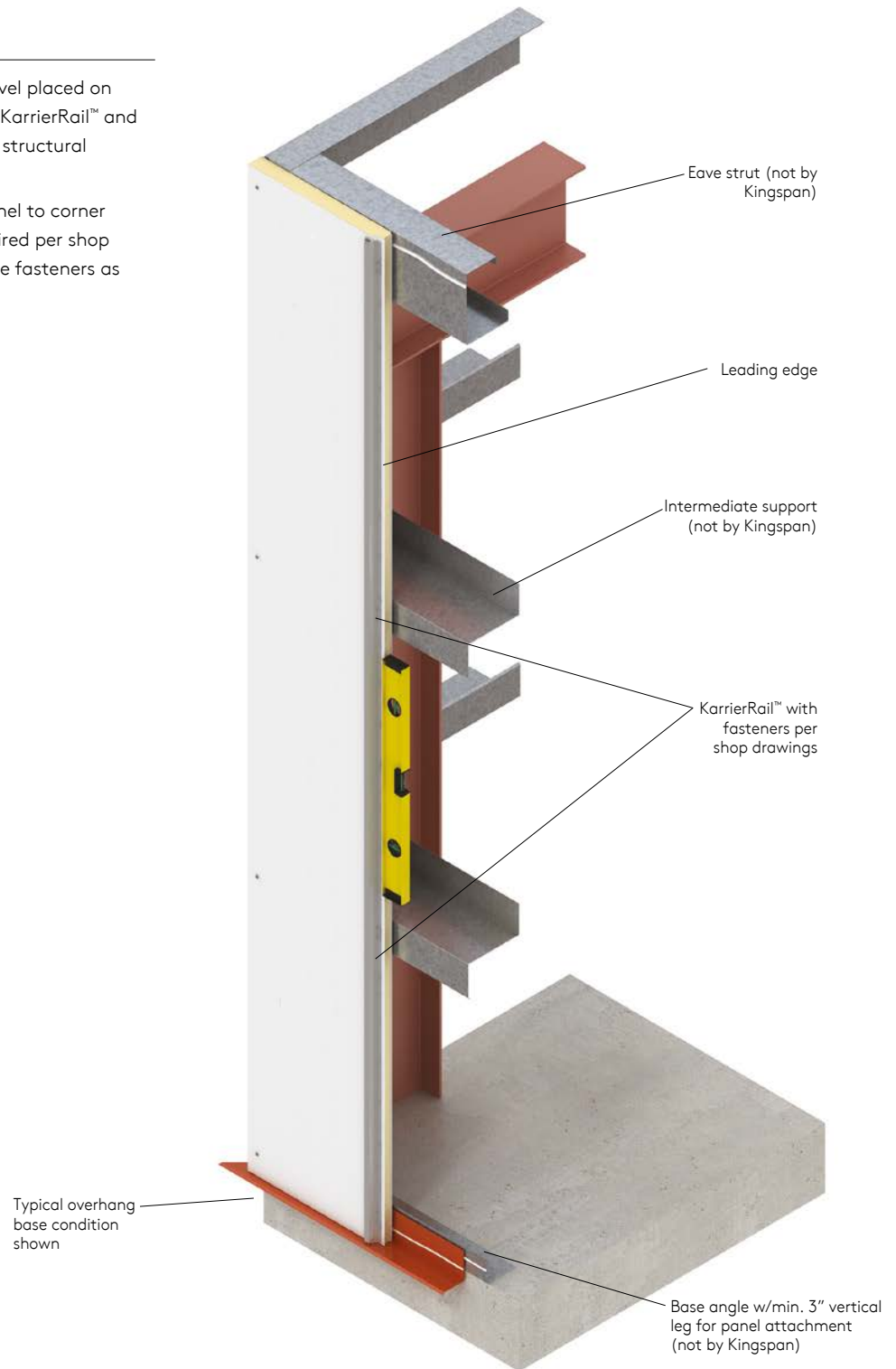
- J** Verify liner side joint sealant has been installed (per Section 10). Sealant quantity should be adequate to properly seal male to female (approx. 50% to 75% fill in female pocket).
- K** Lift starter panel into place and press firmly against structure to seat panel into butyl sealant on the structure and associated trims per E above.



Vertical Panel Installation

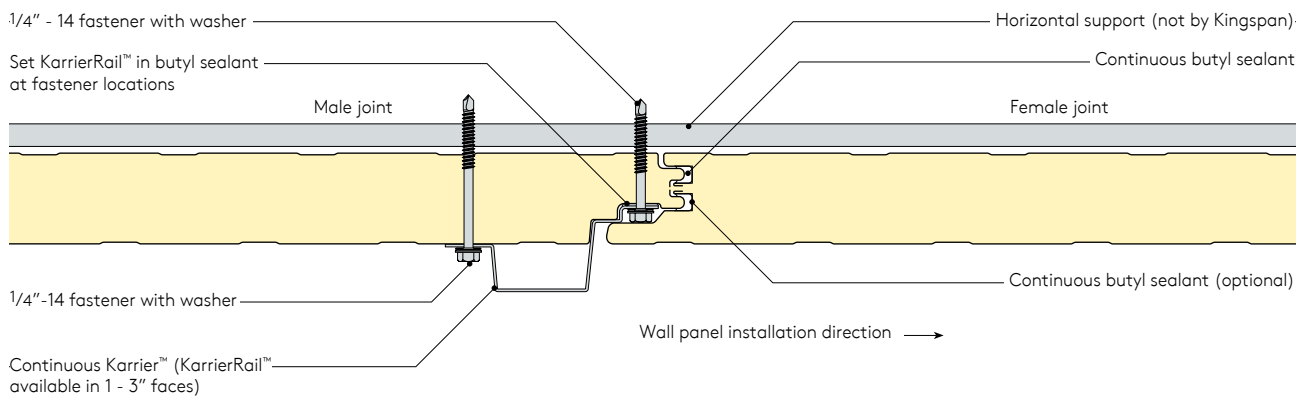
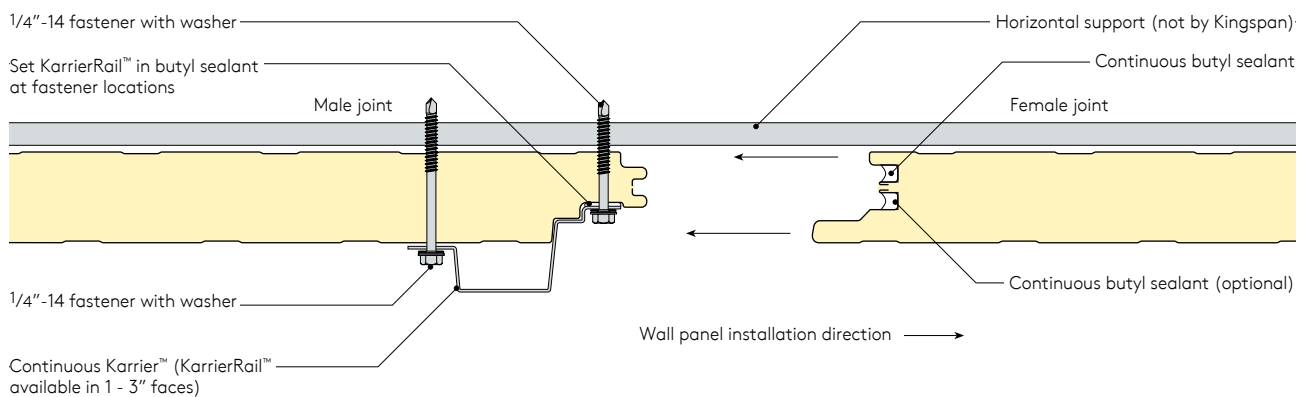
L Verify panel is vertical using a level placed on leading (non-cut) edge. Attach KarrierRail™ and panel with 2 fasteners at EVERY structural support per shop drawings.

Attach trailing (cut edge) of panel to corner structure with fasteners as required per shop drawings. Do not overtighten the fasteners as panel damage will result.



Vertical Panel Installation

- M** Attach trailing edge of KarrierRail™ to panel face with 1/4"-14 fasteners per shop drawings. Contact Kingspan Technical Services for size, type and spacing of expansion fasteners.



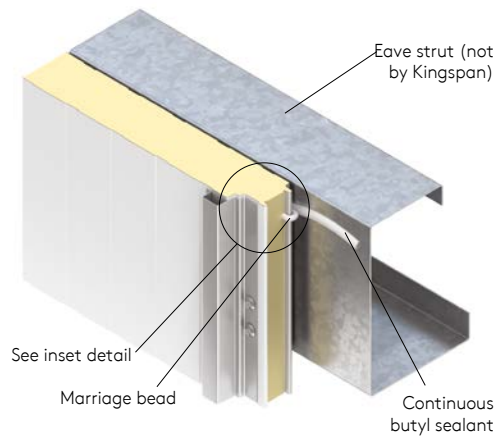
Vertical Panel Installation

N Install marriage bead of sealant from interior joint to supporting structure at EVERY panel termination, i.e. bottom of wall at base support, at framed openings AND at top of wall at eave strut.

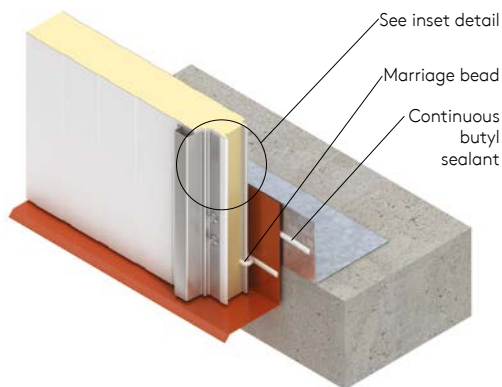
NOTE

Marriage beads are critical to ensure proper vapor barriers and are required at all panel terminations.

Eave Condition



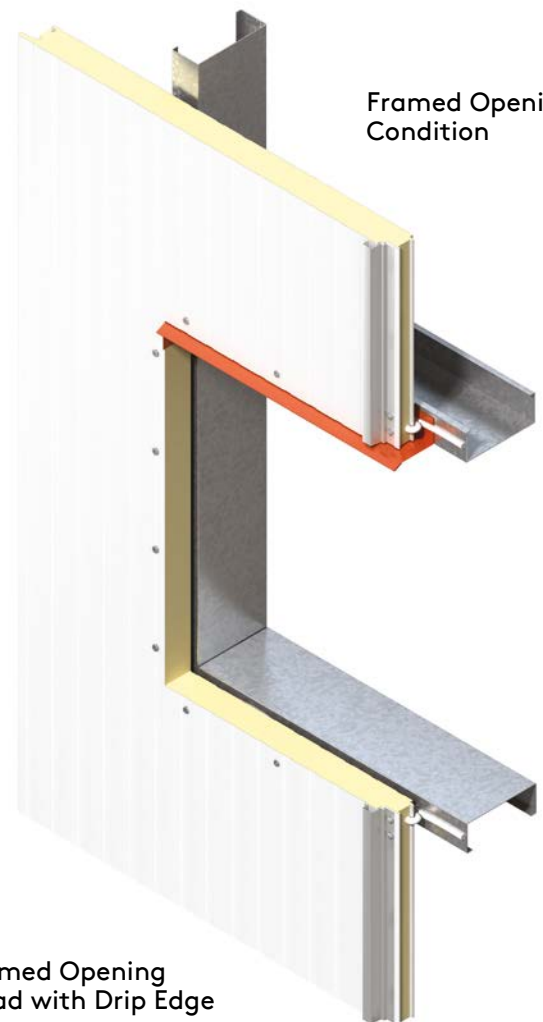
Base Condition



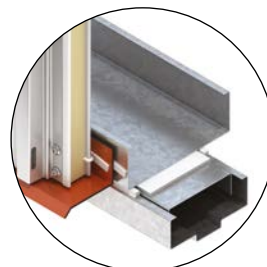
NOTE

Verify panels are completely engaged, with proper sealant contact and joint reveals.

Framed Opening Condition



Framed Opening Head with Drip Edge

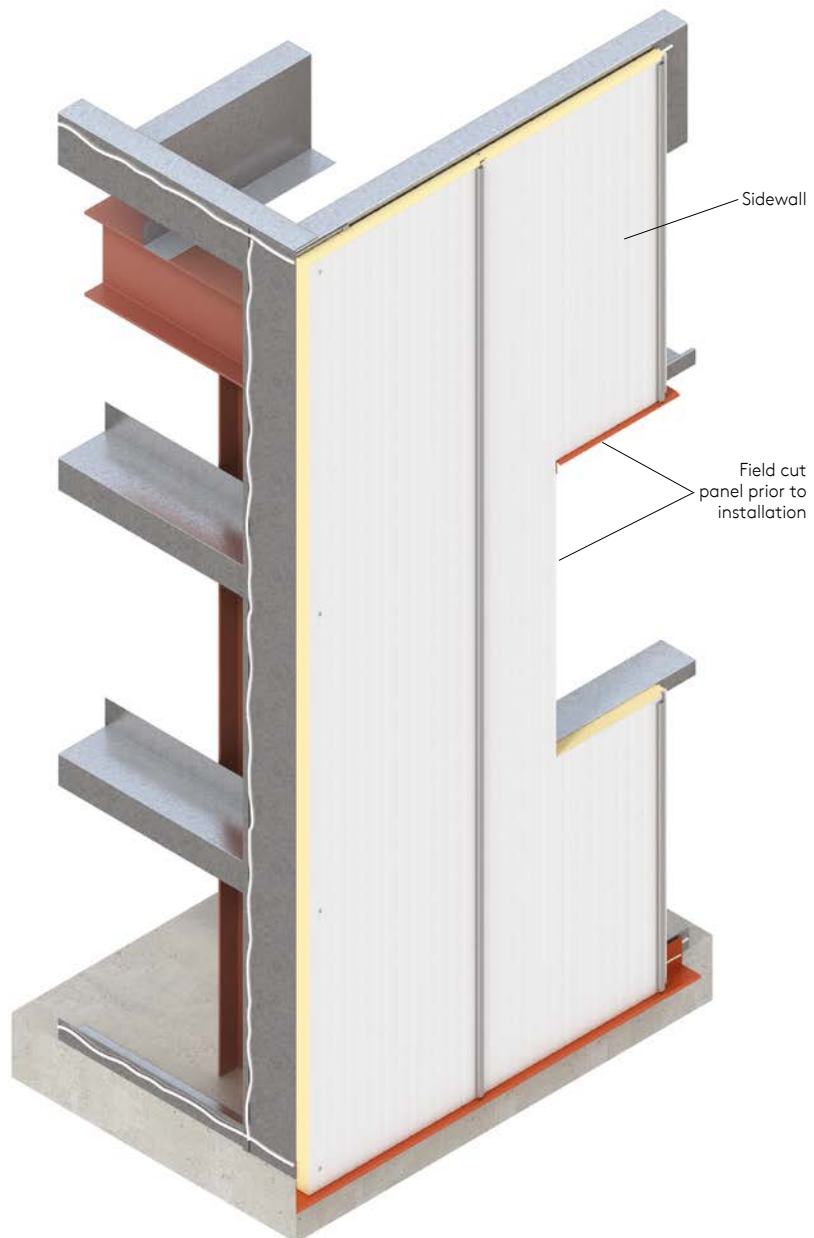


Vertical Panel Installation

IMPORTANT INSTALLATION NOTES!

It is generally easier to cut framed openings from panels prior to installing (refer to Section 9 for panel cutting directions). However, extra care must be taken during panel lifting to prevent kinking pre-cut panels. See Section 9.6 for information on cutting panels at framed opening locations.

- Lift next panel into position and fully engage with previously installed panel. Verify panel is vertical using a level placed on leading edge and install KarrierRail™ and fasteners as required.



Vertical Panel Installation

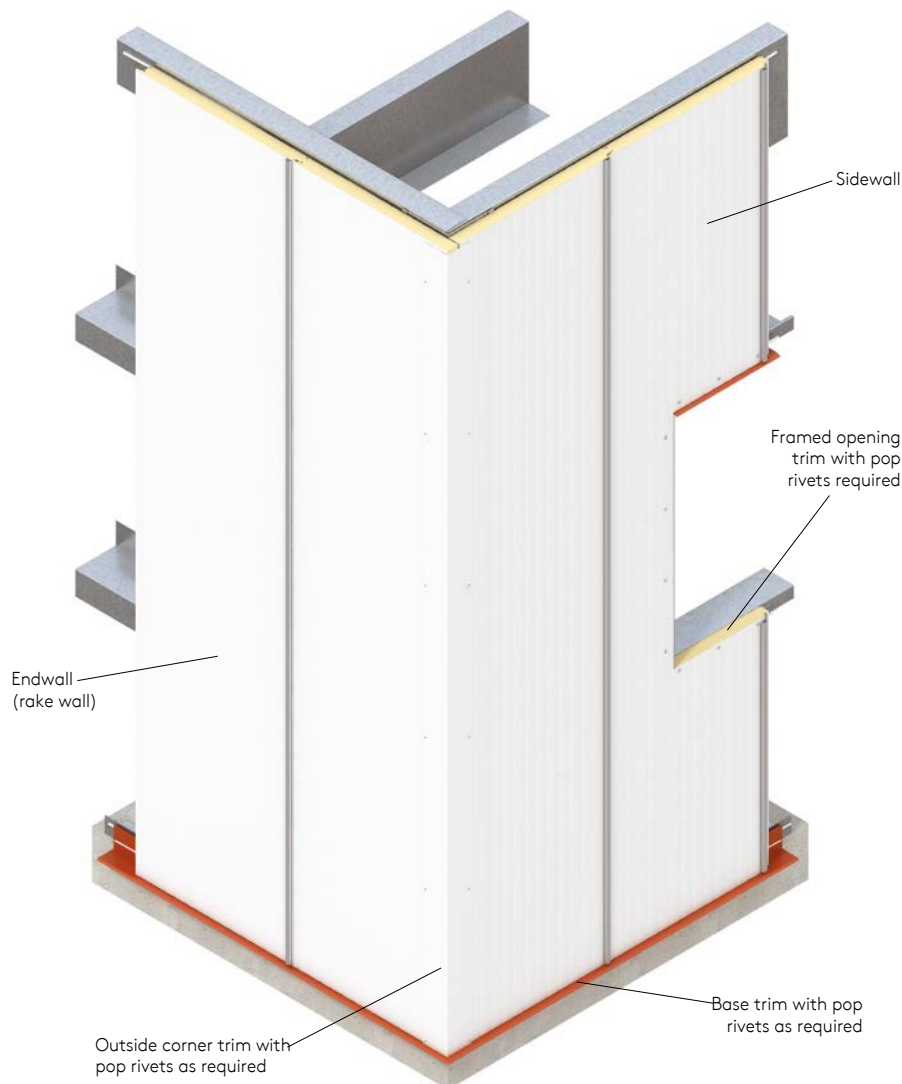
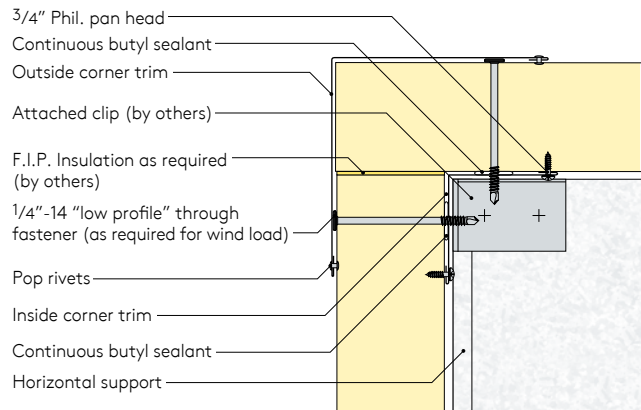
P Repeat steps K through N until wall elevation is completed.



Vertical Panel Installation

- Q** Repeat process for other wall elevations. For non-parapet wall conditions, endwall (rake wall) panels must be field cut to match slope of roof.
- R** Once all walls are sheeted, install exterior corner trims as required. Follow fastening information on project shop drawings.

Outside Corner with Flat Trim Detail

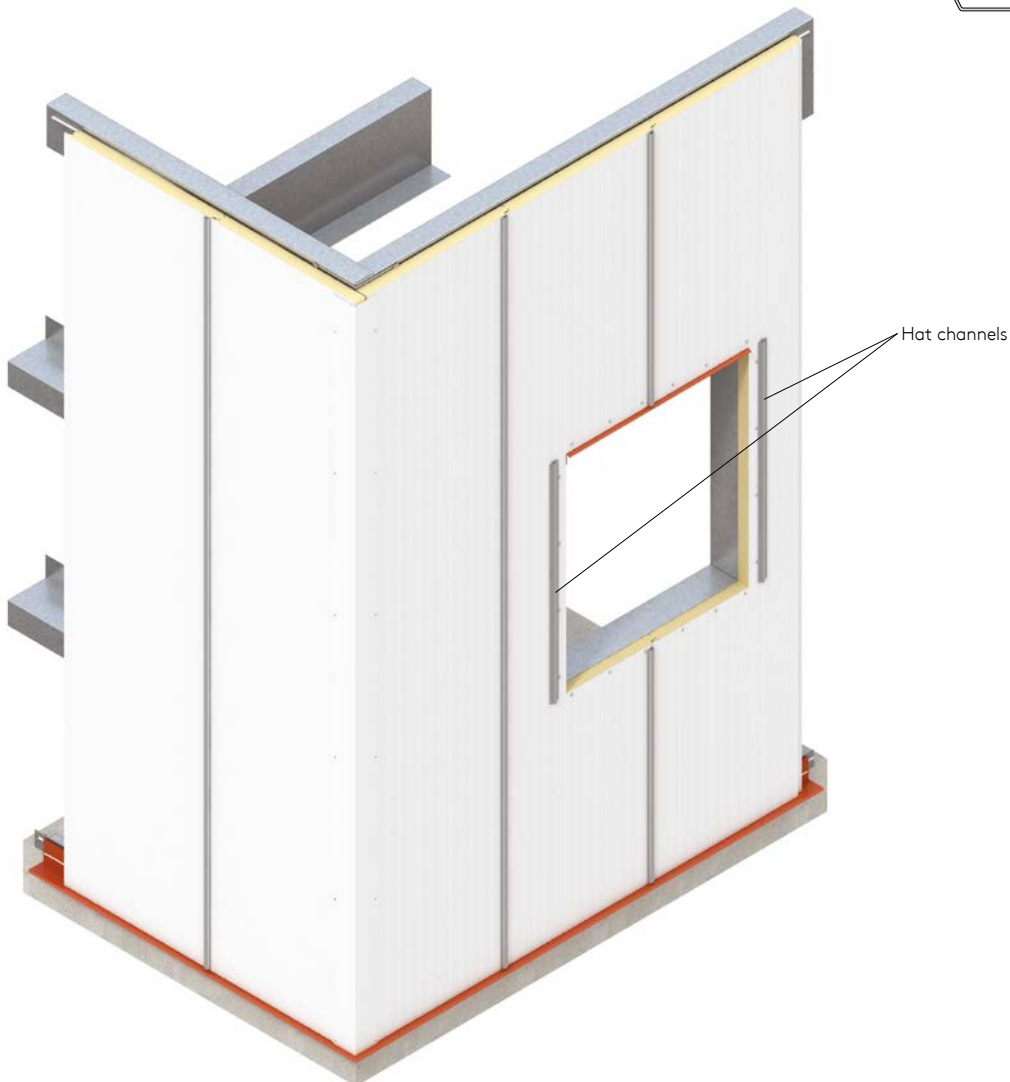
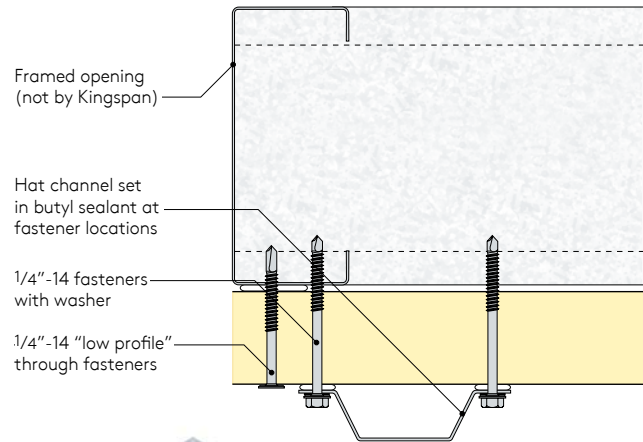


NOTE
Refer to page 33 for detailed instructions on framed opening trim assembly.

Vertical Panel Installation

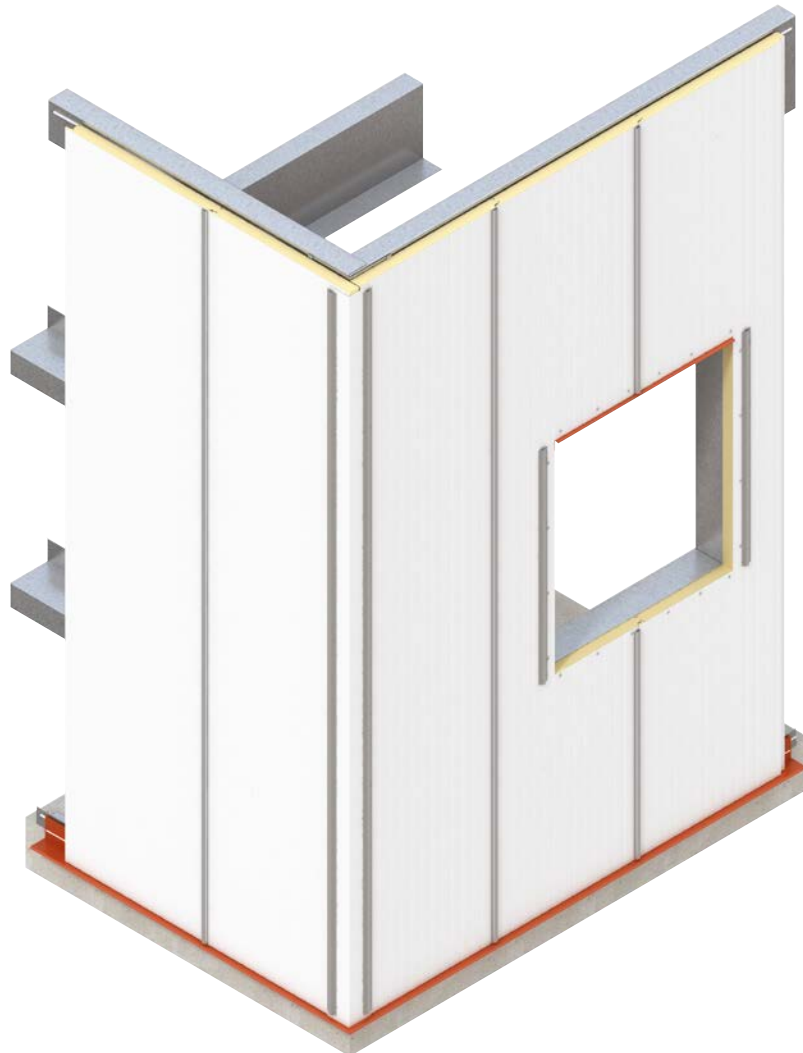
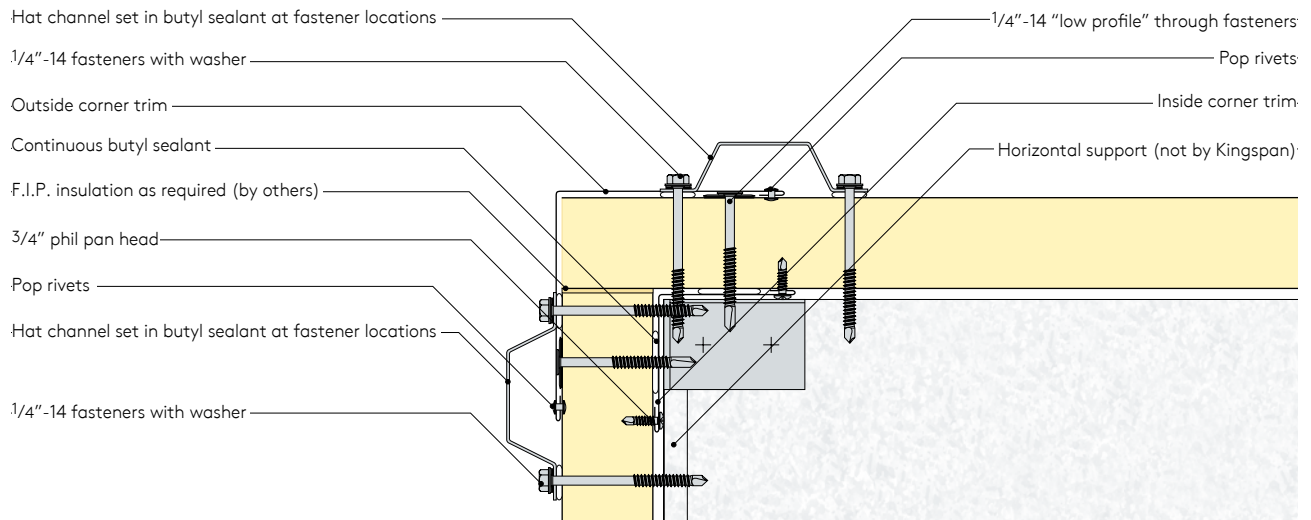
- S** Attach hat channels at jambs of framed openings (gauge and size to match the KarrierRail™).

Hat Channels at Framed Openings



Vertical Panel Installation

T Install hat channels at corners as required.



Vertical Panel Installation

U Install rainscreen panel per manufacturer's instructions.

NOTE

Rainscreen orientation may be rotated 90° by adding hat channels over the top of the KarrierRail™. Contact Kingspan Technical Services for more information.

Install continuous starter clip along base of panels and secure with fasteners per rainscreen details.

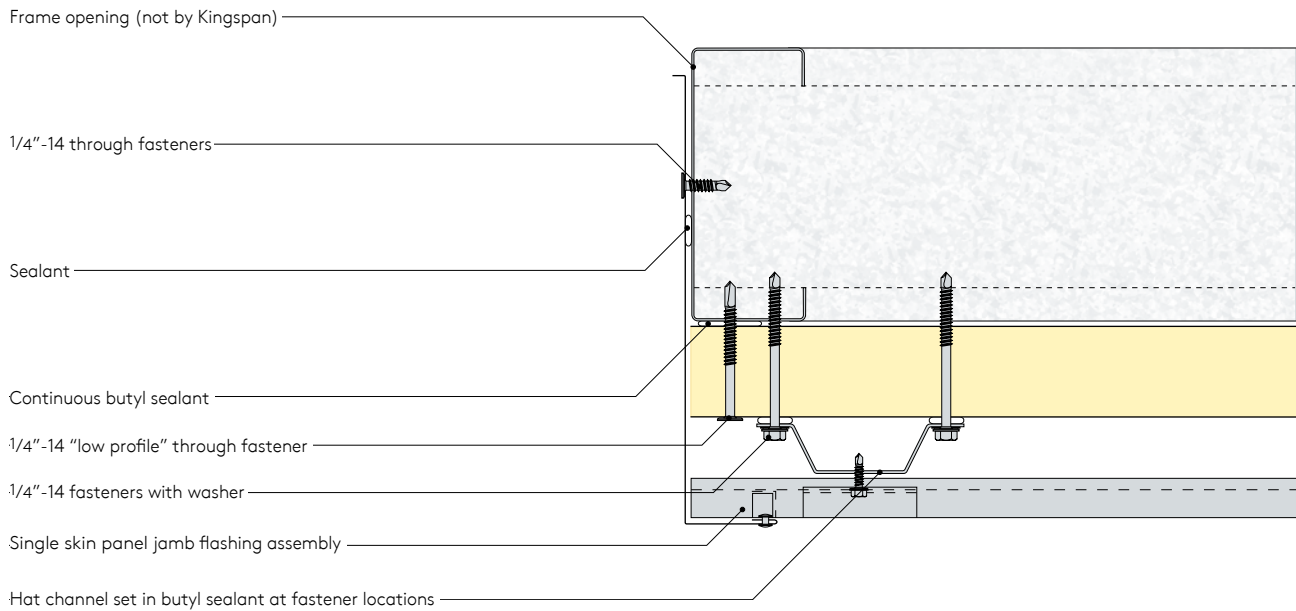
Install rainscreen panels and secure to KarrierRail™ with clips and fasteners per rainscreen details.

Engage panel and repeat until wall is covered.

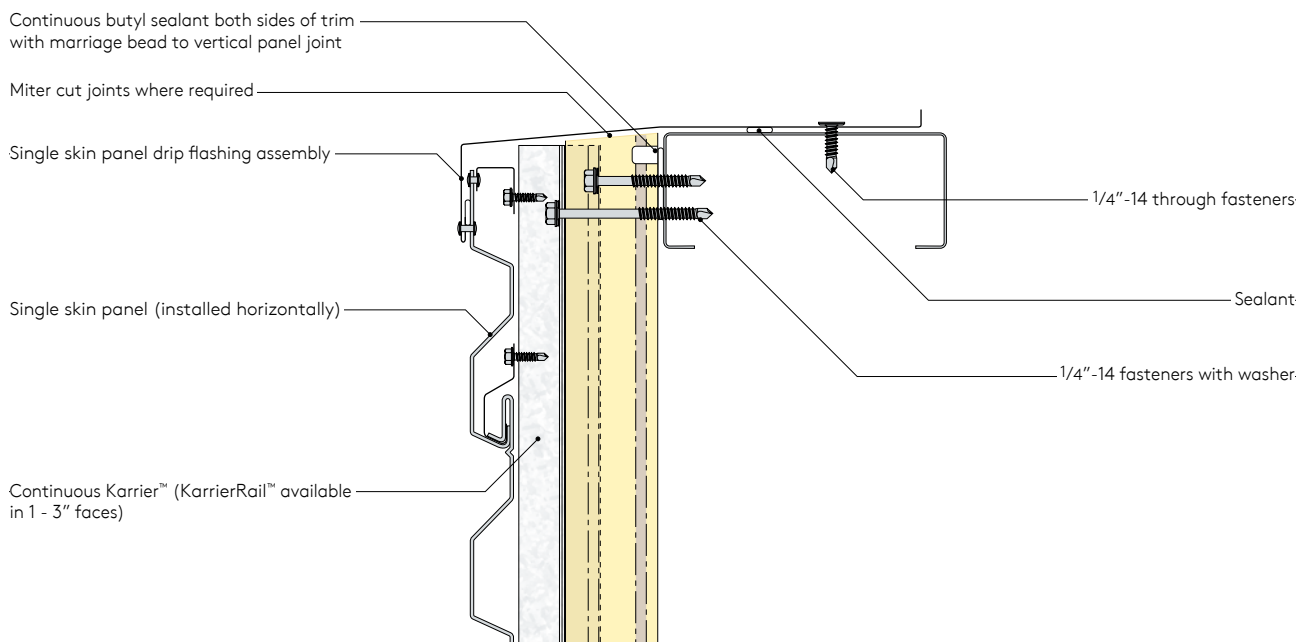
Vertical Panel Installation

V Install framed opening jamb and sill trims.

Framed Opening Jamb

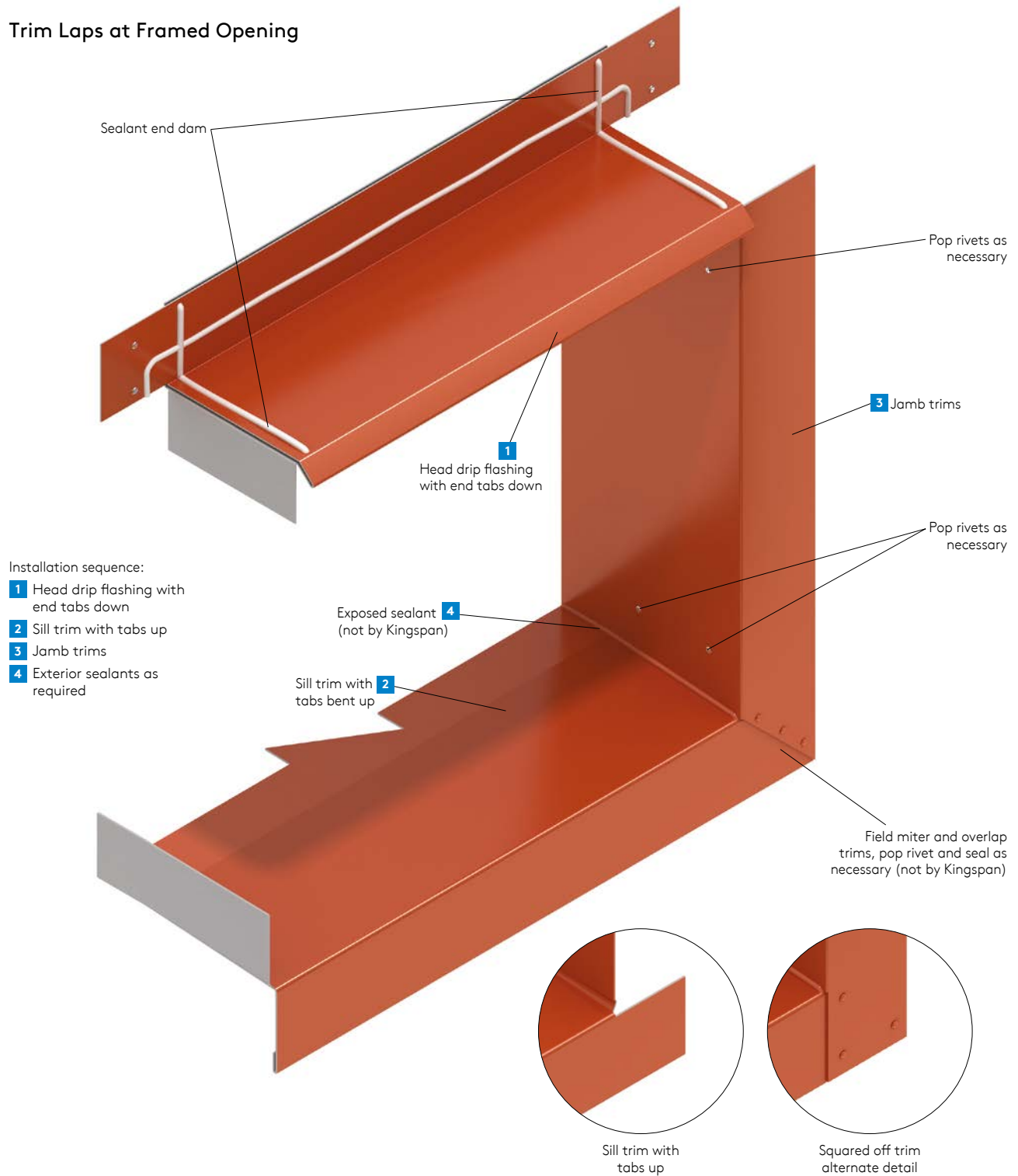


Framed Opening Sill



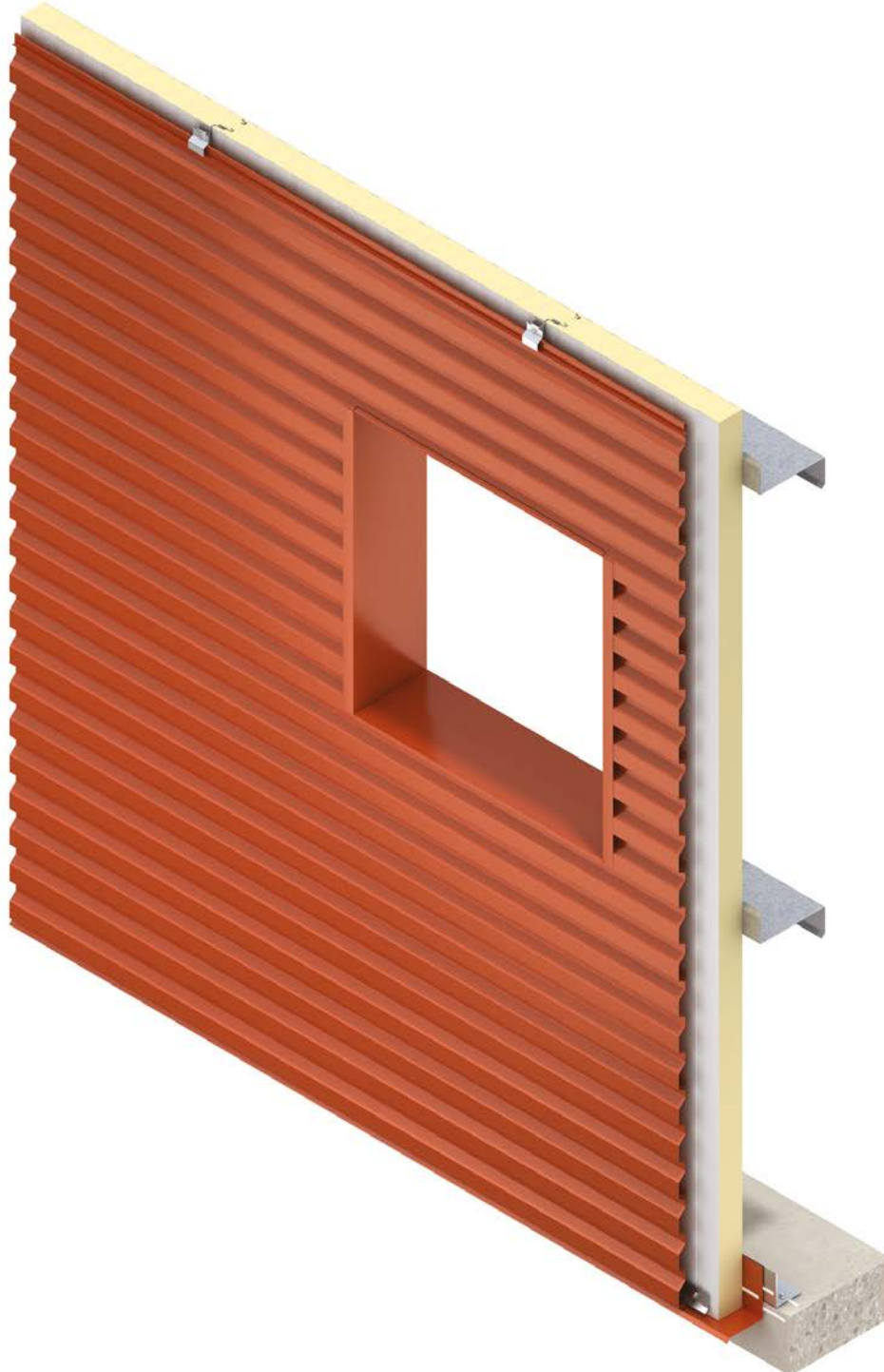
Vertical Panel Installation

Trim Laps at Framed Opening



Vertical Panel Installation

Completed Window Flashing



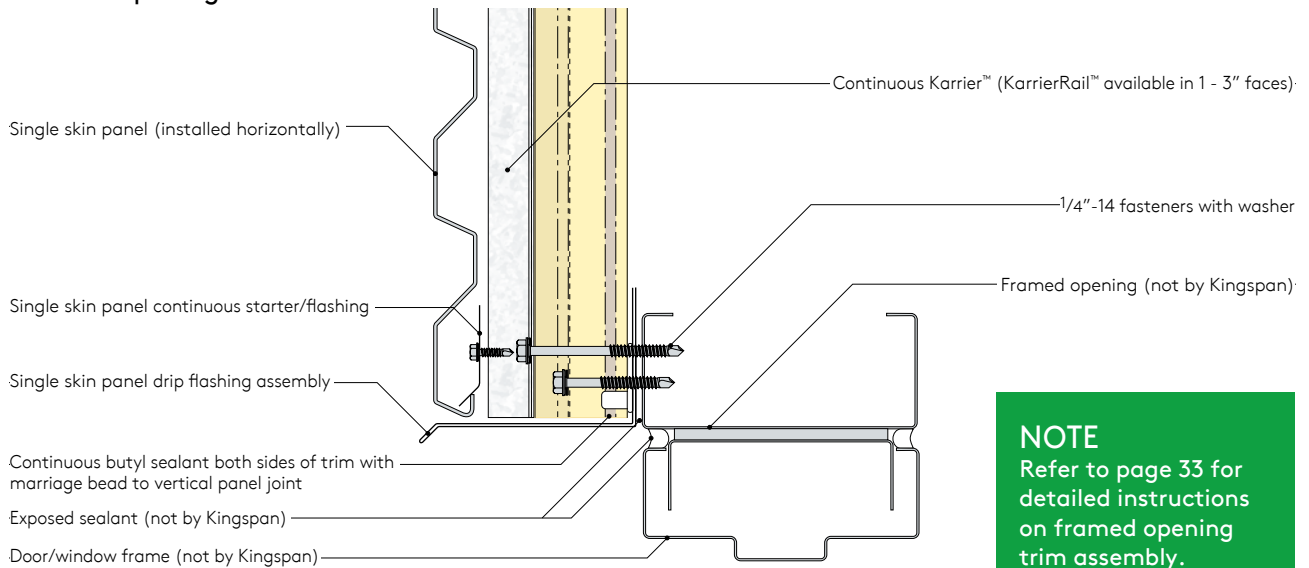
Vertical Construction Details

Disclaimer

These details are designed to show how single skin metal panels integrate with the KarrierPanel system. Please consult the rainscreen panel manufacturer you are using for installation instructions, exact trim profiles and project specific details.

Vertical KarrierPanel with Horizontal Metal Rainscreen Details

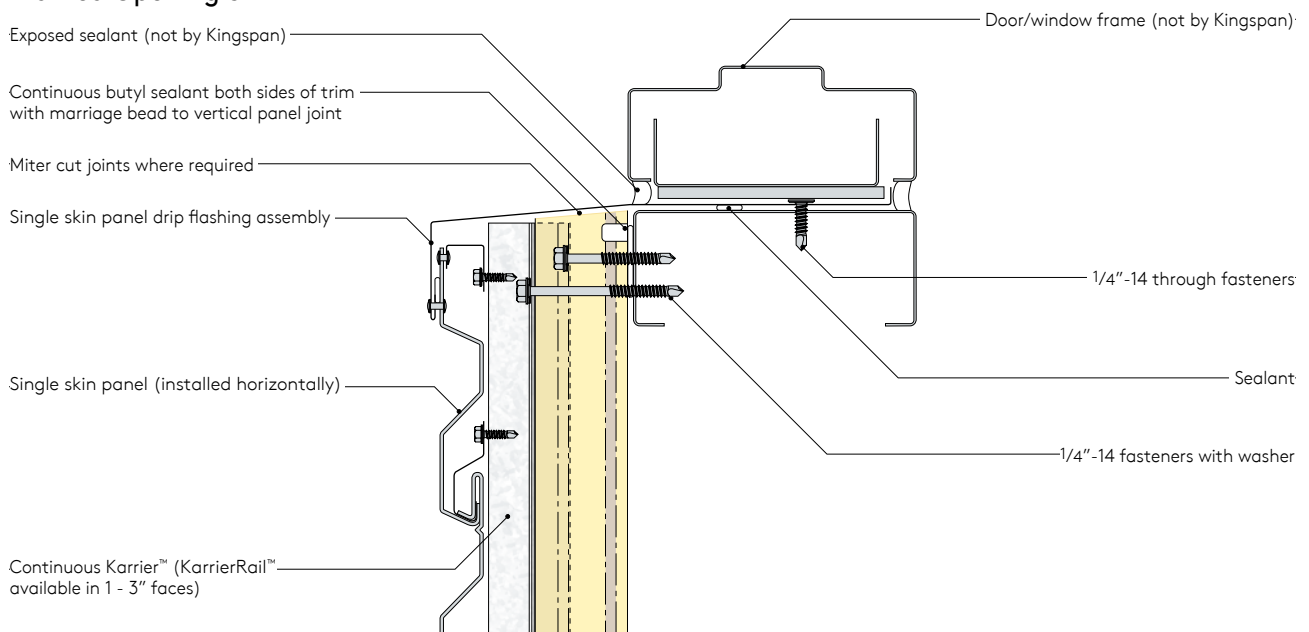
Framed Opening Head



NOTE

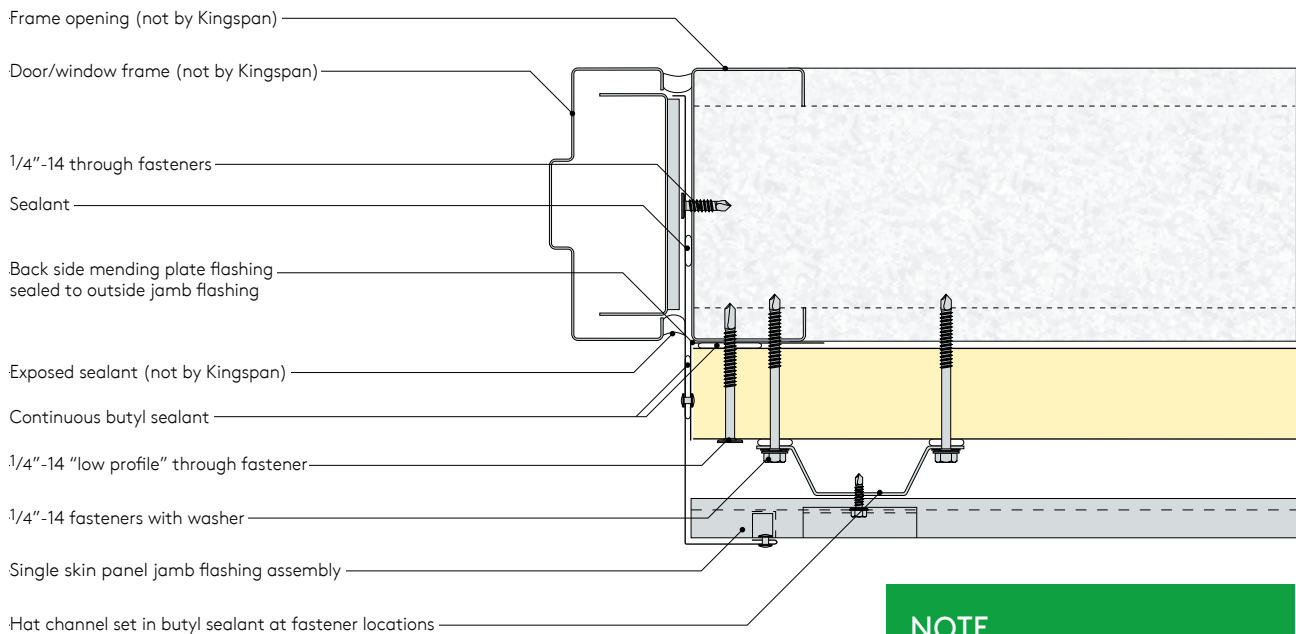
Refer to page 33 for detailed instructions on framed opening trim assembly.

Framed Opening Sill



Vertical Construction Details

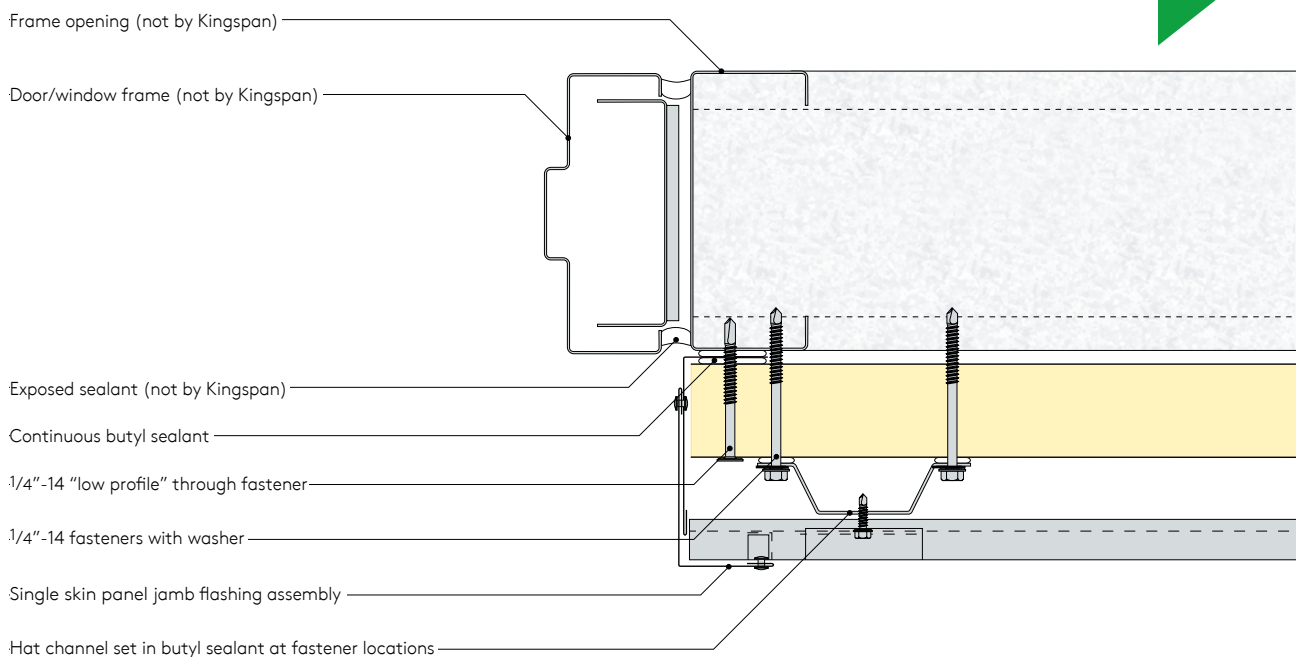
Framed Opening Jamb



NOTE

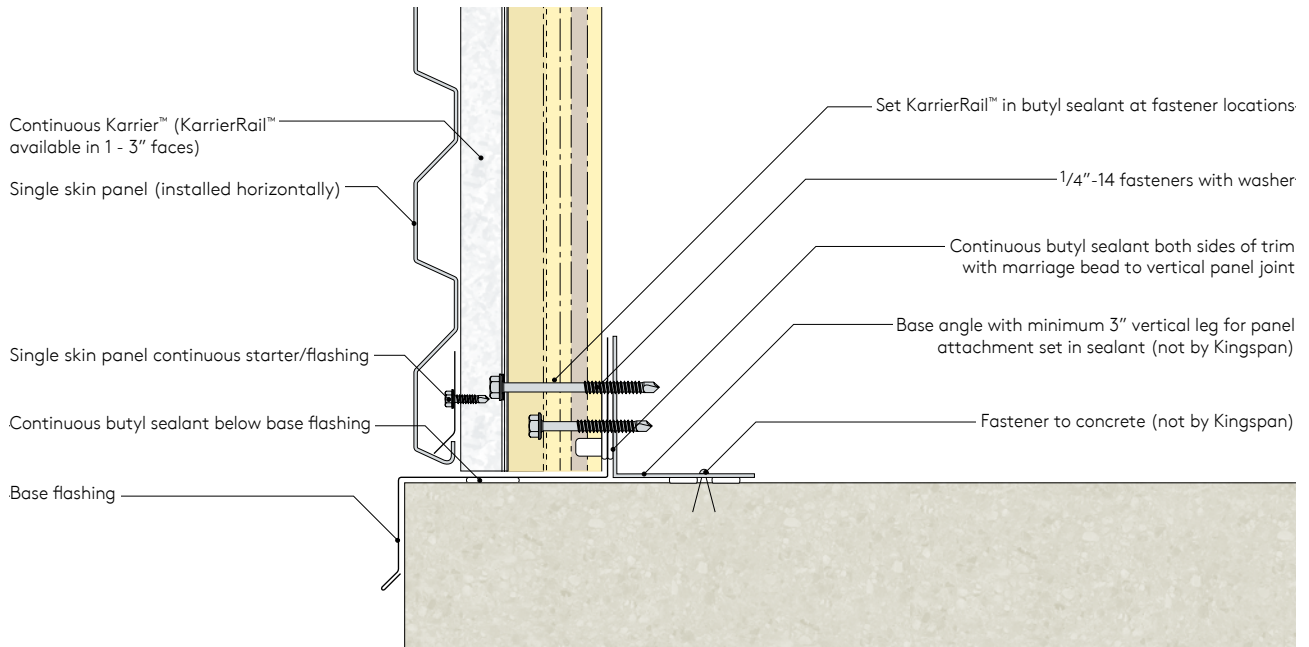
Use of this detail requires interior portion of jamb trims be installed PRIOR to installing KarrierRail™.

Framed Opening Two Piece Jamb

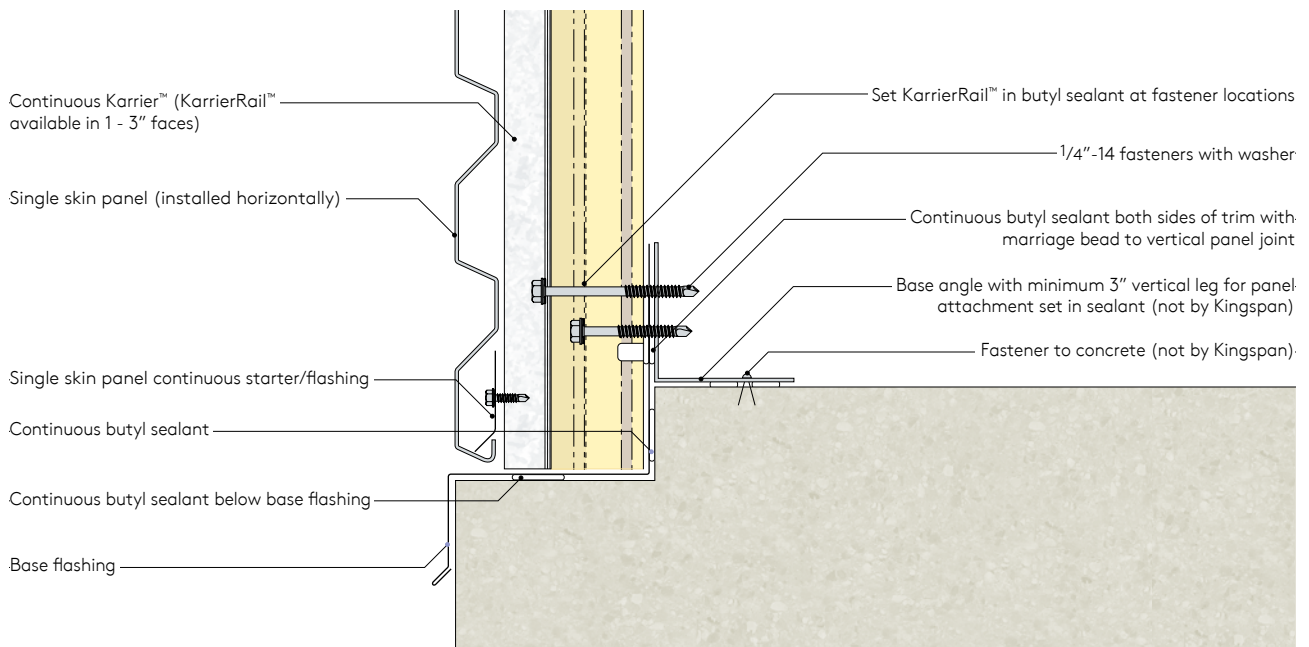


Vertical Construction Details

Base - Flush

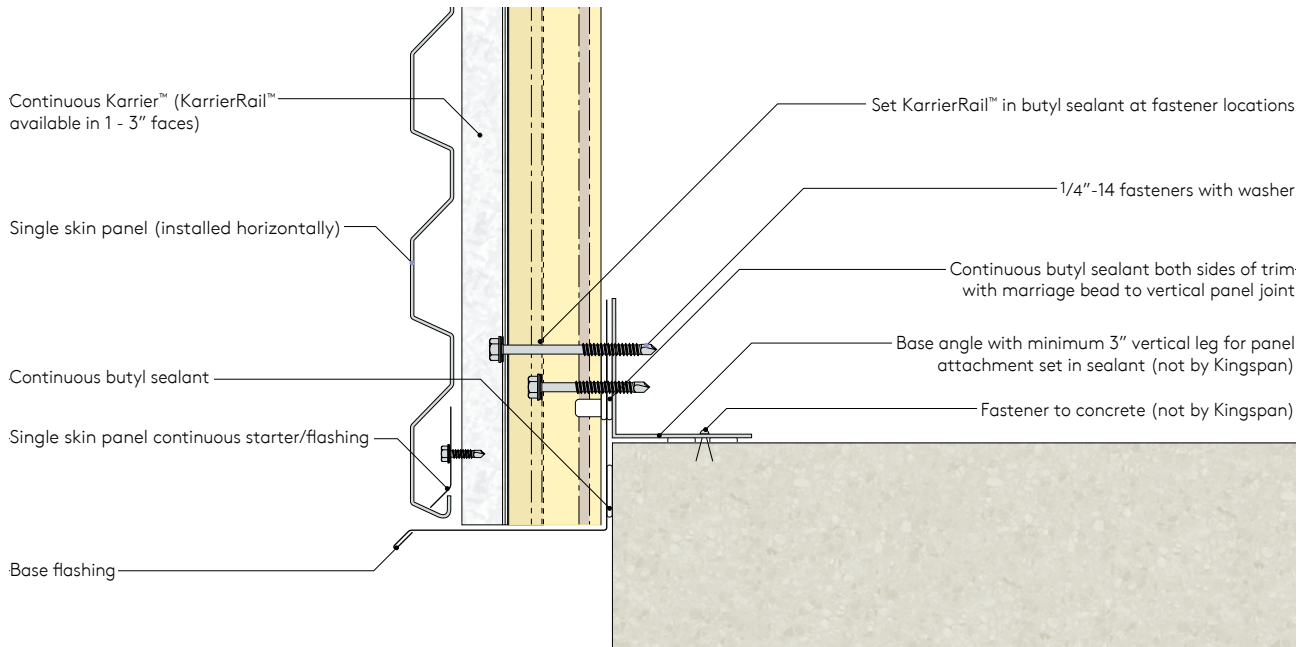


Base at Notched Concrete



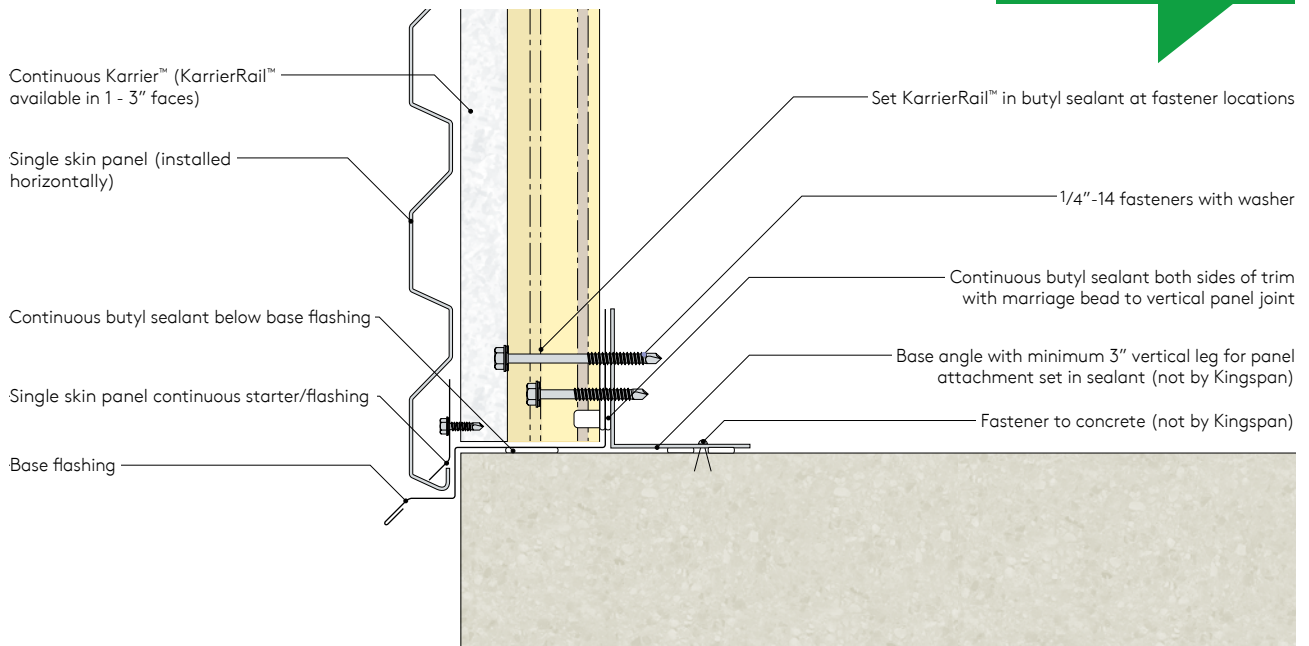
Vertical Construction Details

Base - Overhang with Angle



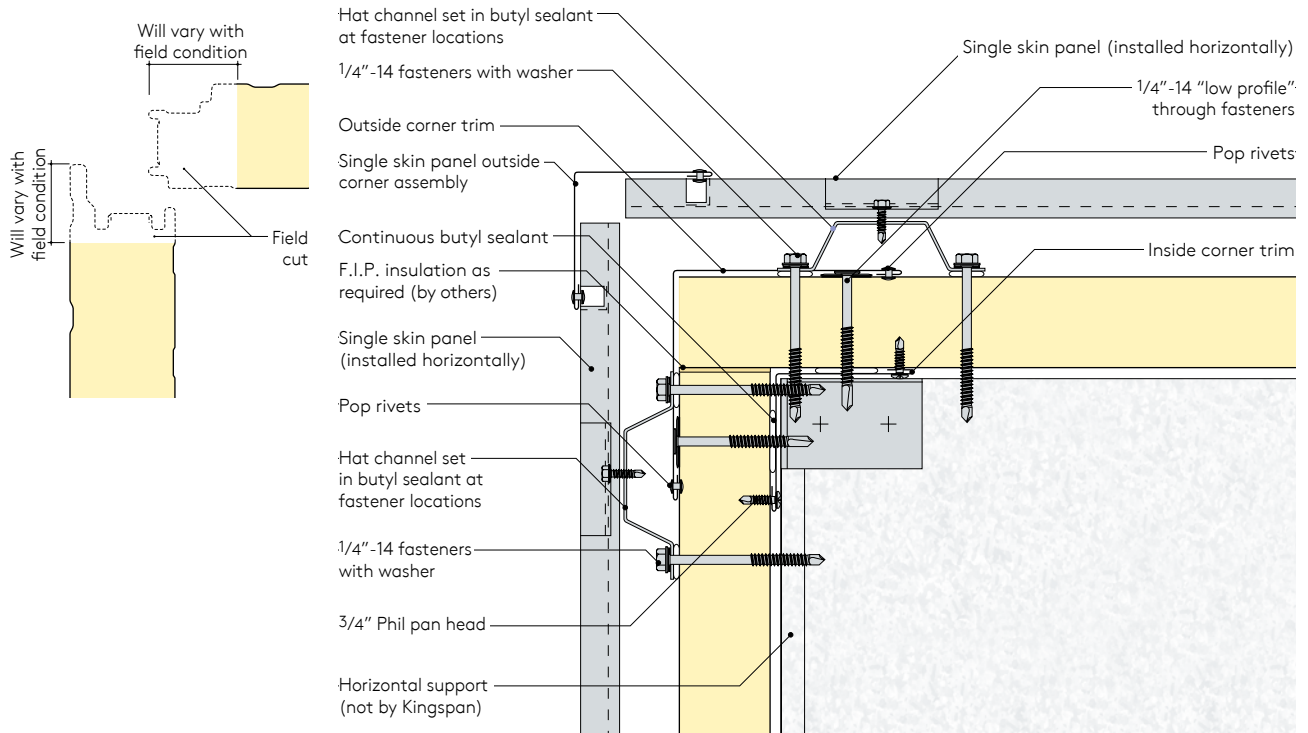
NOTE
Refer to page 43
for typical trim lap
instructions.

Base - Flush with Rainscreen Overhang

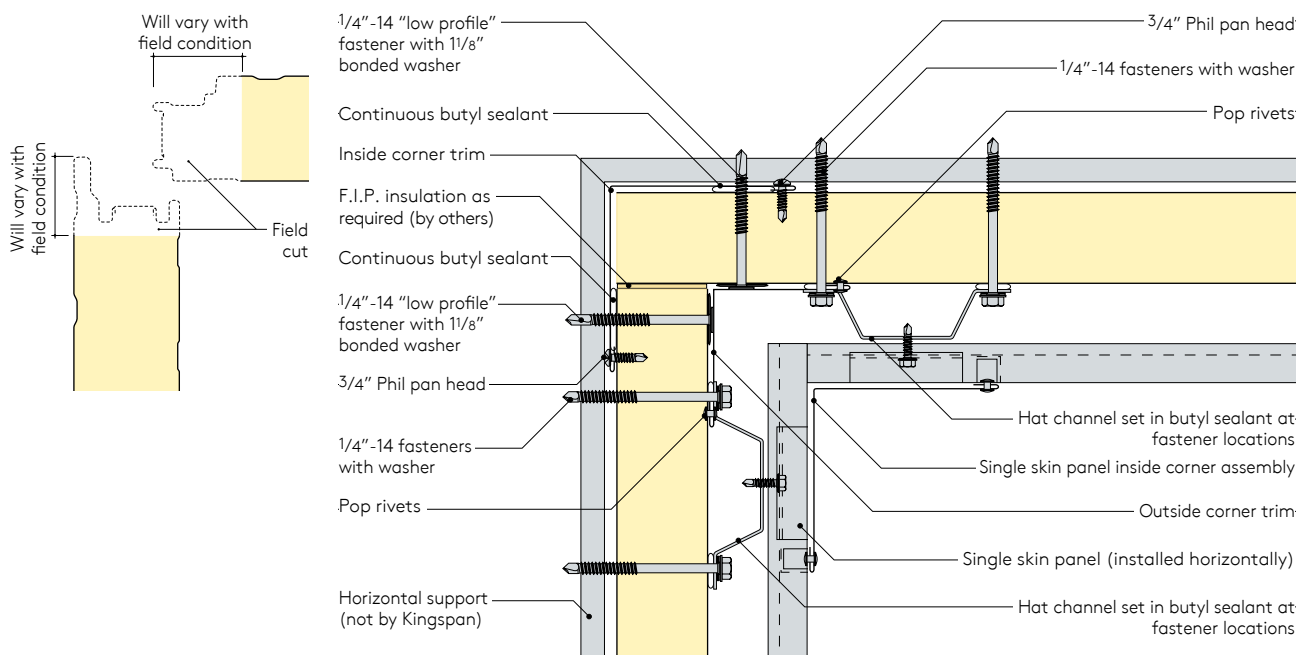


Vertical Construction Details

Outside Corner with Flat Trim

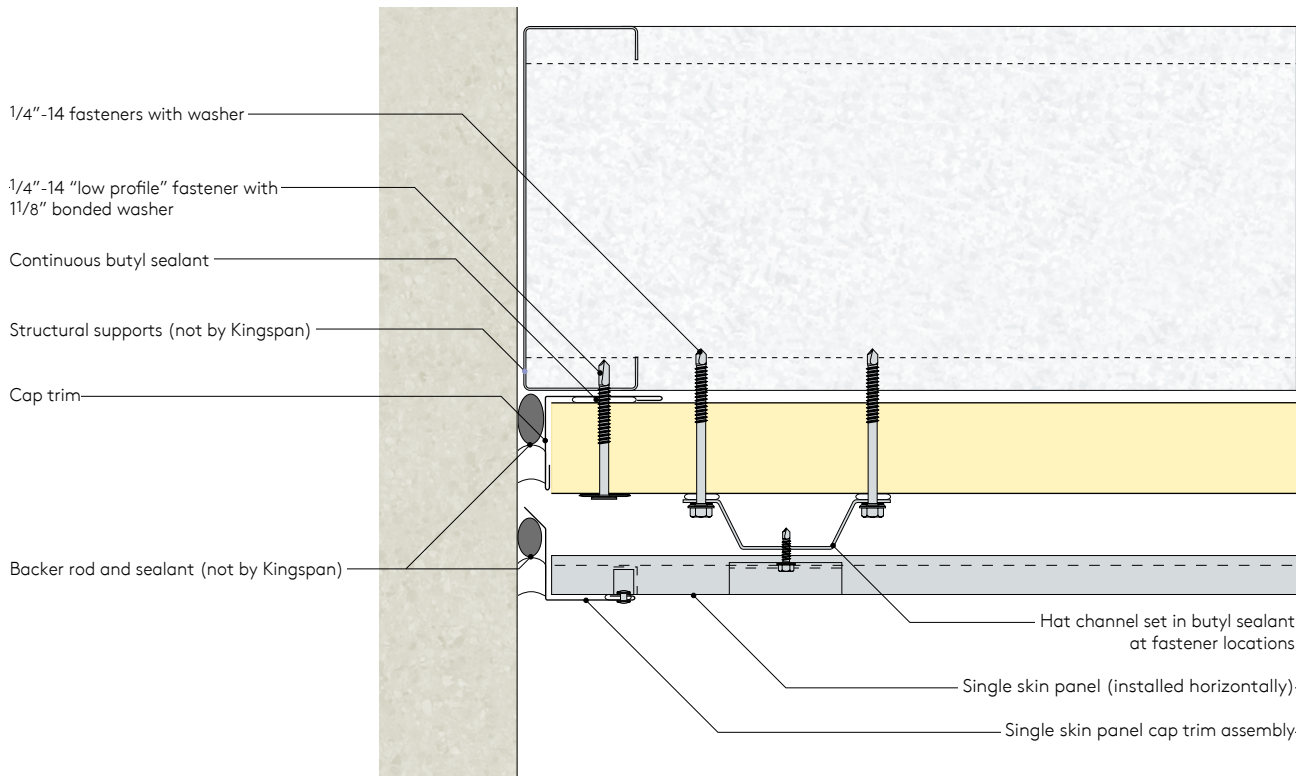


Inside Corner with Flat Trim



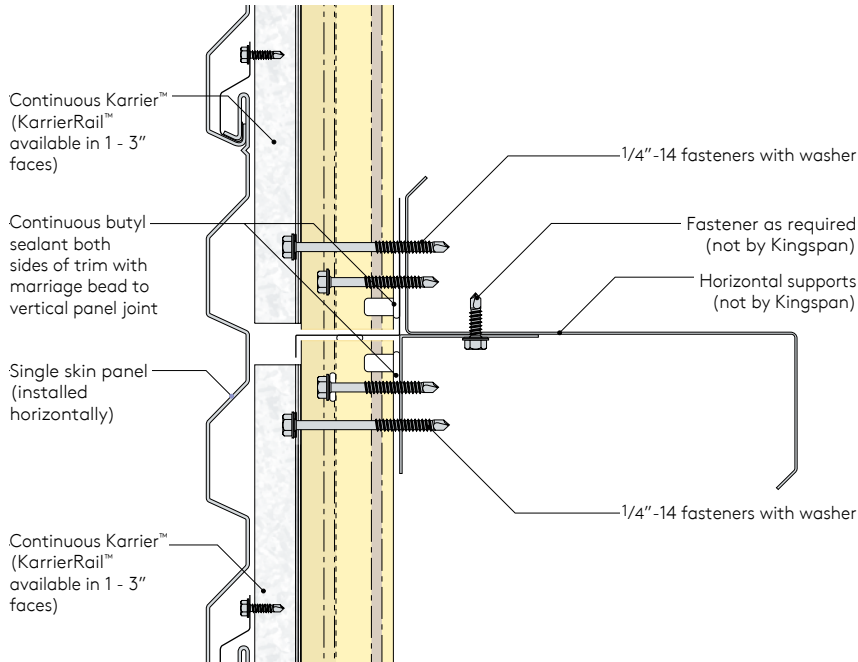
Vertical Construction Details

Panel Termination



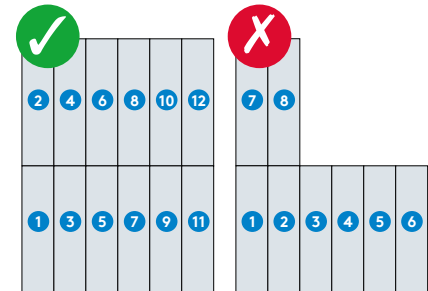
Vertical Construction Details

Stack Joint

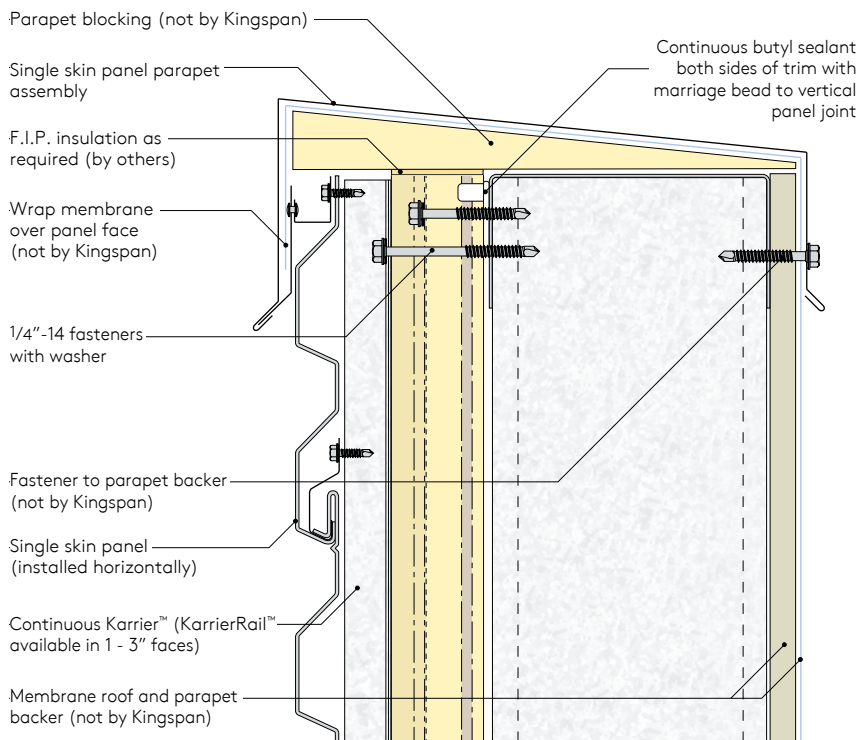


NOTE

For wall elevations requiring stack joints, it is necessary that each column of panels is installed at the same time to maintain proper vertical reveal alignment.



Parapet



NOTE

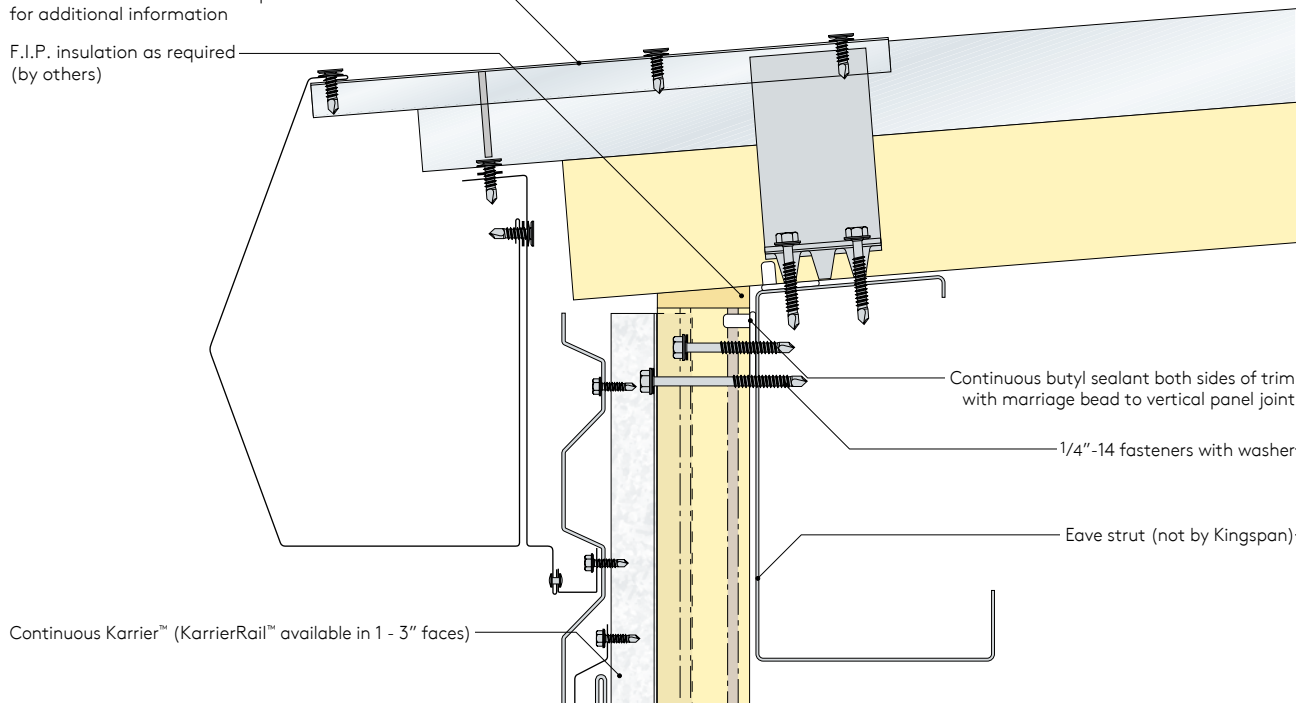
Numbers indicate order of panel installation.

Vertical Construction Details

Low Eave

Refer to 900/1000 Series roof panel details for additional information

F.I.P. insulation as required (by others)



Rake

Rake angle (not by Kingspan)

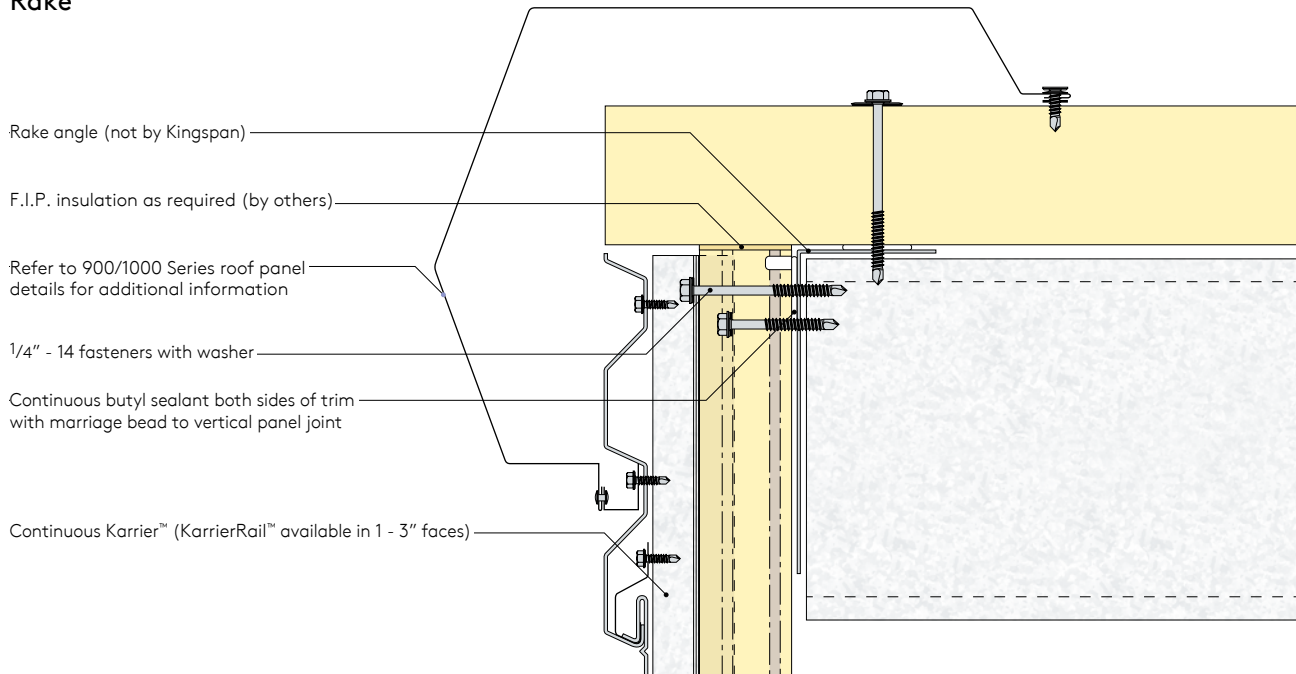
F.I.P. insulation as required (by others)

Refer to 900/1000 Series roof panel details for additional information

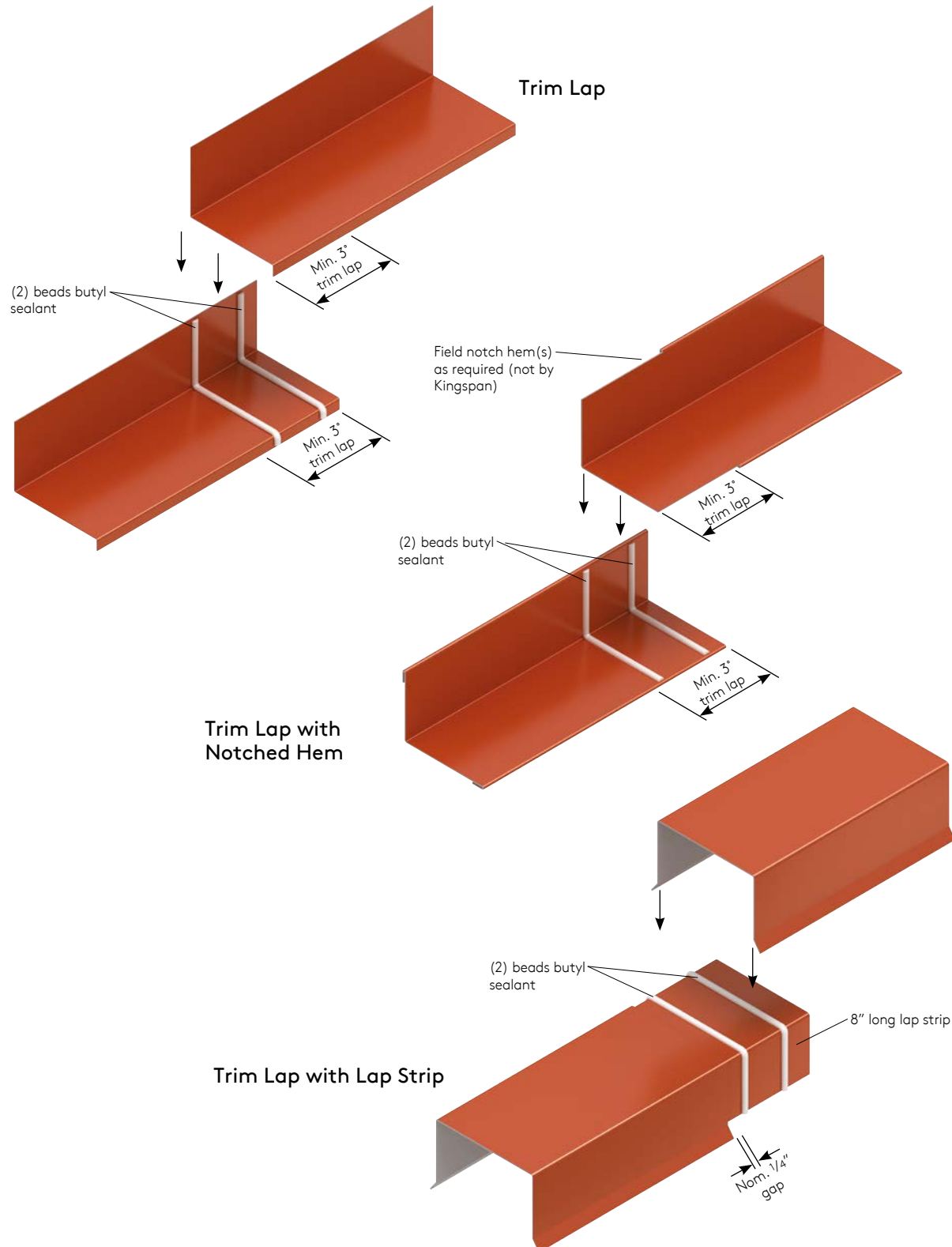
1/4" - 14 fasteners with washer

Continuous butyl sealant both sides of trim with marriage bead to vertical panel joint

Continuous Karrier™ (KarrierRail™ available in 1 - 3" faces)



Vertical Construction Details



Horizontal Panel Installation

IMPORTANT INSTALLATION NOTES!

- Minimum width of load-bearing steel exposed behind two horizontal panels at vertical joint is 5" nominal (approx. 127mm) which could be provided by standard double steel stud configuration with steel backer plate. Optional I-beam or HSS steel sections.
- Minimum bearing face for intermediate support is 1.625" (approx. 42mm).
- Where long runs of integrated strip windows are installed, the vertical panel joints should terminate above and continue below the window units.
- Visually check all internal and external tongue-and-groove joints between two adjacent panels to ensure panels are engaged fully and the gaps do not exceed tolerances.
- Details shown in this guide are for reference only. Consult project shop drawings for actual details required.

A Verify that all structural supports are properly aligned before installing panels (refer to Section 8 Structural Alignment - Horizontal Panels).

B Install continuous mending plates at all vertical reveal locations. Using a level, mark the centerline of all vertical reveal joints on mending plates to match locations shown on shop drawings.

If the structure does not meet alignment specs, it should be straightened. Shimming is not recommended at the vertical joint, as the mending plate must be fully supported and firmly against the backside of the panel with minimal gap to establish and hold the seal.

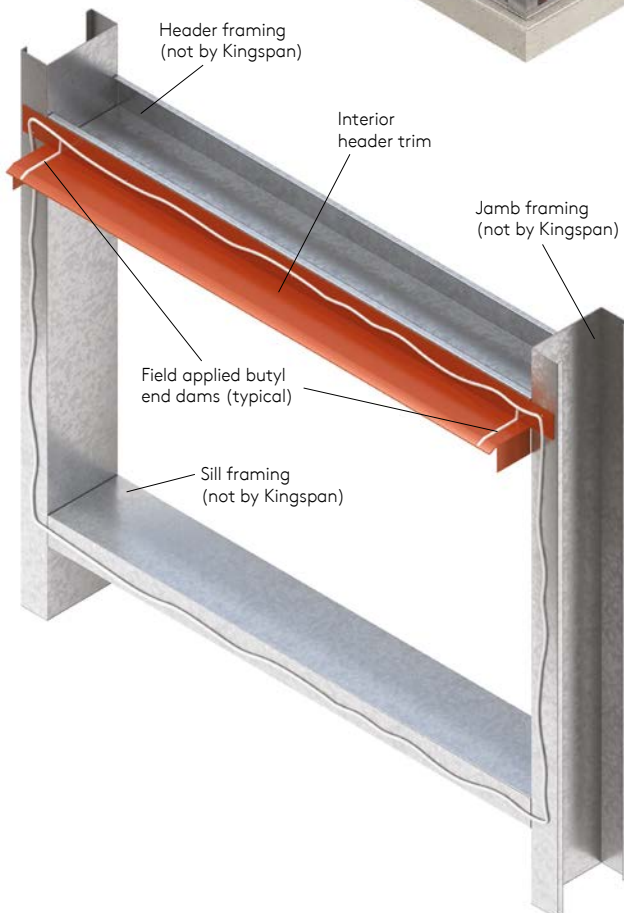
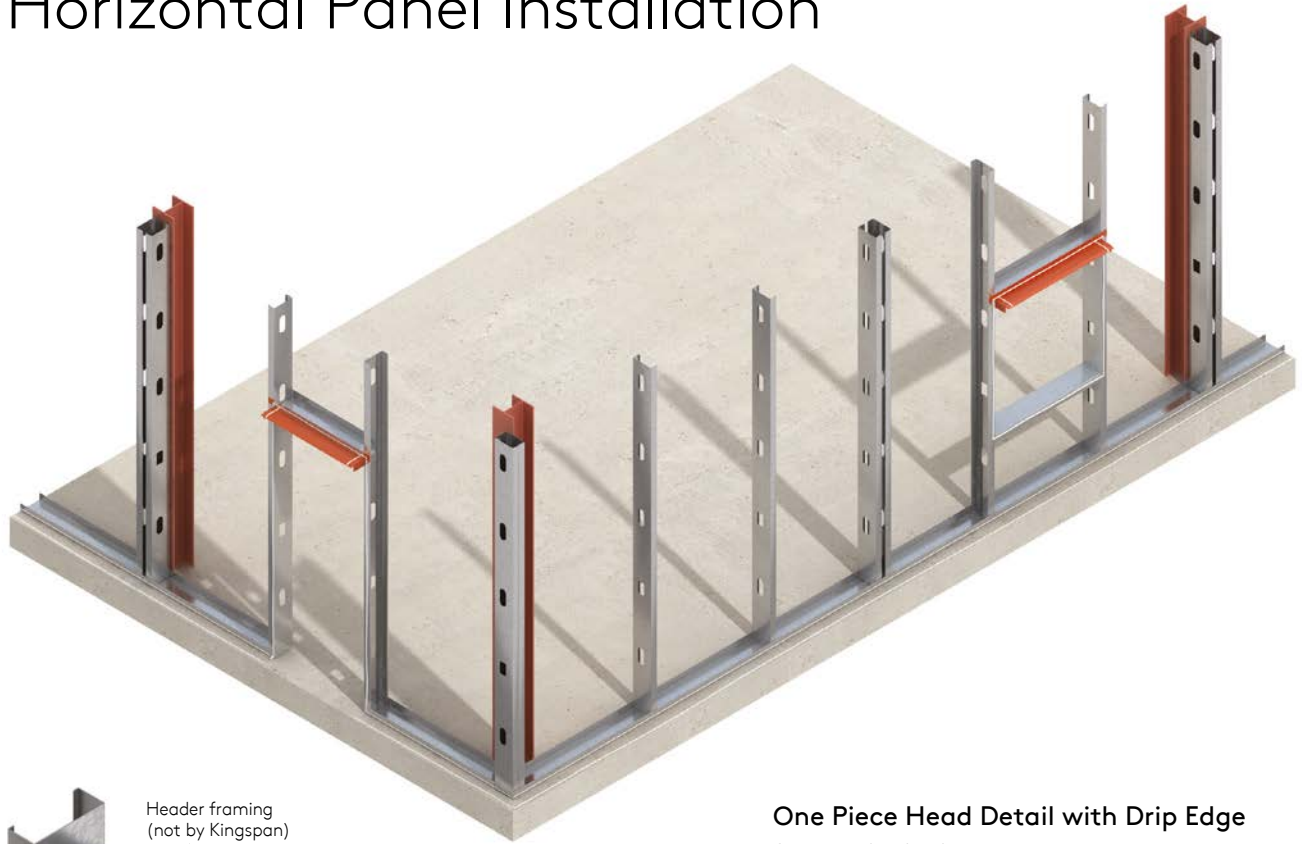
C Verify all framed opening locations. Apply butyl sealant to outside face of steel supports/studs around framed openings. Install head drip flashing and tack in place as necessary.

Apply butyl sealant to head drip flashing as shown on opposite page. This serves to form both a weather and vapor seal to the back side of the panels.

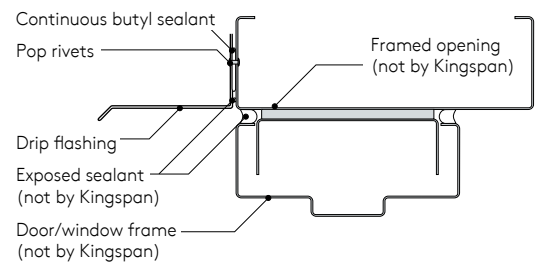
NOTE

Care must be taken to properly seal all framed openings. Sealant **MUST** be installed between trims and supporting steel **AND** between trims and back side of panels.

Horizontal Panel Installation



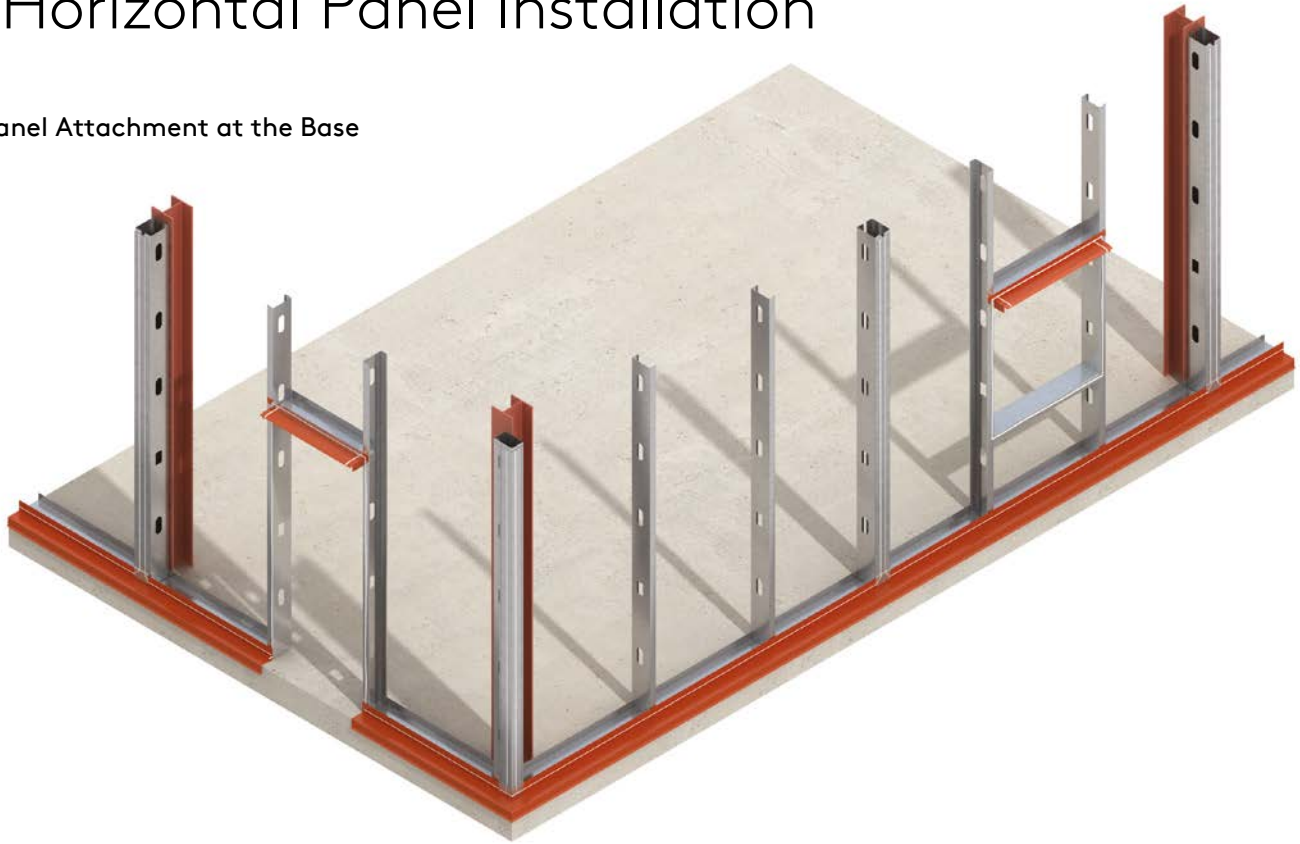
One Piece Head Detail with Drip Edge



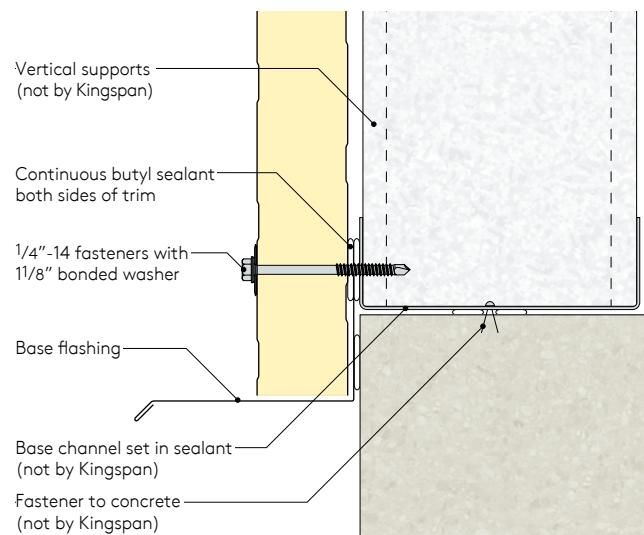
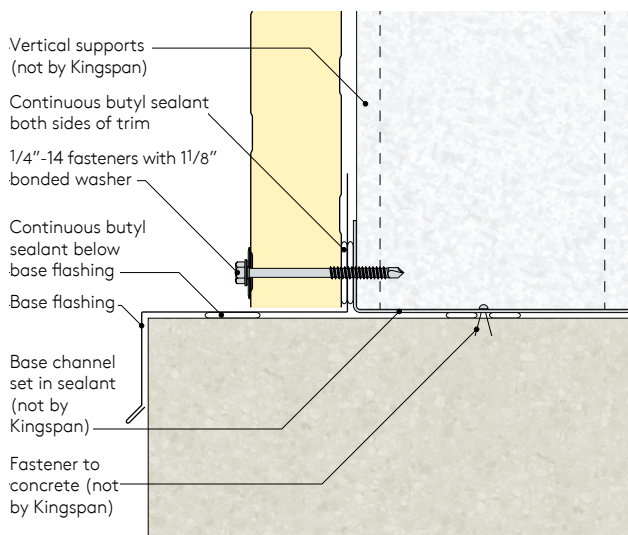
(Typical framed opening head conditions)

Horizontal Panel Installation

Panel Attachment at the Base

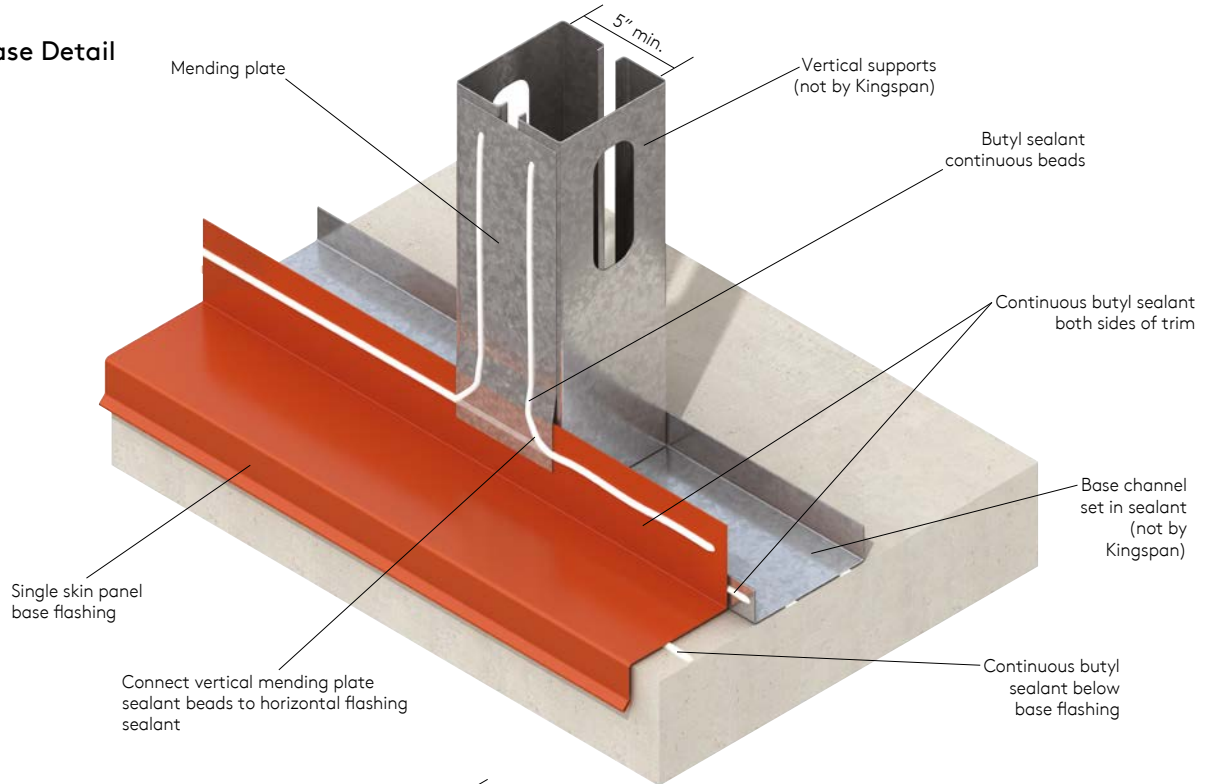


- D** Install base trim per project shop drawings. Trim must be level and set in butyl sealant.
- E** Apply beads of butyl sealant on vertical mending plates as shown.

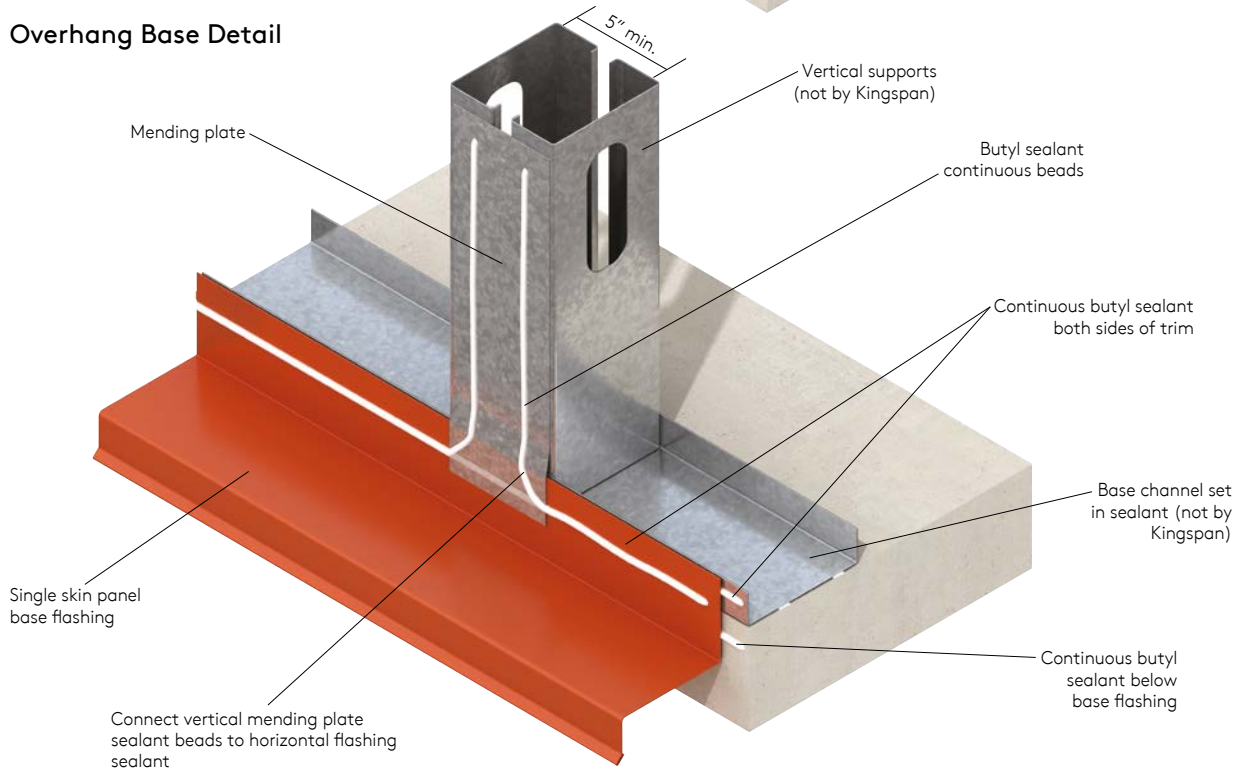


Horizontal Panel Installation

Flush Base Detail

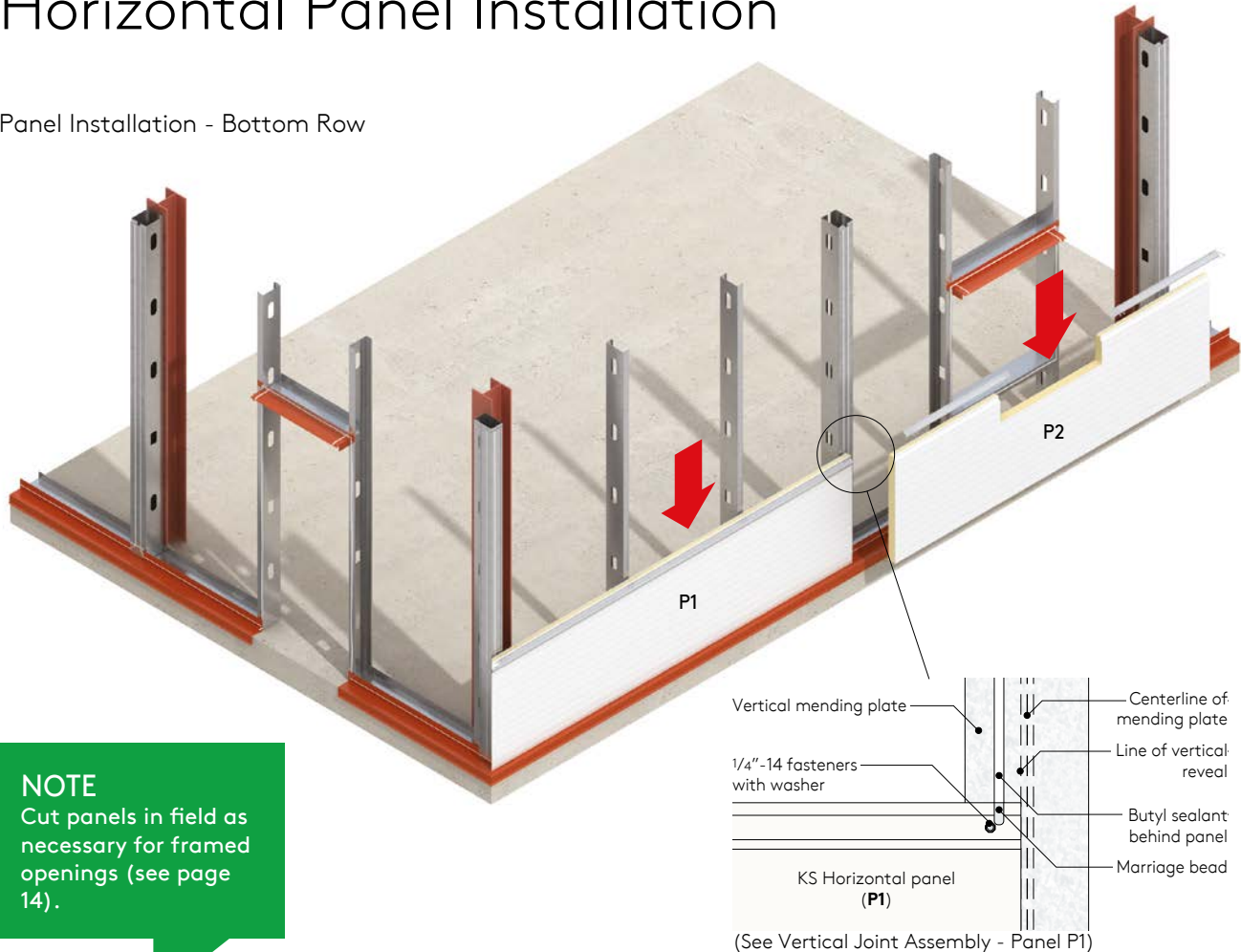


Overhang Base Detail



Horizontal Panel Installation

Panel Installation - Bottom Row

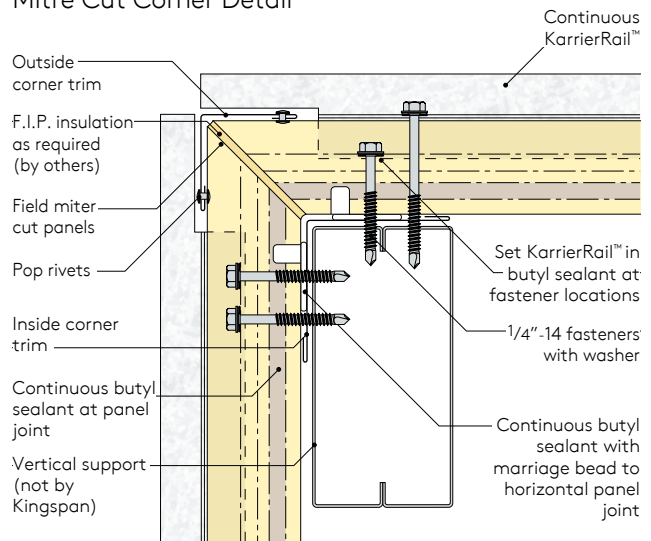


NOTE

Cut panels in field as necessary for framed openings (see page 14).

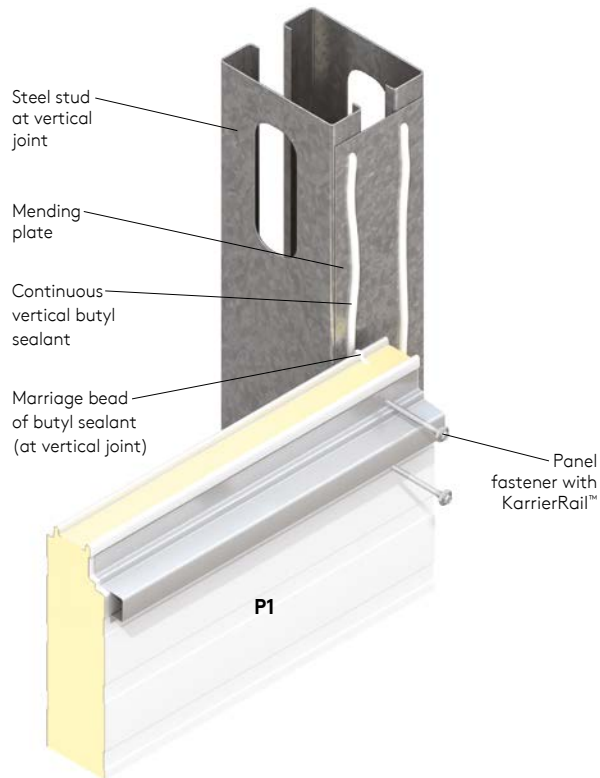
- F** Starting from the corner, measure to the centerline of the first vertical mending plate.
- G** Cut panel **P1** to length. Mitre cut corner as shown in detail.
- H** Set panel **P1** as shown. Notch top flanges of rail at corner as necessary to accommodate mitre cut panel.
- I** Fasten panel and rail into supporting steel fasteners as indicated on shop drawings.
- J** Once panel is secured, apply butyl sealant over the interior male lip at both panel ends to create marriage beads to the inside corner trim (left edge of panel) and vertical mending plate (right edge of panel).
- K** Cut panel **P2** to length as required, and install panel and rail with fasteners per shop drawings. Gaps between the ends of panels **P1** and **P2** larger than 1/4" should be filled with expandable foam insulation.

Mitre Cut Corner Detail

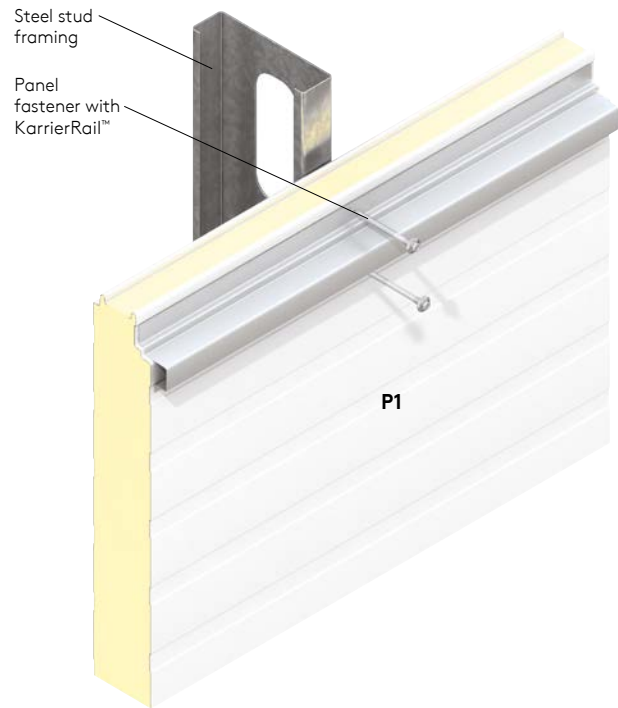


Horizontal Panel Installation

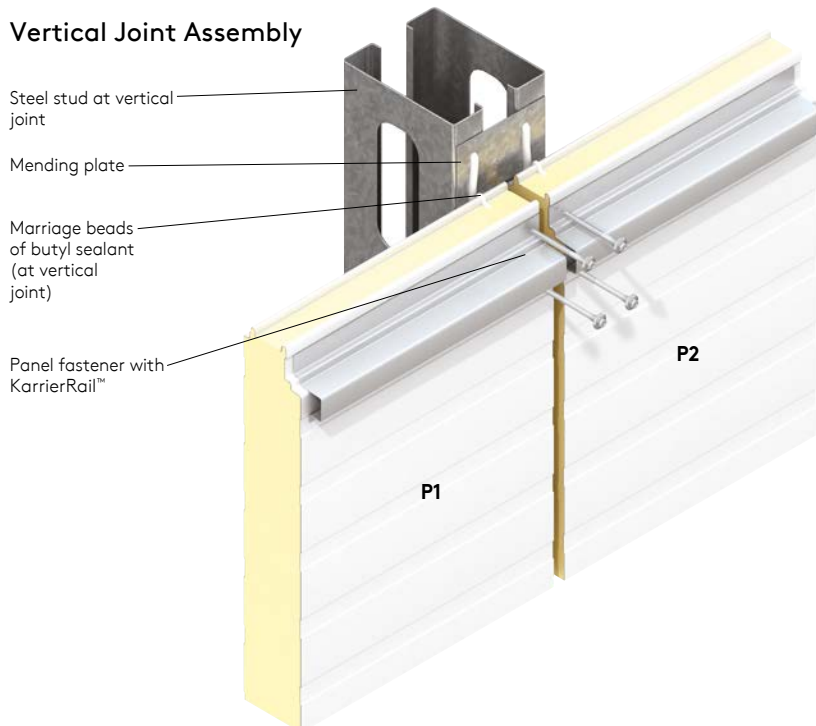
Vertical Joint Assembly at Corner- Panel P1



Intermediate Fastener Position



Vertical Joint Assembly



CAUTION

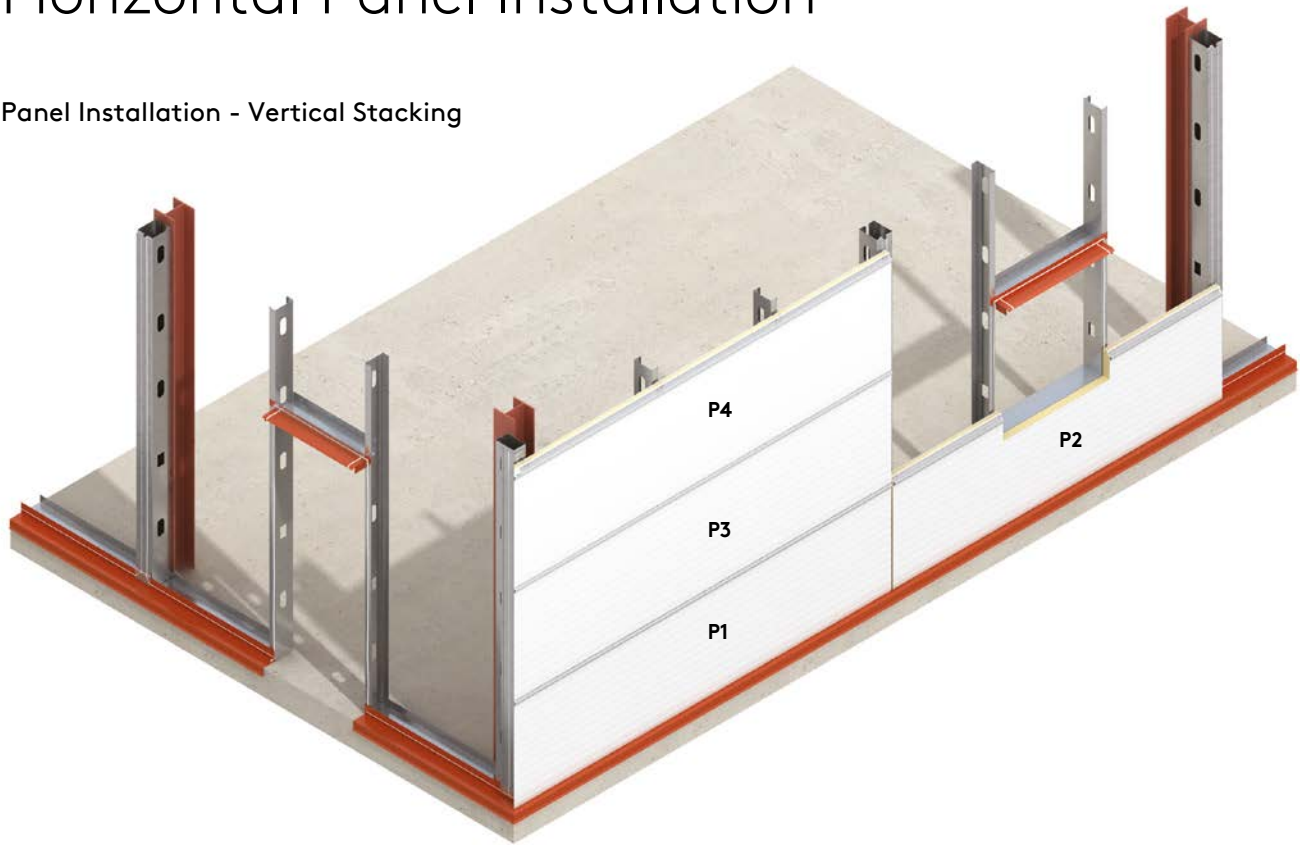
Do not over-tighten fasteners as damage to the panel core as well as facings will result.

NOTE

Verify panels are completely engaged, with proper sealant contact and joint reveals.

Horizontal Panel Installation

Panel Installation - Vertical Stacking

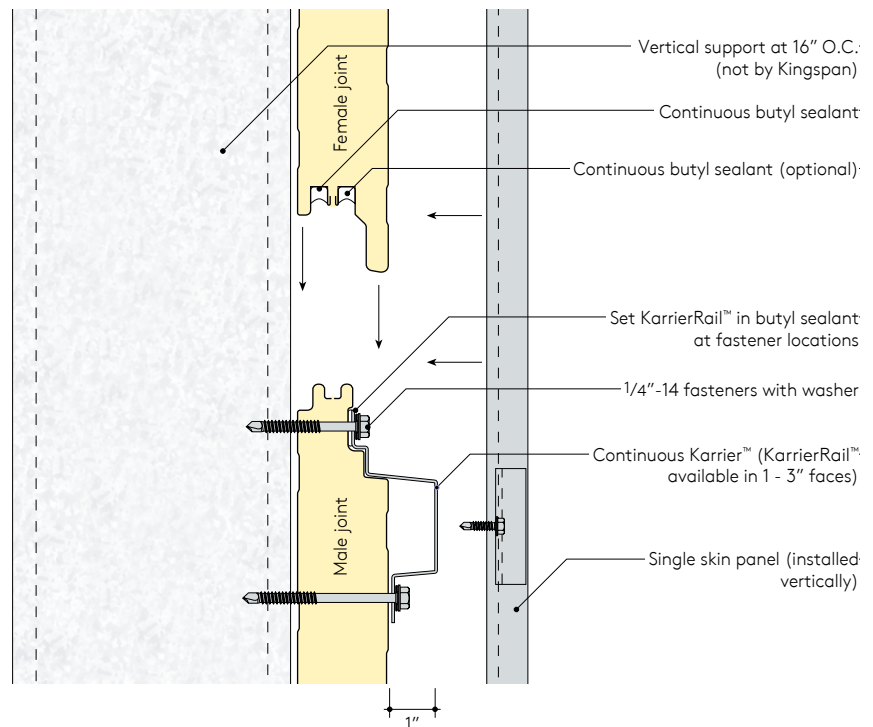


- L** Complete installation of bottom row of panels. Then install first column of panels bottom to top using the same process. (Panels **P3-P4**, steps **G-K**).

NOTE

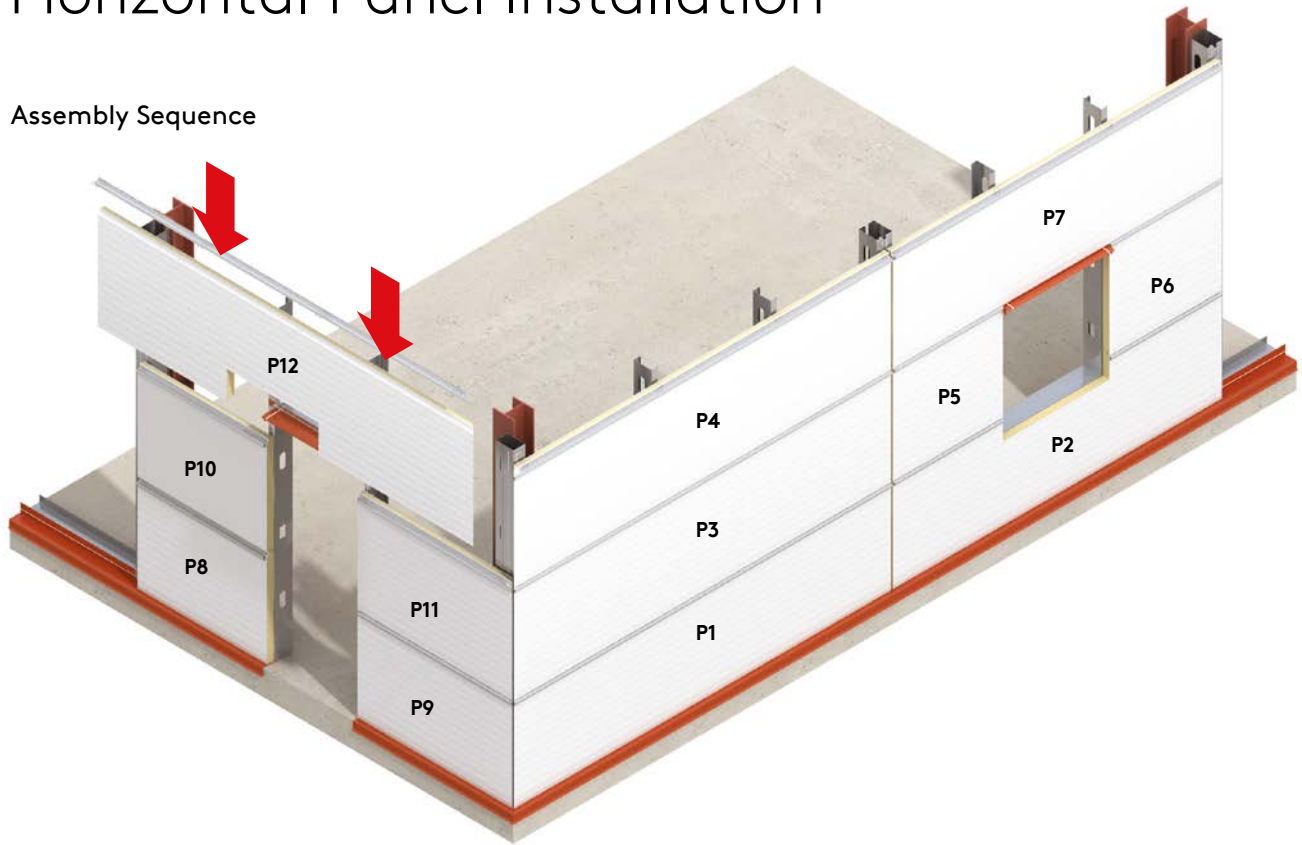
Consult with Kingspan Technical Department for allowable panel loads, spans and fastening patterns.

Horizontal Expanded Panel Joint Section Detail



Horizontal Panel Installation

Assembly Sequence



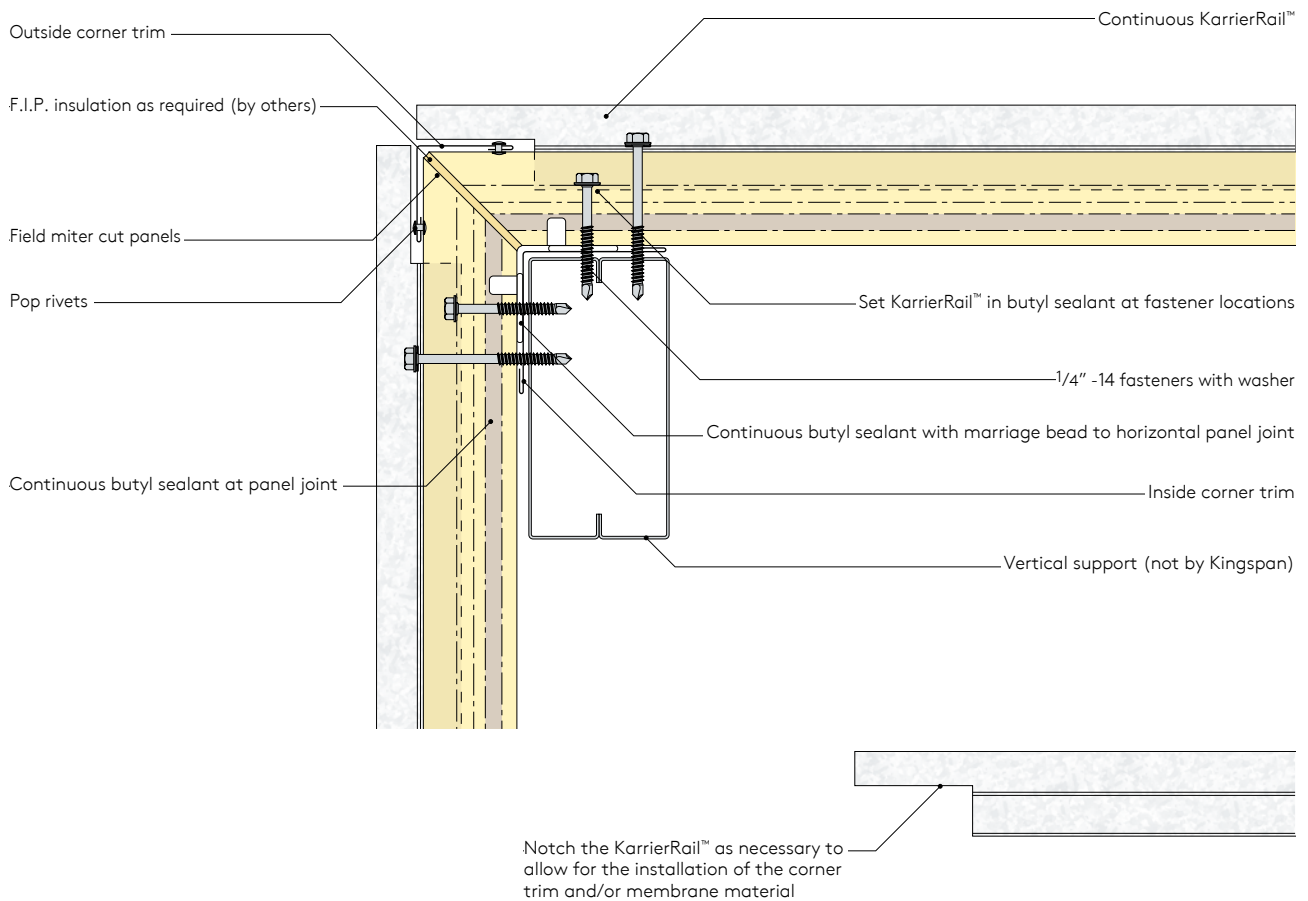
M Once the first building elevation is completed (**P1-P7**), start around the corner on next elevation using the same sequence and method (**P8-12**).

NOTE
Numbers indicate order of panel installation.

NOTE
To minimize panel cutting, panel lengths should be pre-determined to align with framed opening jambs.

Horizontal Panel Installation

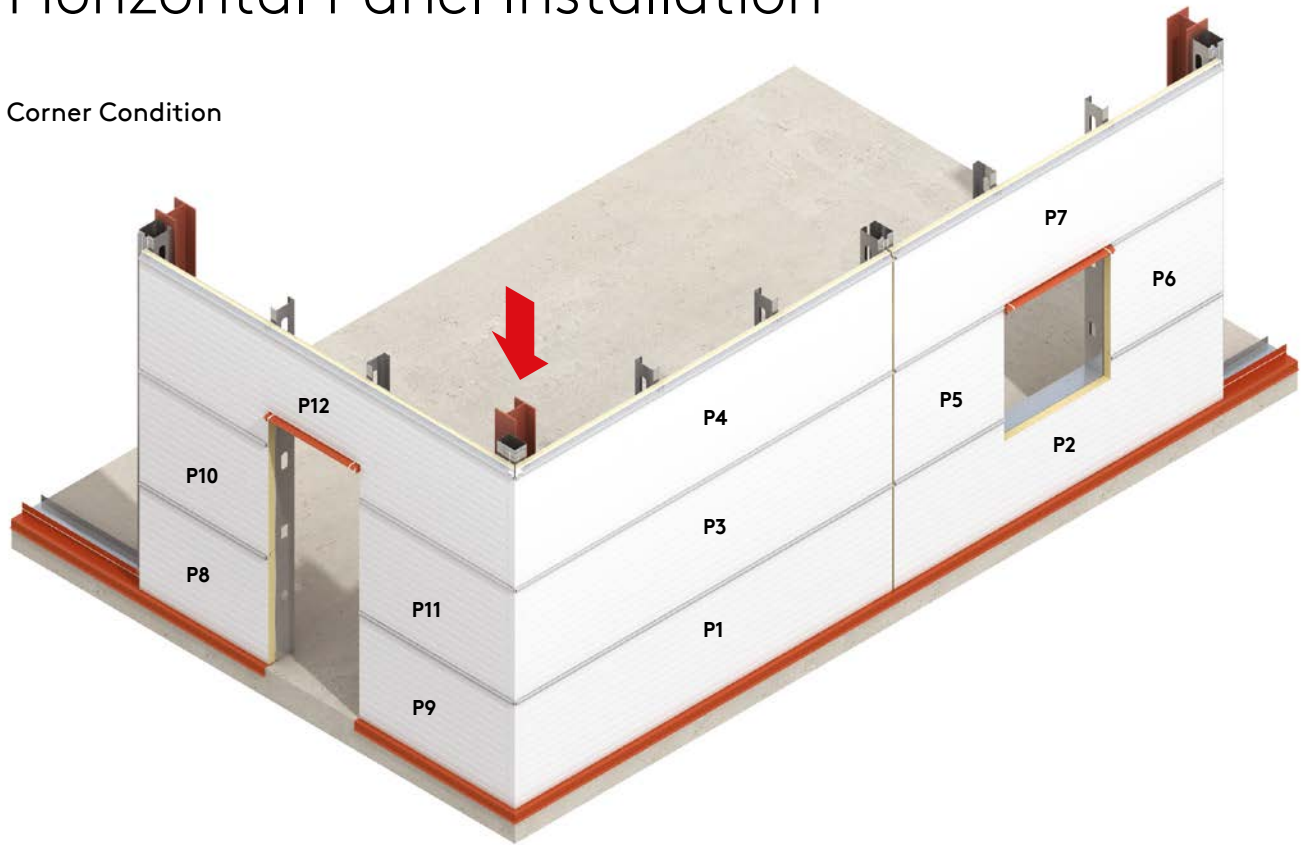
Outside Corner - Detail



-
- N** Install **P8** into corner as shown. (Mitre cut panel and notch KarrierRail™ as required).
 - O** Install butyl sealant marriage beads from interior corner trim to interior male joint (right edge of panel) and door jamb (left edge of panel).
 - P** Install **P9** with marriage beads to mending plate (left edge of panel) and door jamb (right edge of panel).
 - Q** Install remaining panels, repeating steps **N-P** as necessary.

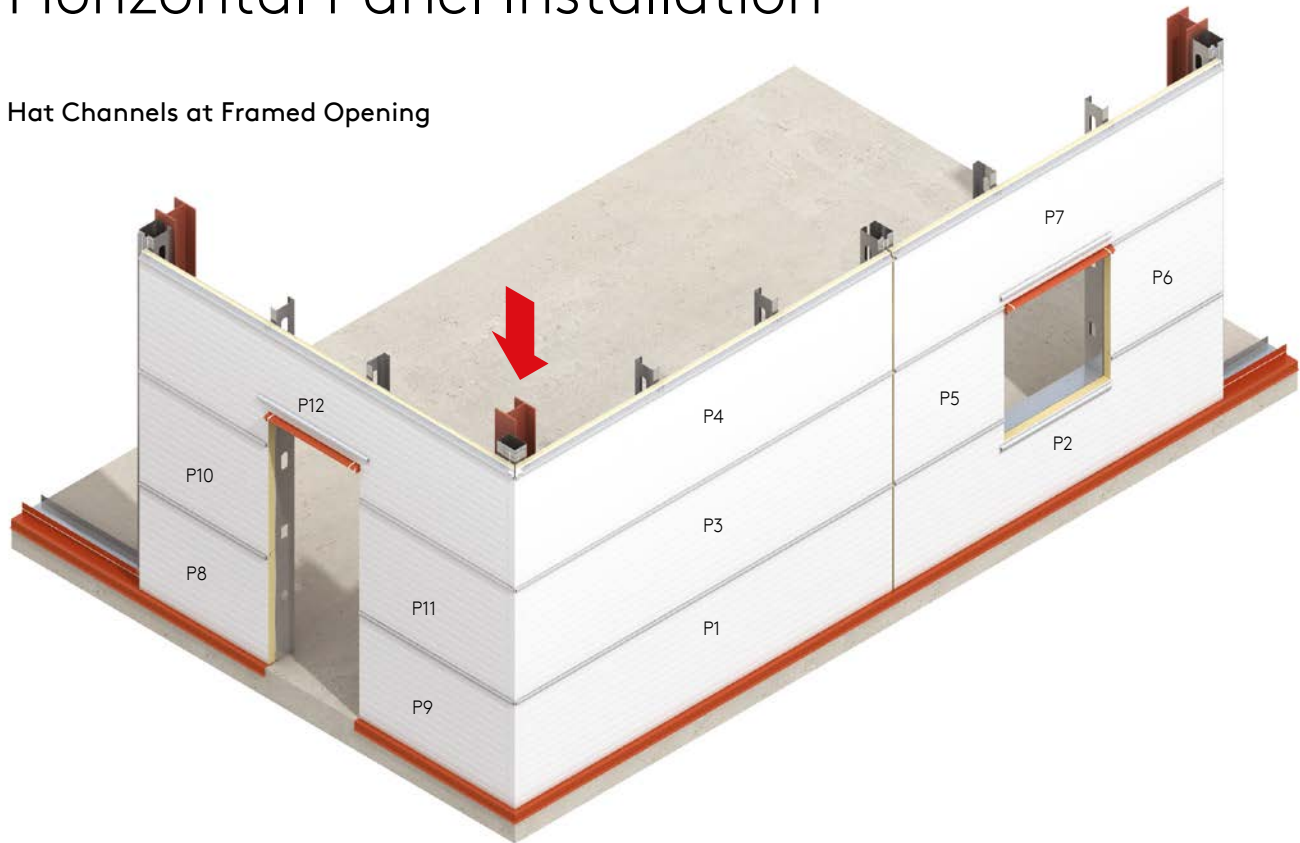
Horizontal Panel Installation

Corner Condition



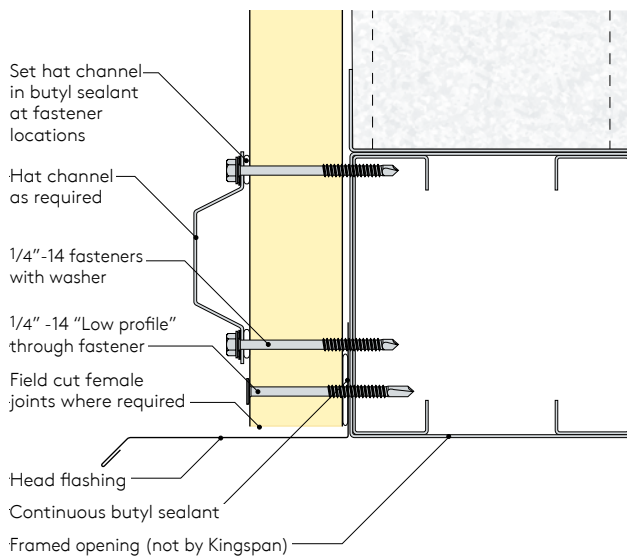
Horizontal Panel Installation

Hat Channels at Framed Opening

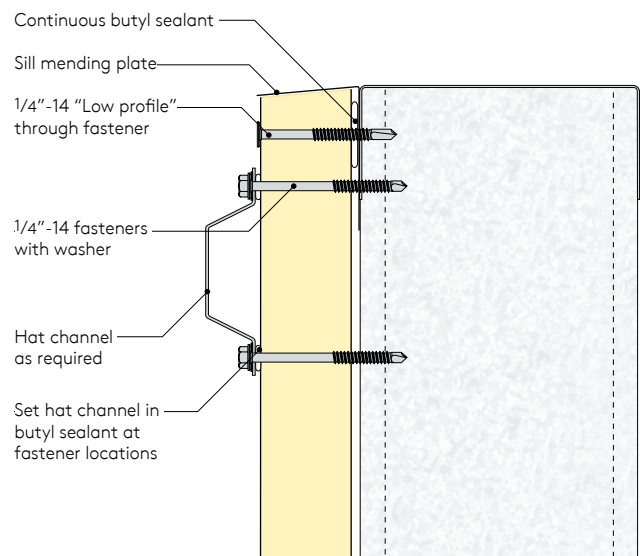


- R** Install hat channels at window head and sill areas.

Head Detail



Sill Detail

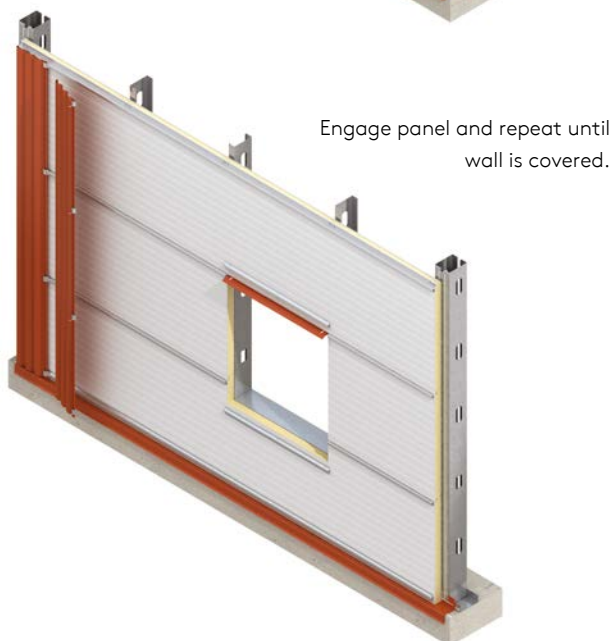


Horizontal Panel Installation

- S** Install rainscreen panel per manufacturer's instructions.

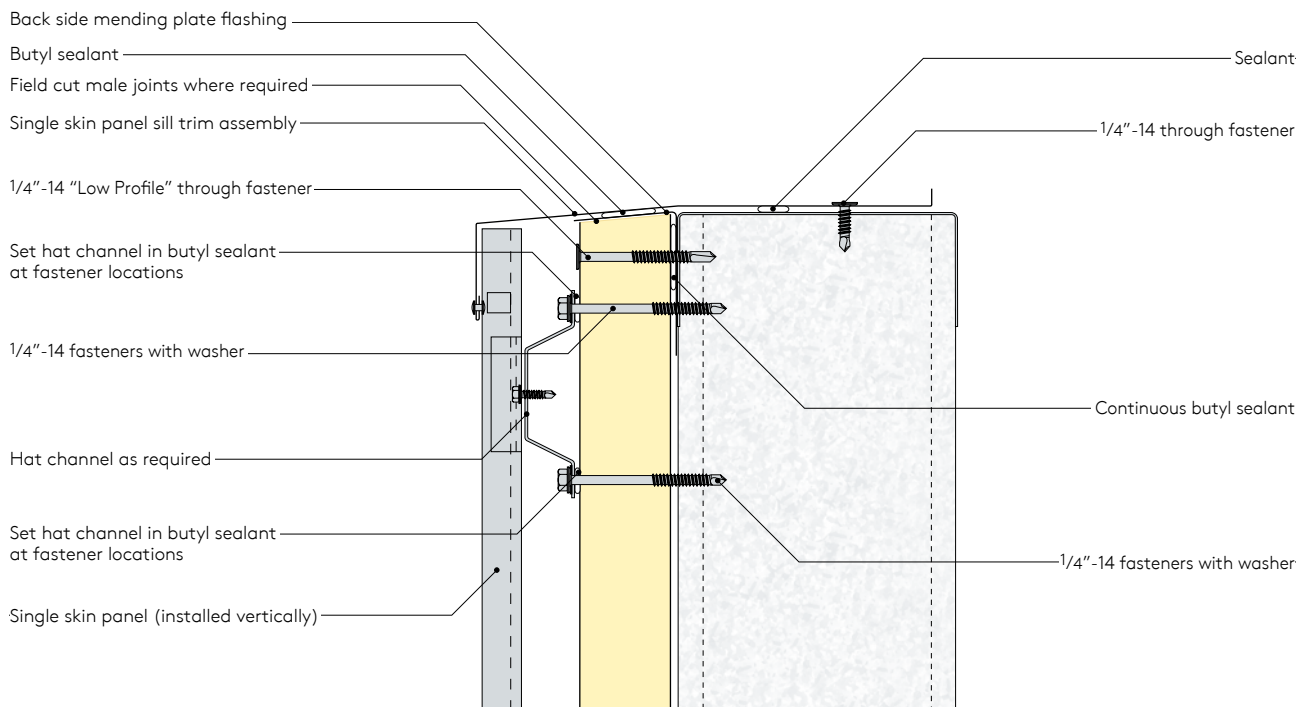
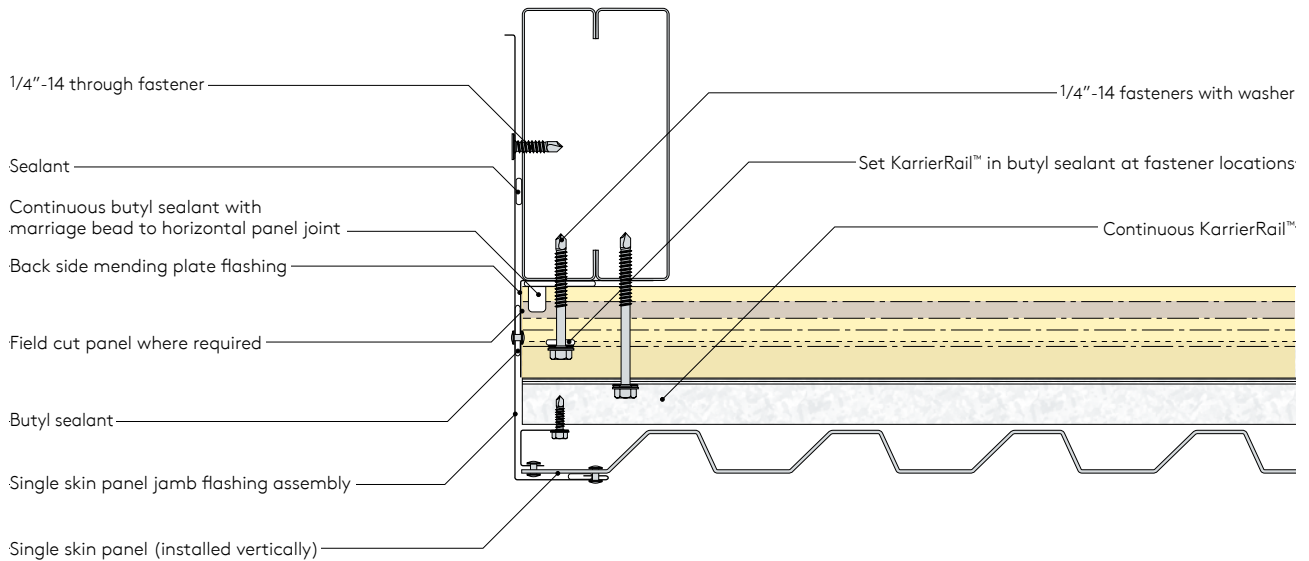
NOTE

Rainscreen orientation may be rotated 90° by adding hat channels over the top of the KarrierRail™. Contact Kingspan Technical Services for more information.



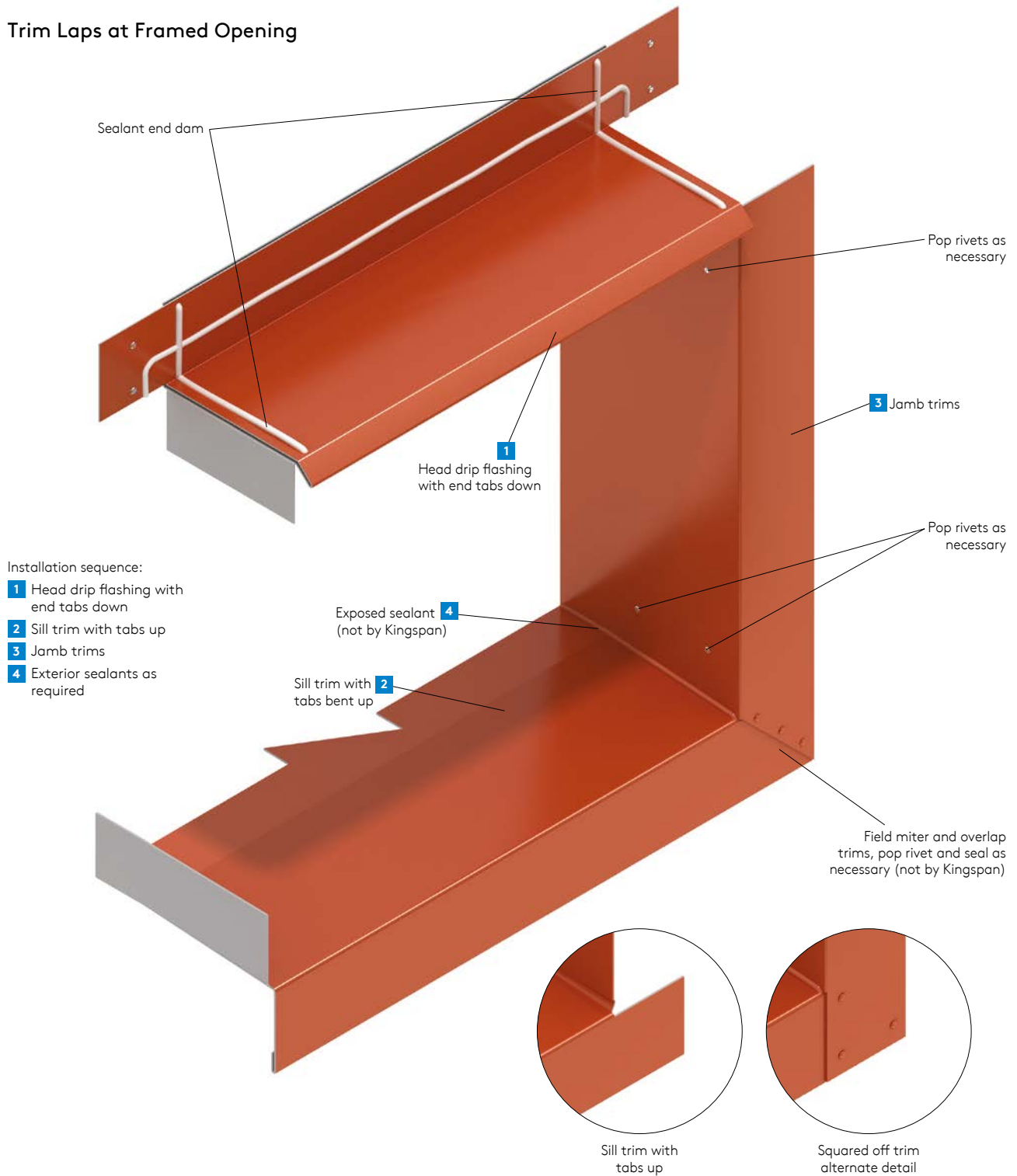
Horizontal Panel Installation

T Install framed opening jamb and sill trims.



Horizontal Panel Installation

Trim Laps at Framed Opening



Horizontal Panel Installation

Completed Window Flashing



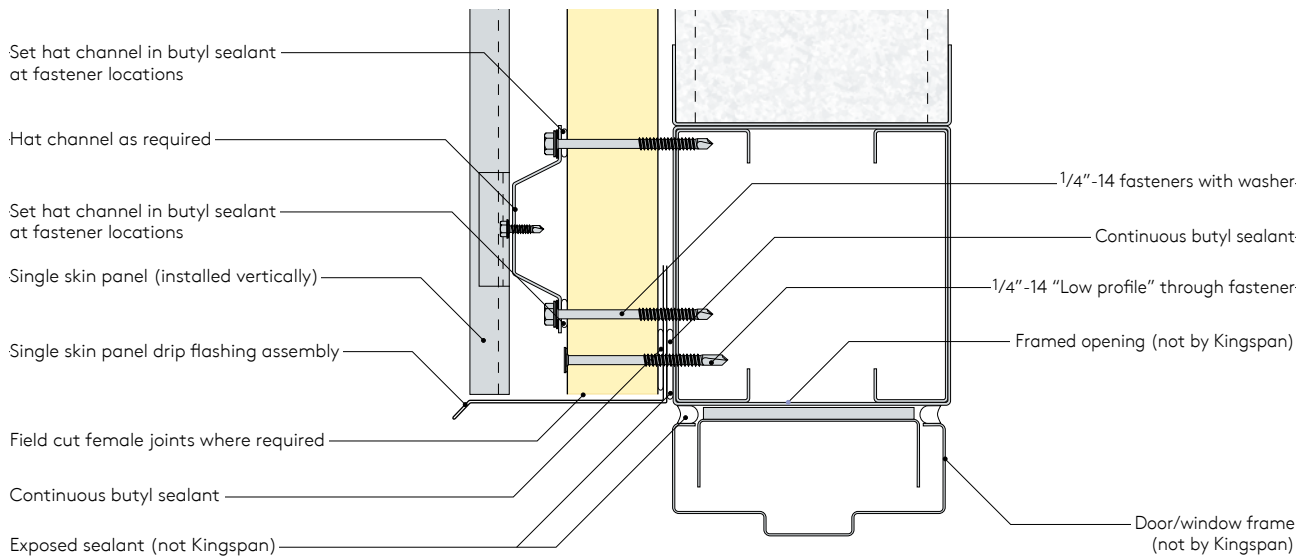
Horizontal Construction Details

Disclaimer

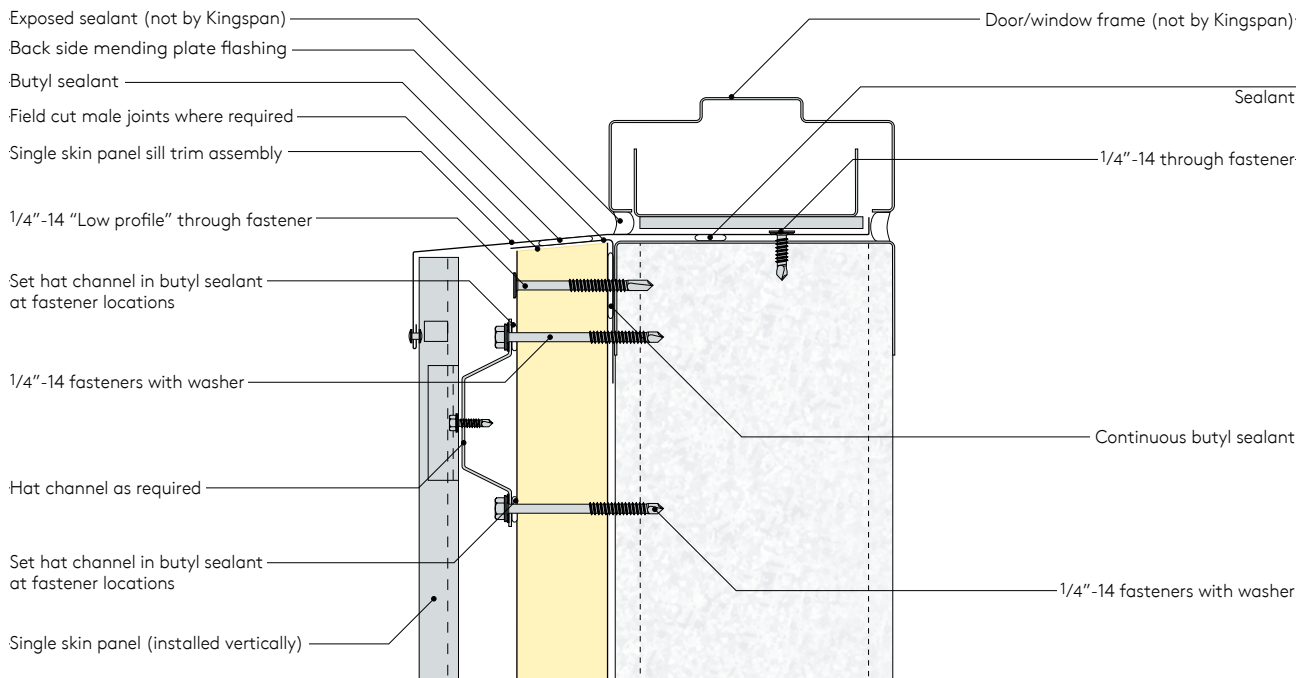
These details are designed to show how single skin metal panels integrate with the KarrierPanel system. Please consult the rainscreen panel manufacturer you are using for installation instructions, exact trim profiles and project specific details.

Horizontal KarrierPanel with Vertical Metal Rainscreen Details

Framed Opening Head - Detail

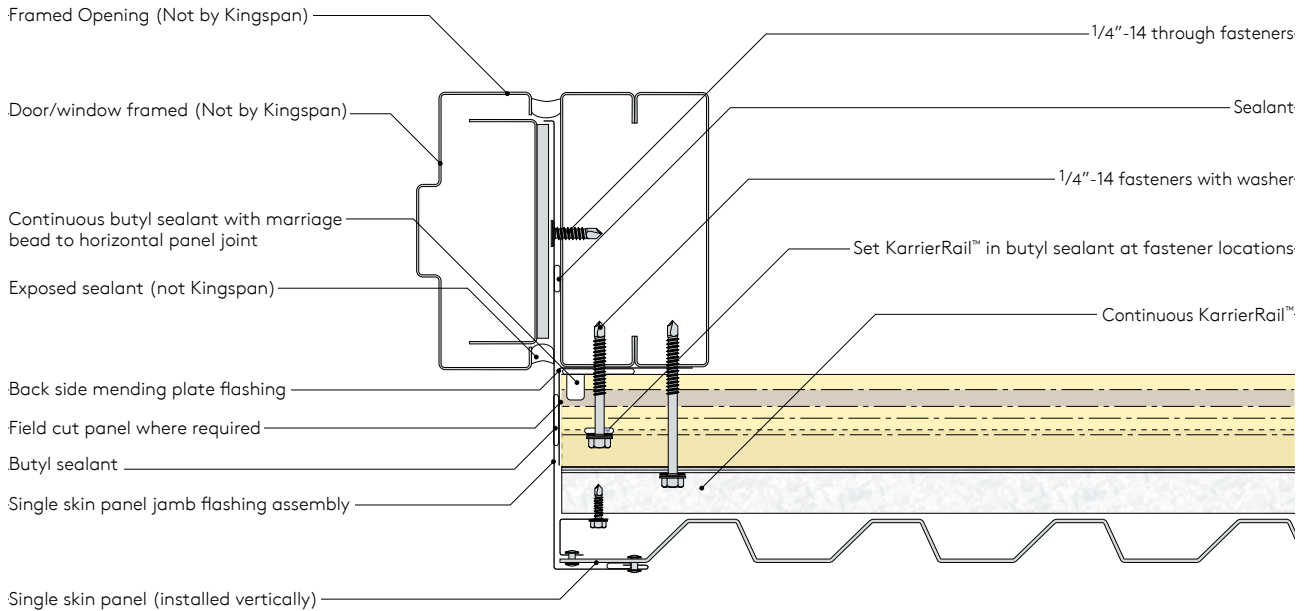


Framed Opening Sill - Detail



Horizontal Construction Details

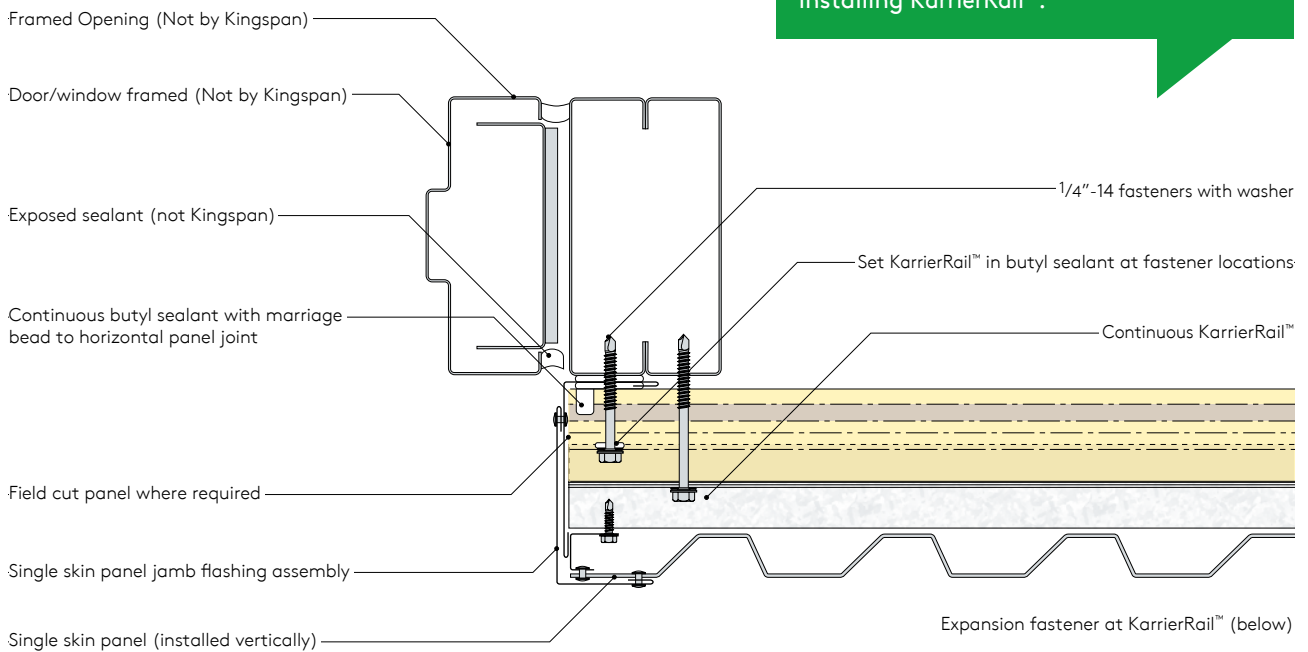
Framed Opening Jamb (High Cell)



NOTE

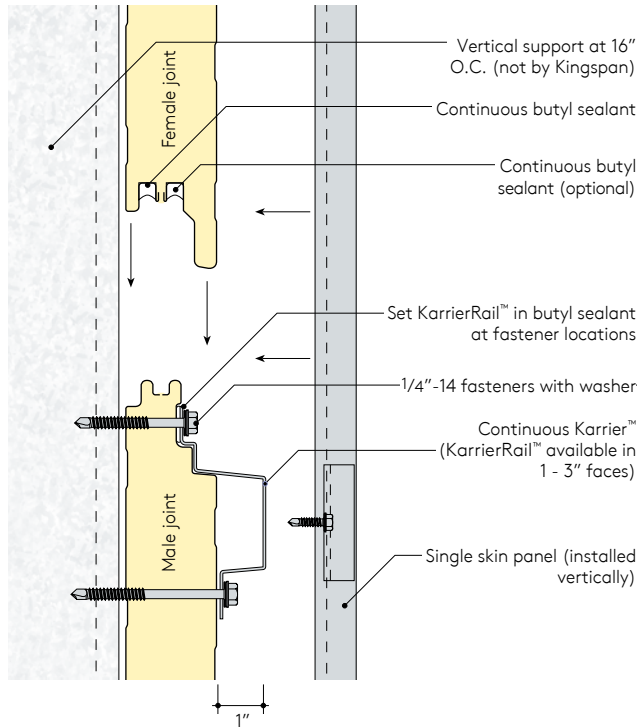
Use of this detail requires interior portion of jamb trims be installed PRIOR to installing KarrierRail™.

Framed Opening Two Piece Jamb

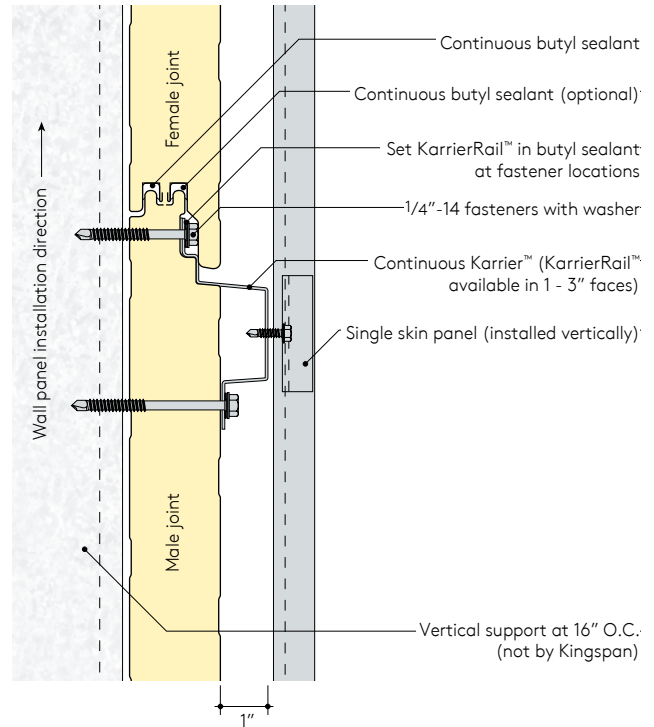


Horizontal Construction Details

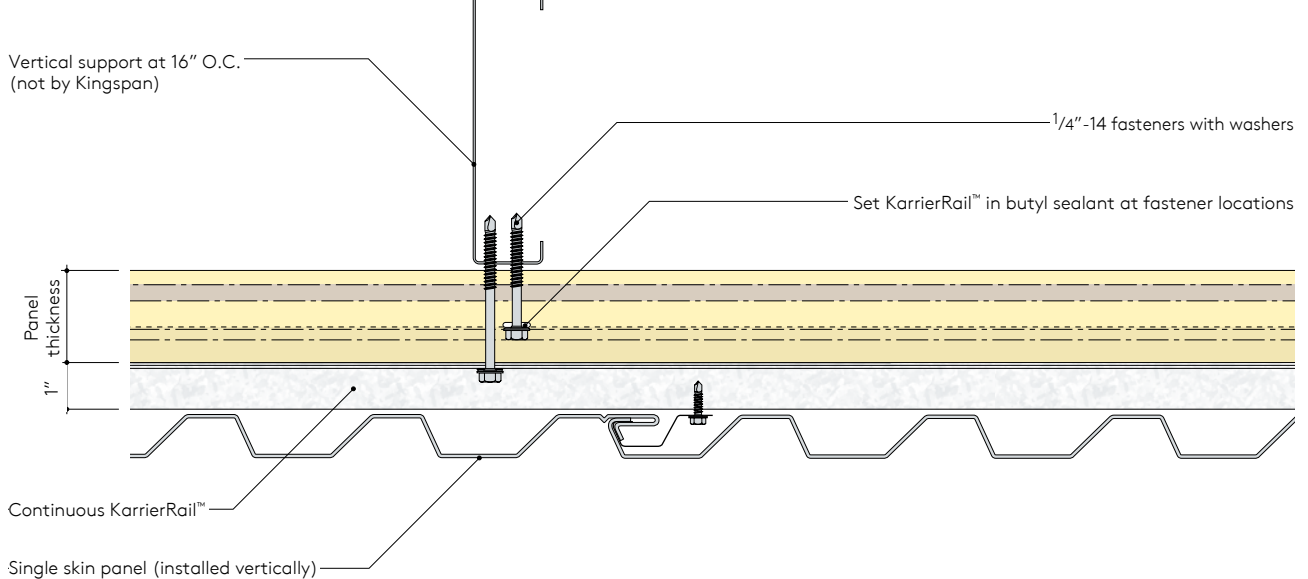
Horizontal Expanded Panel Joint Section



Horizontal Engaged Panel Joint Section

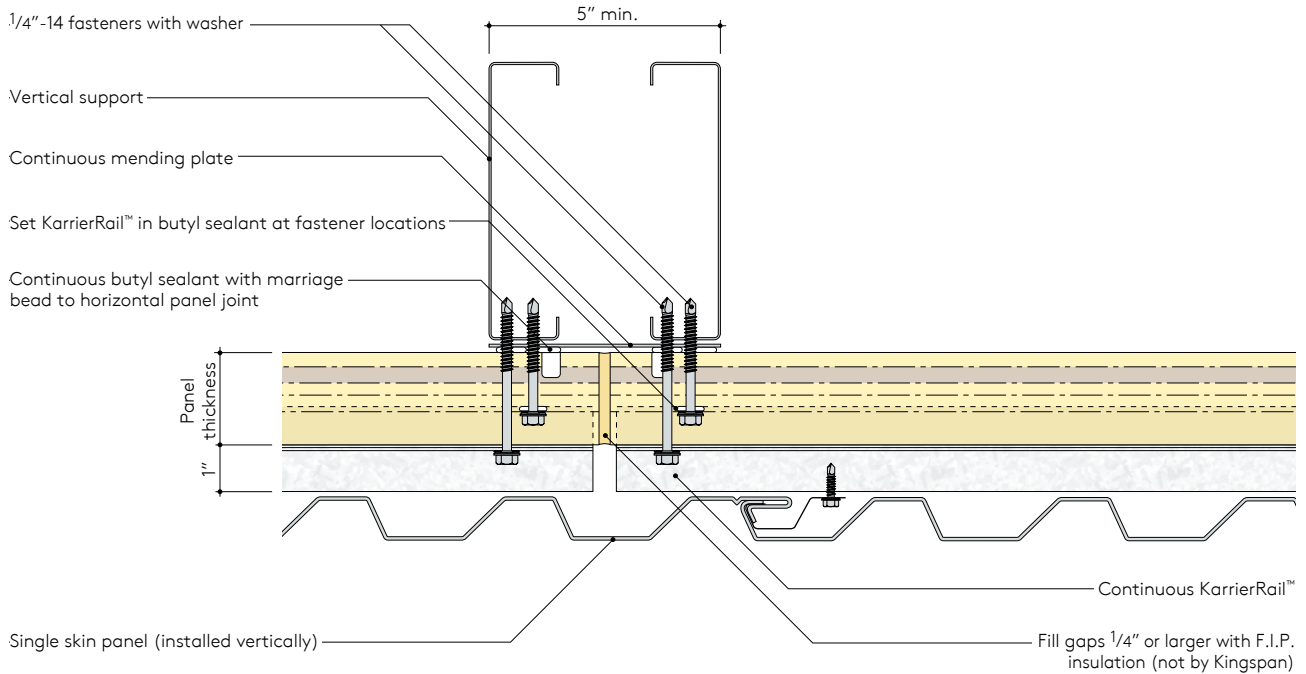


Intermediate Support

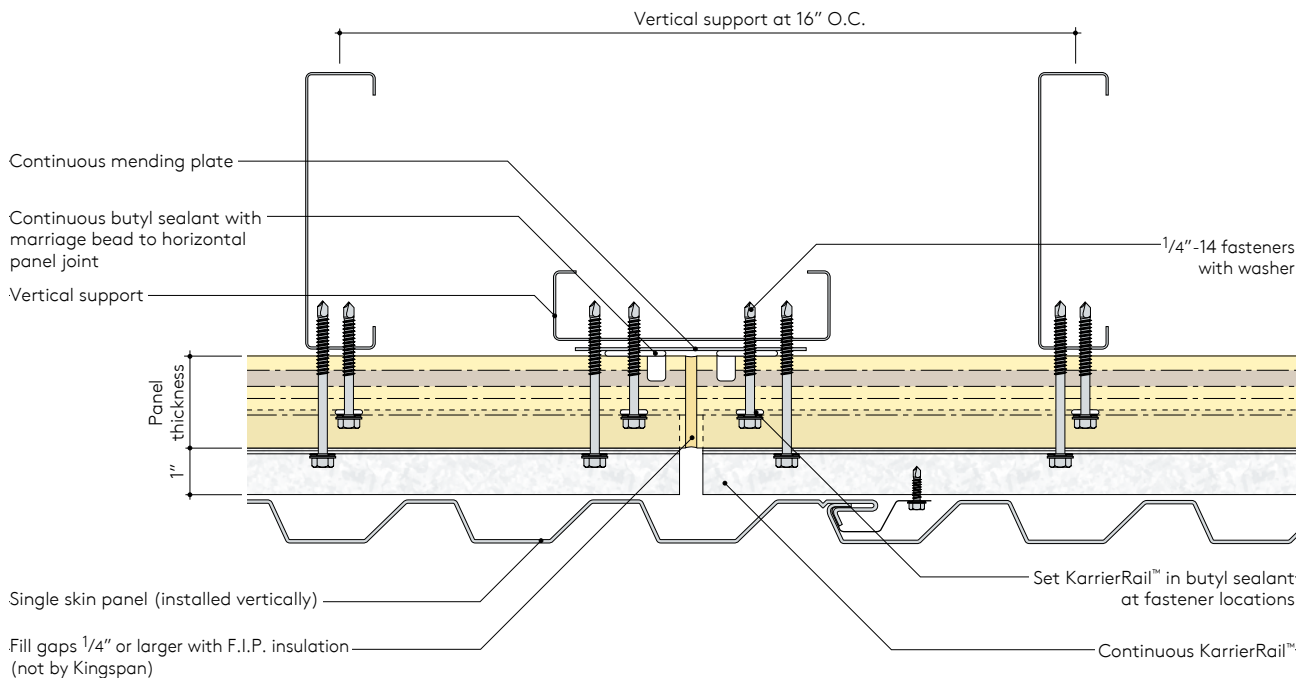


Horizontal Construction Details

Vertical Joint

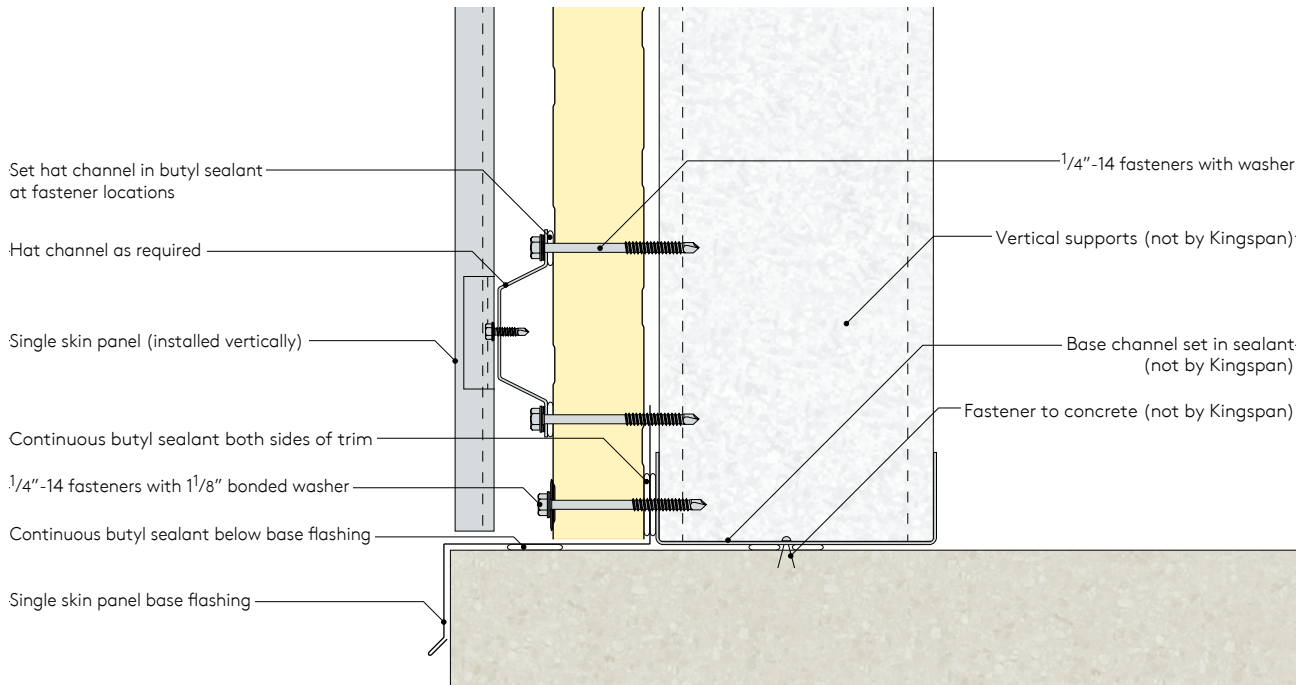


Vertical Joint between Studs

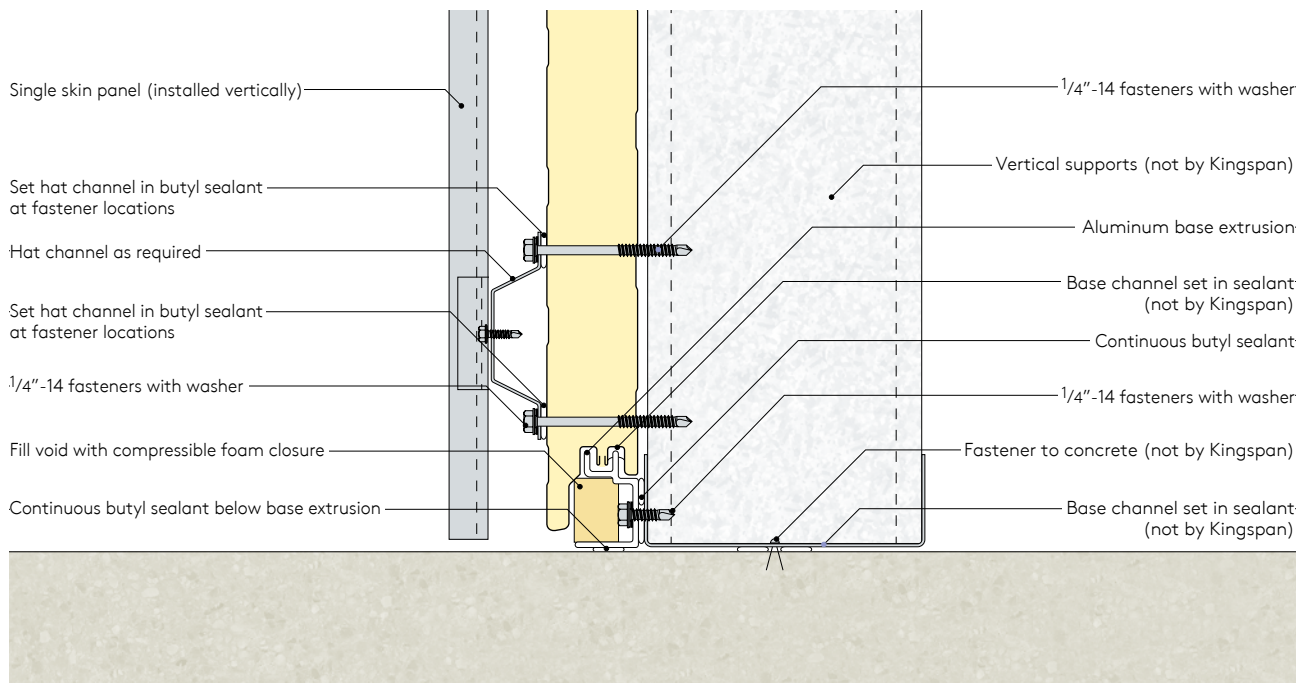


Horizontal Construction Details

Base - Flush

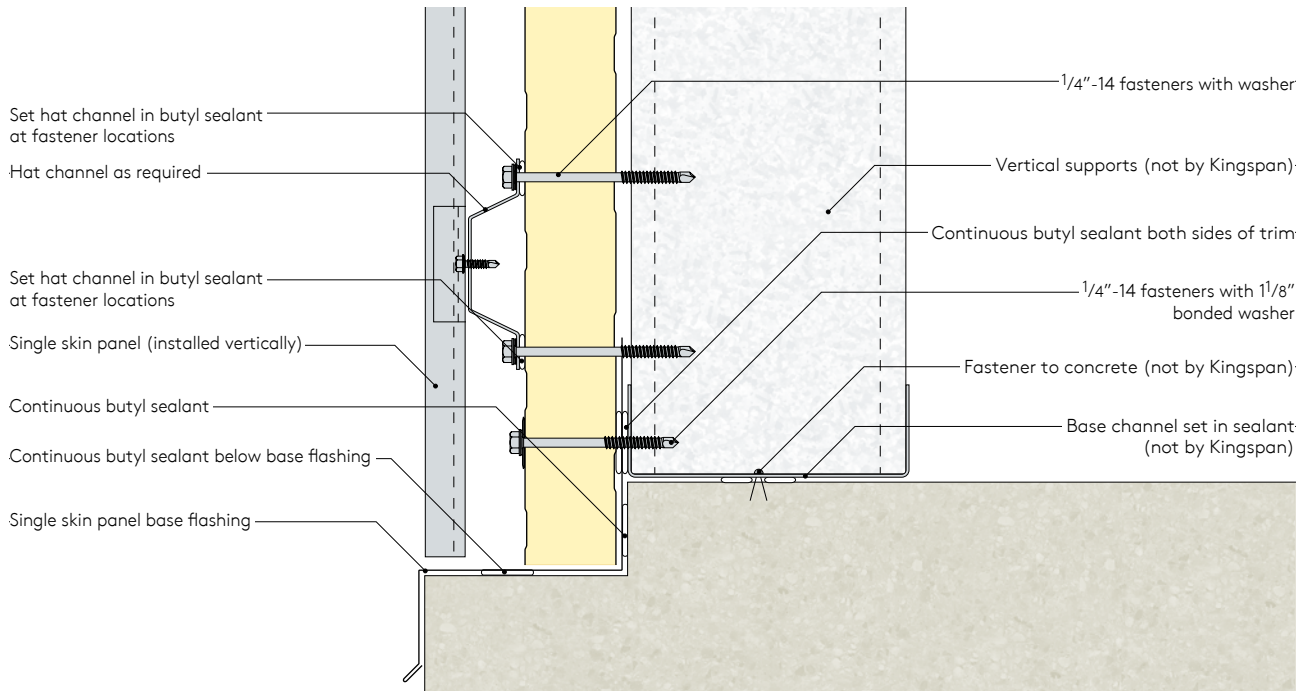


Base - Flush with Extrusion

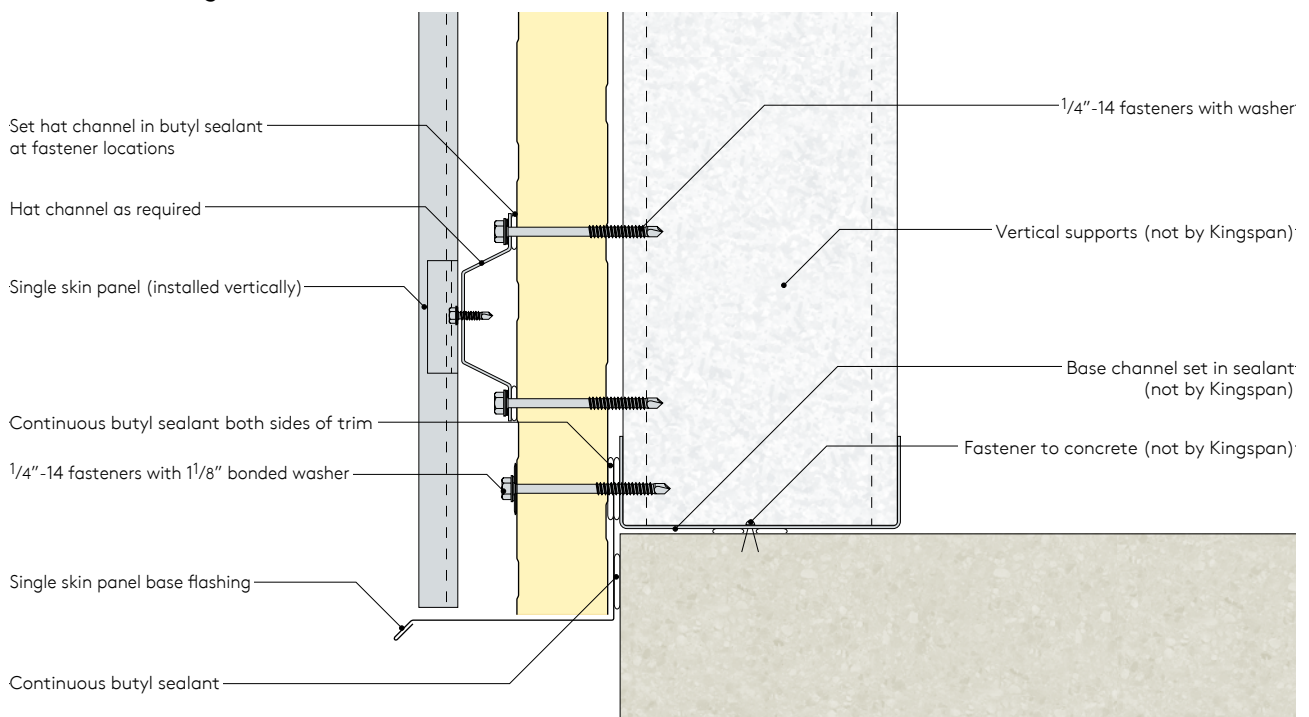


Horizontal Construction Details

Base at Notched Concrete

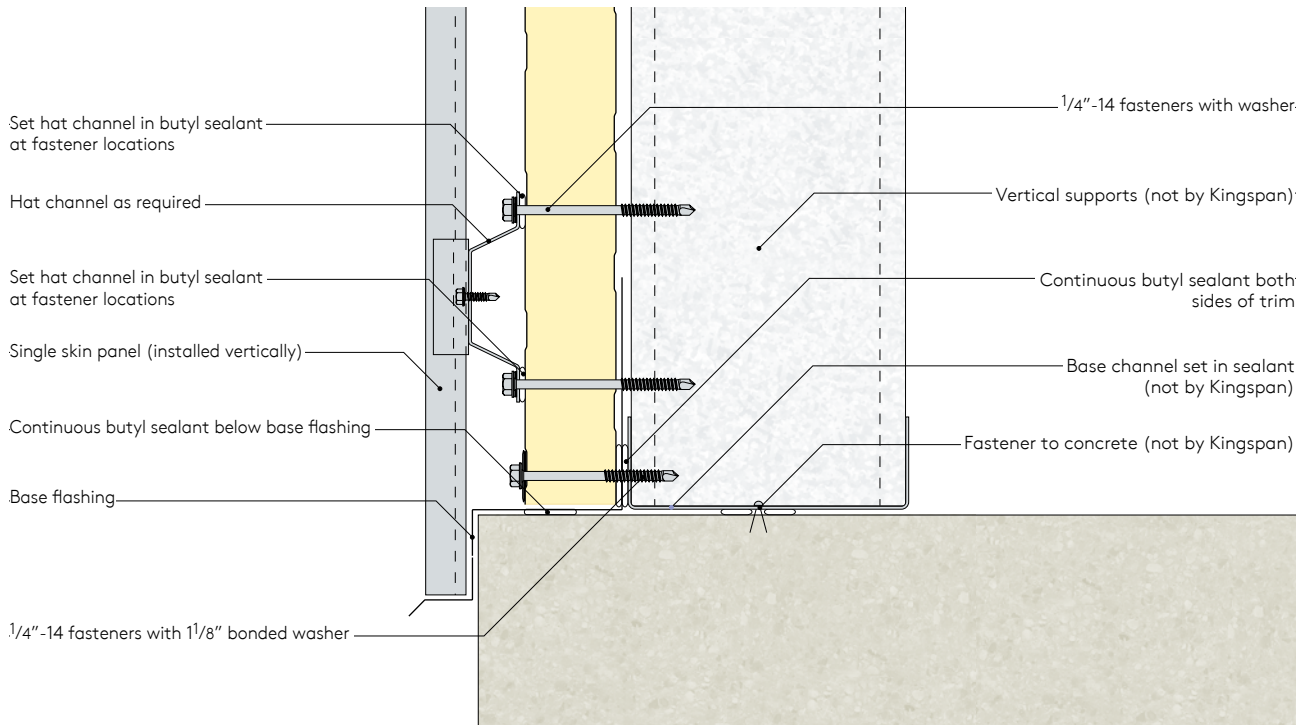


Base - Overhang



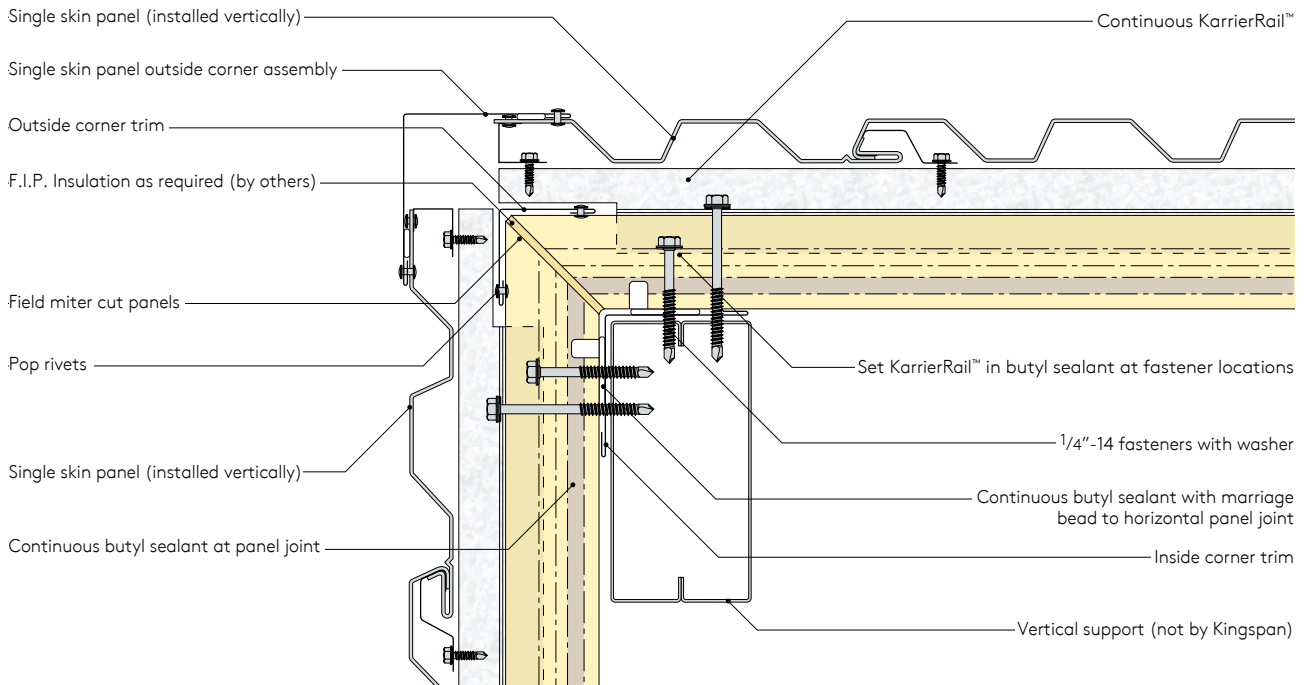
Horizontal Construction Details

Base - Flush with Rainscreen Overhang

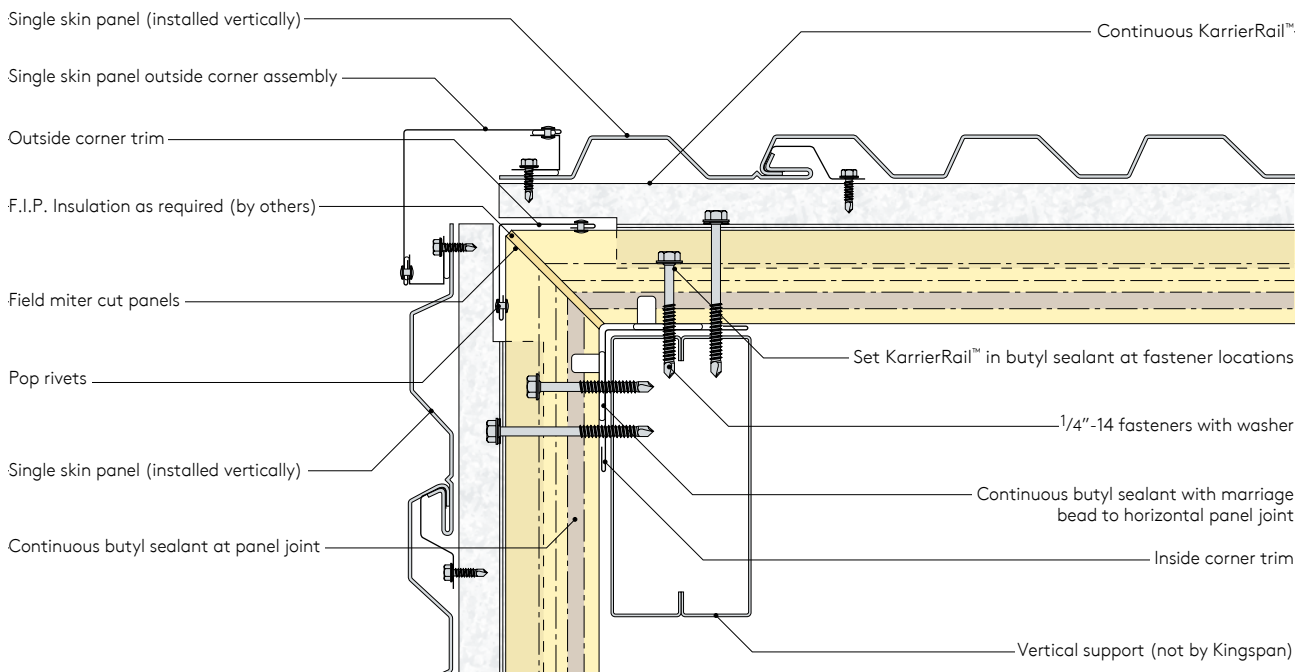


Horizontal Construction Details

Outside Corner (High Cell) - Detail

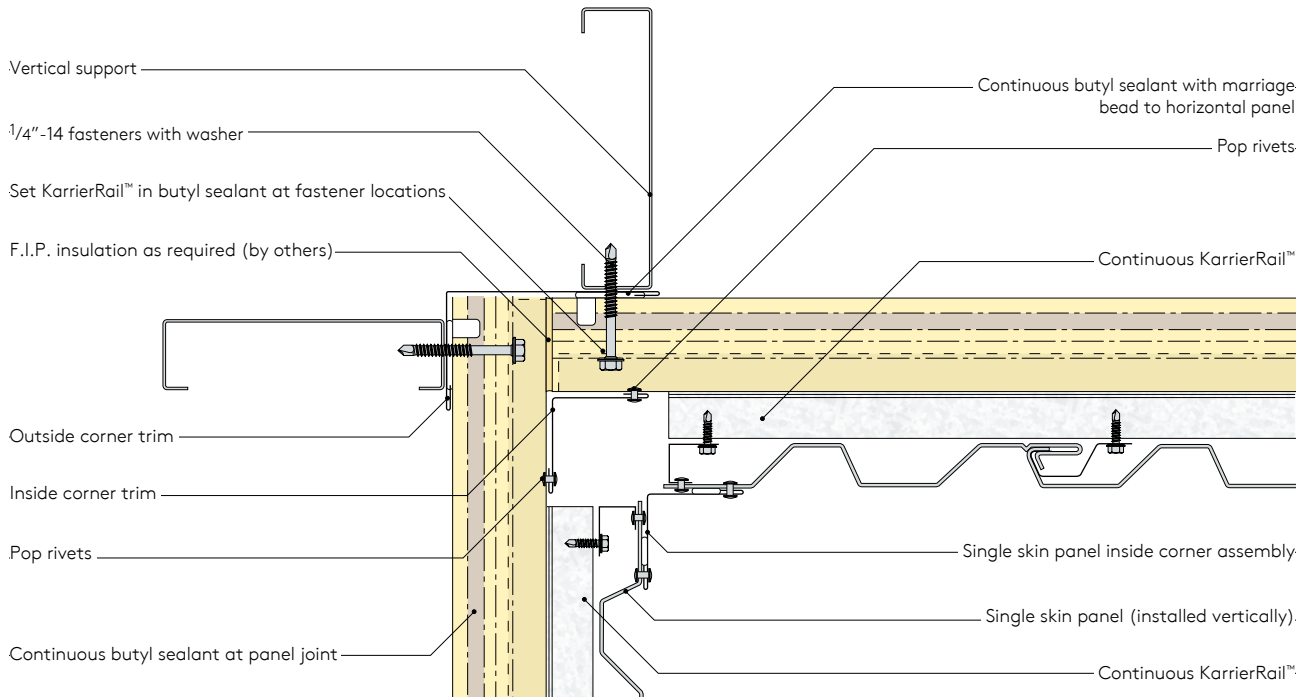


Outside Corner (Low Cell) - Detail

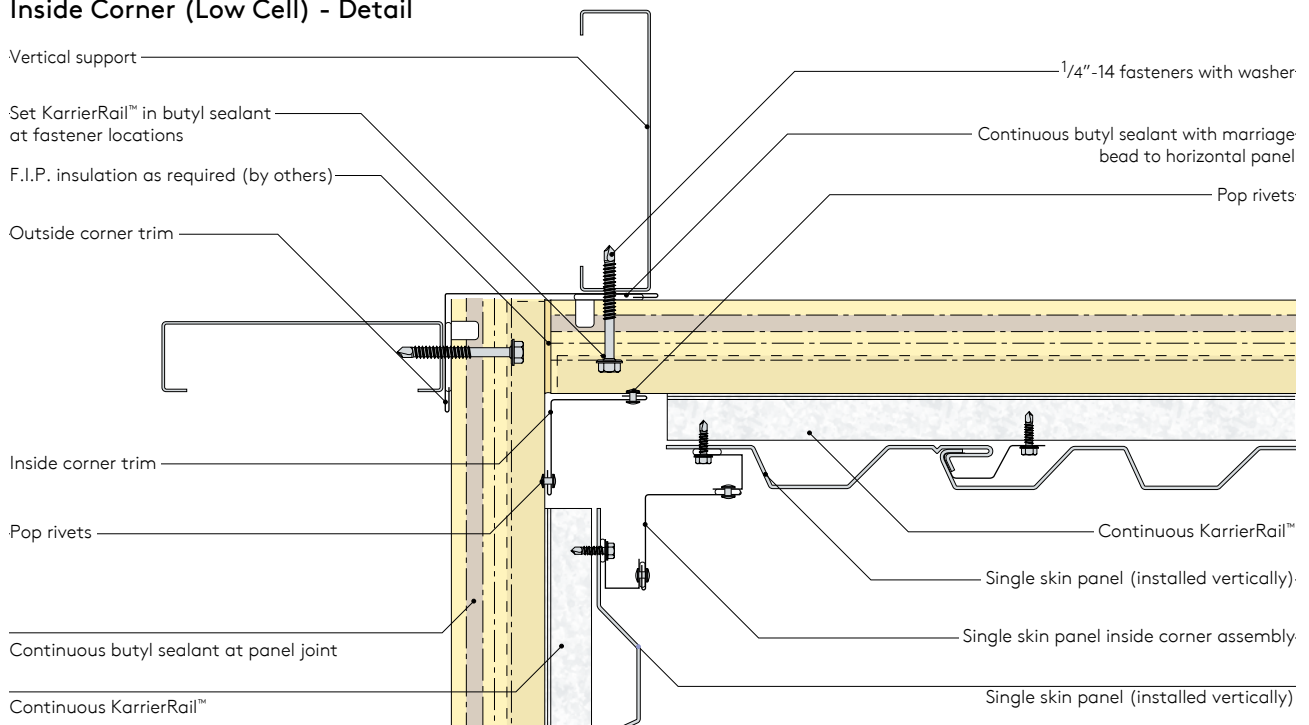


Horizontal Construction Details

Inside Corner (High Cell) - Detail

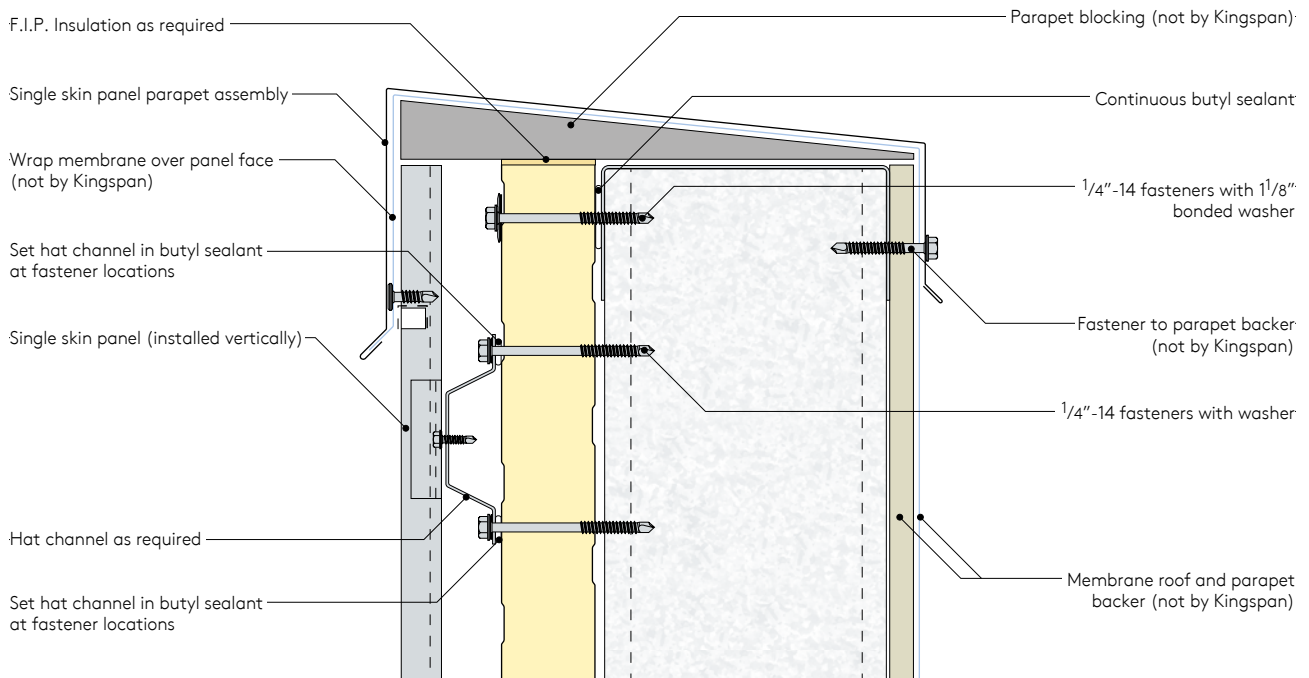


Inside Corner (Low Cell) - Detail

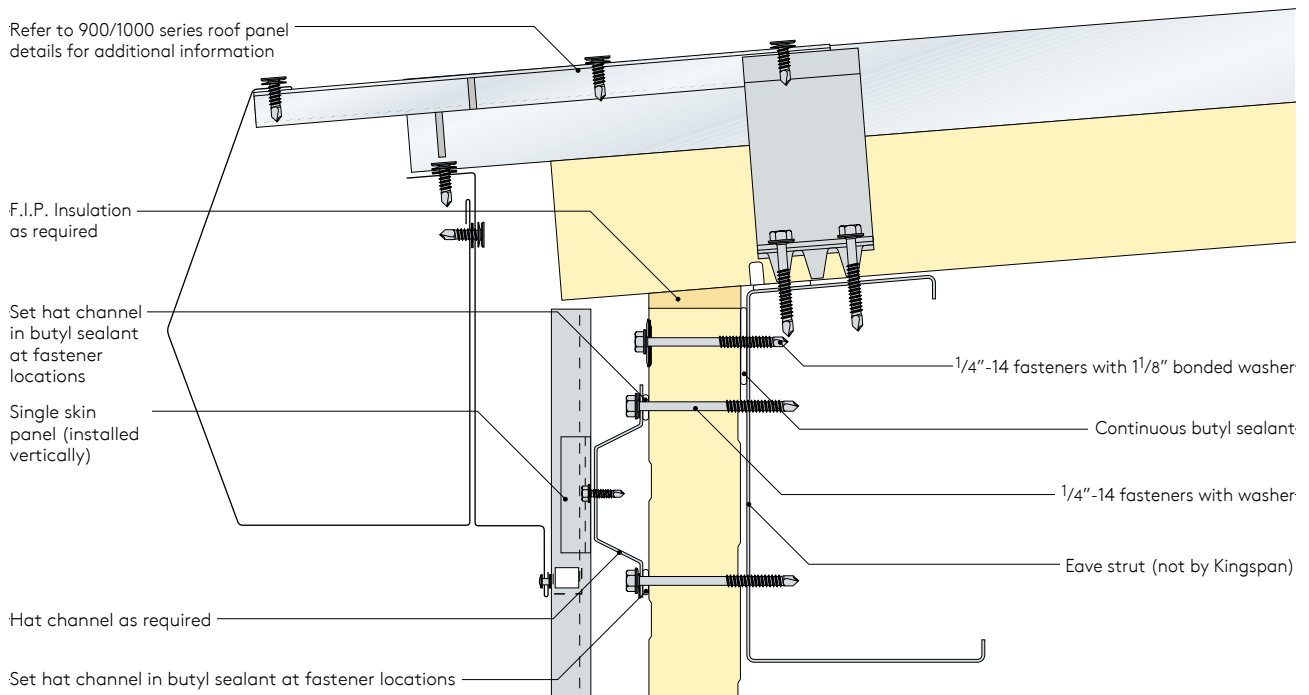


Horizontal Construction Details

Parapet - Detail

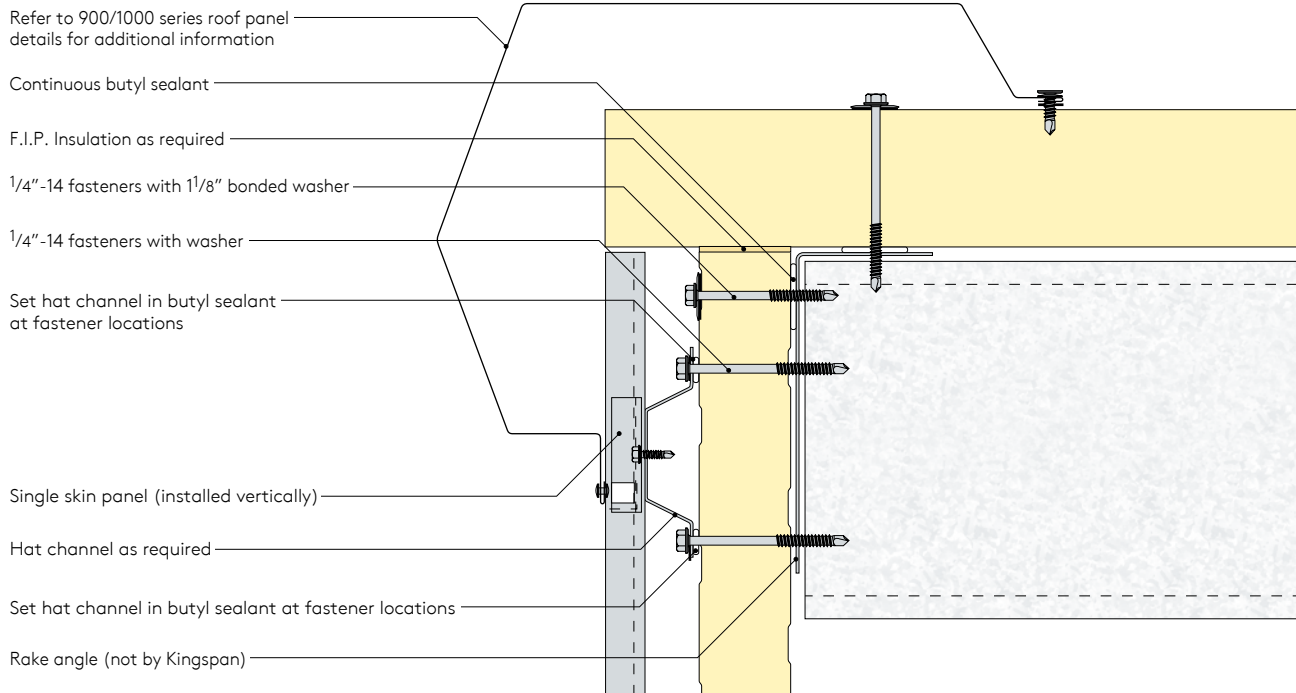


Low Eaves - Detail



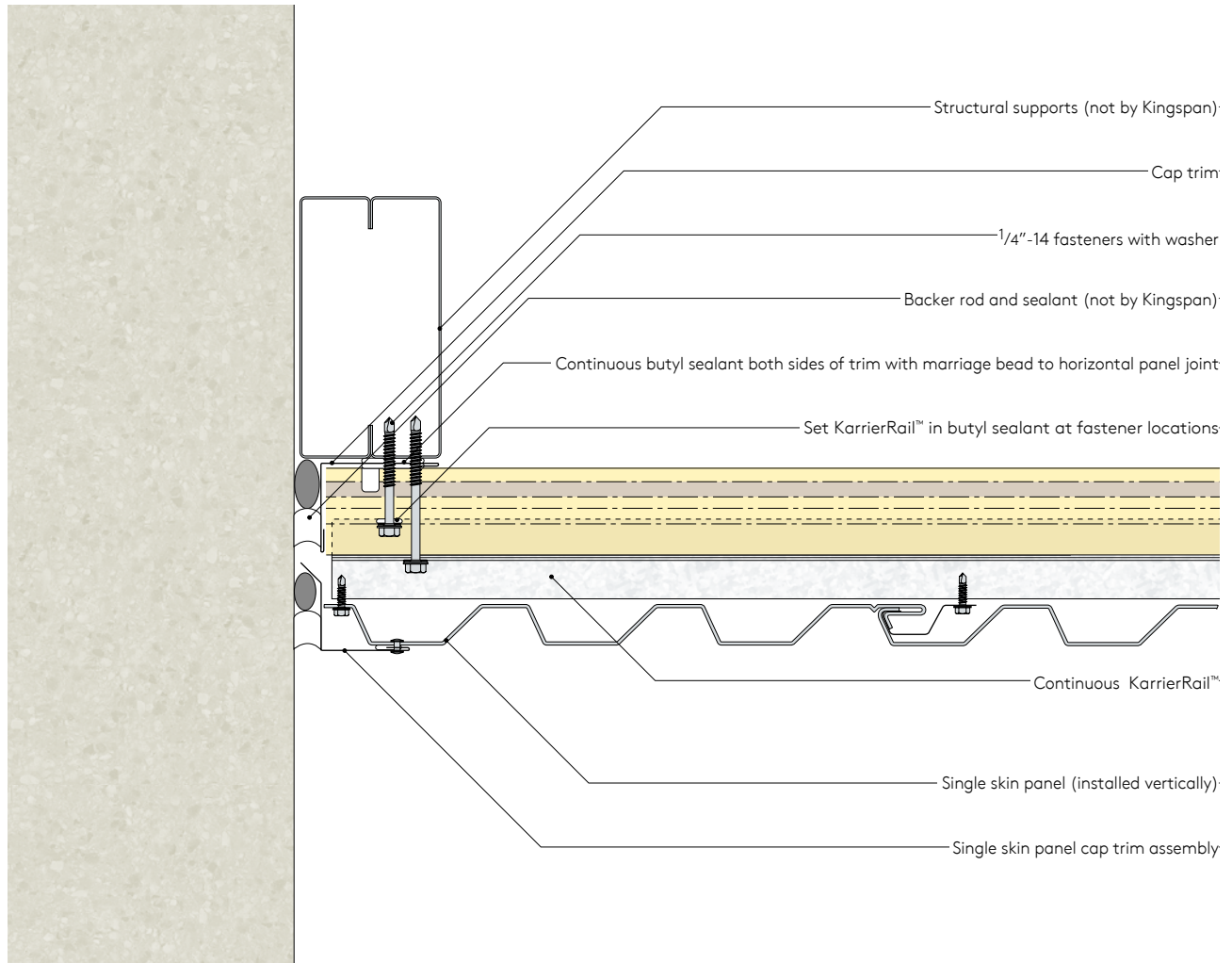
Horizontal Construction Details

Rake - Detail



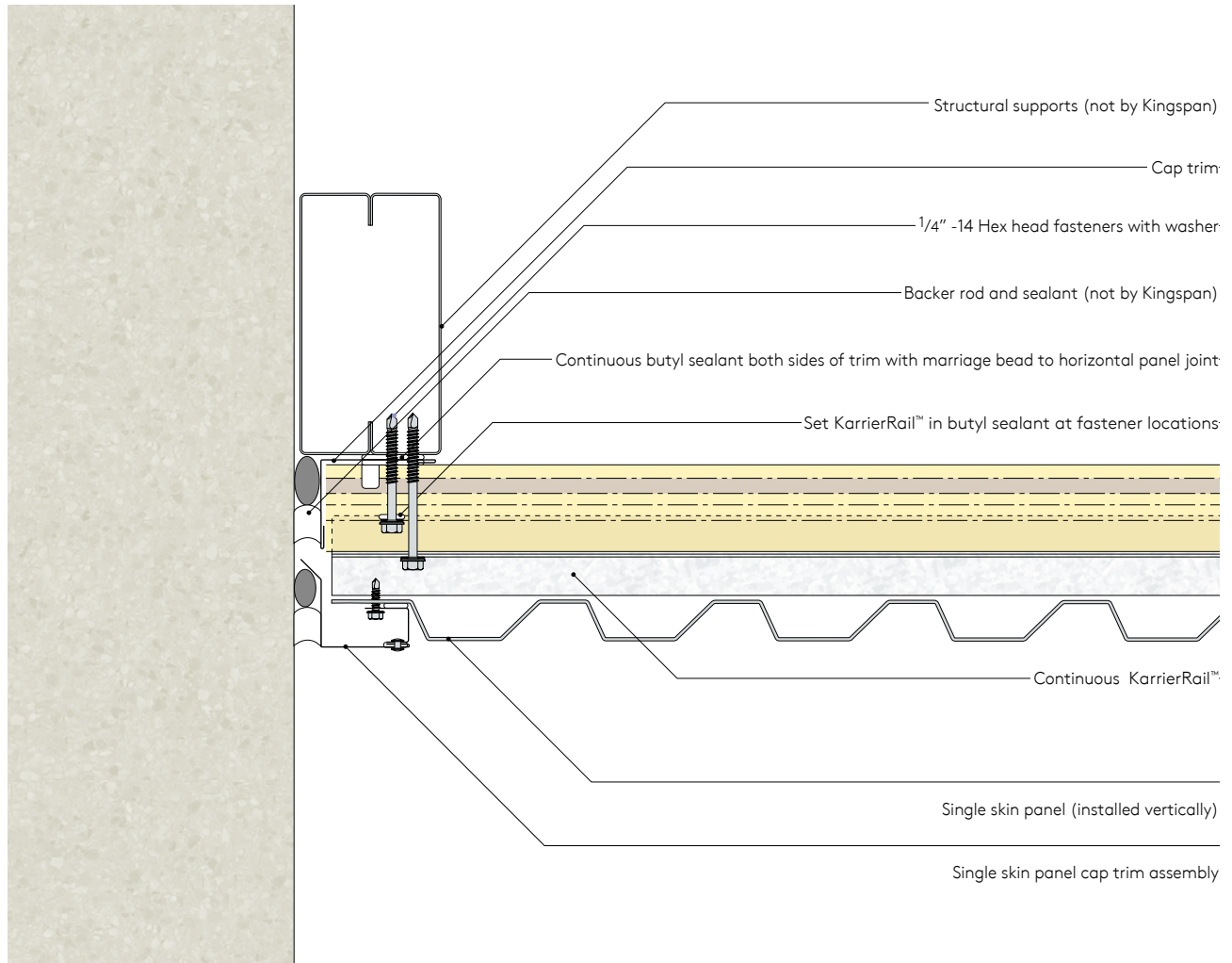
Horizontal Construction Details

Panel Termination (High Cell) - Detail

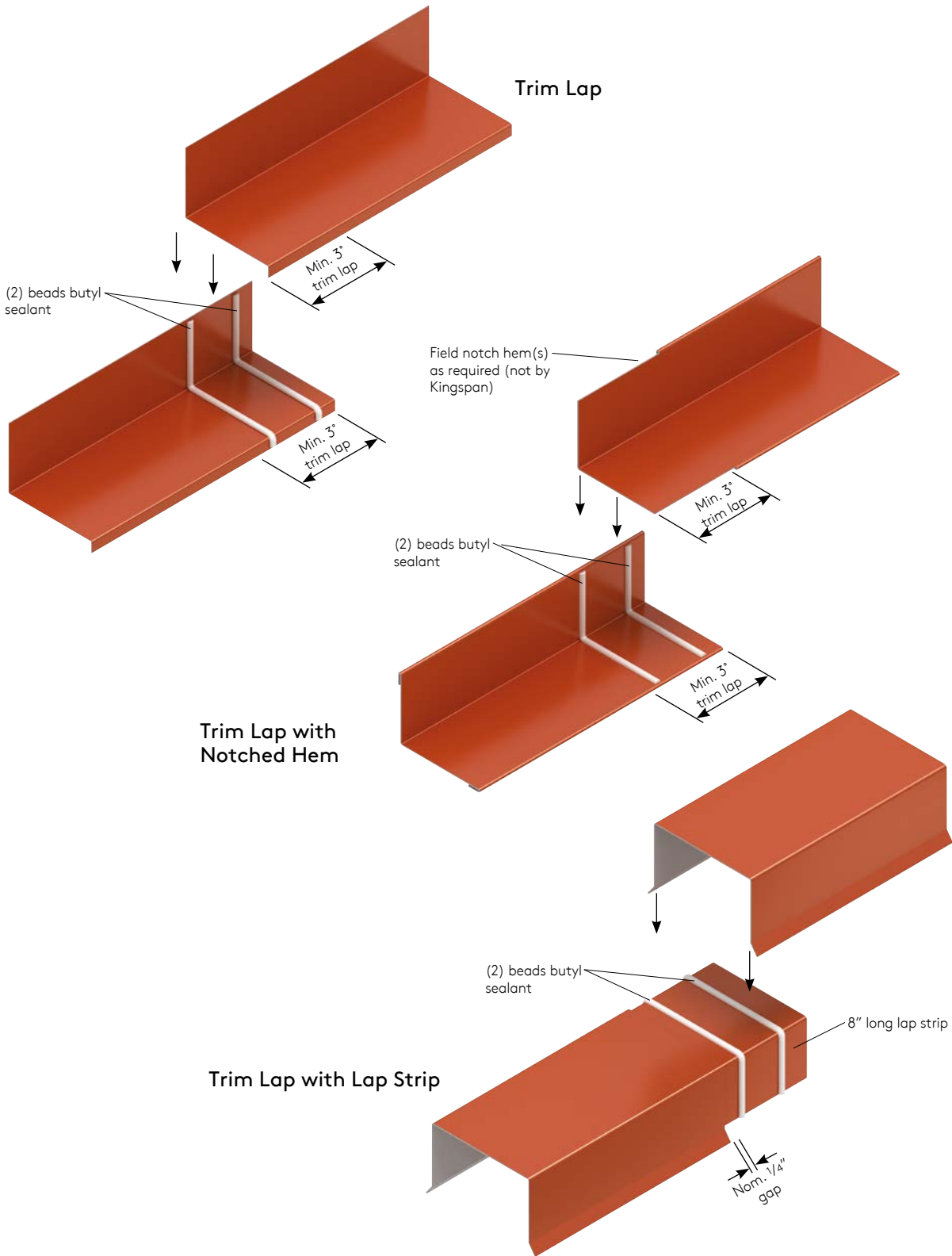


Horizontal Construction Details

Panel Termination (Low Cell) - Detail

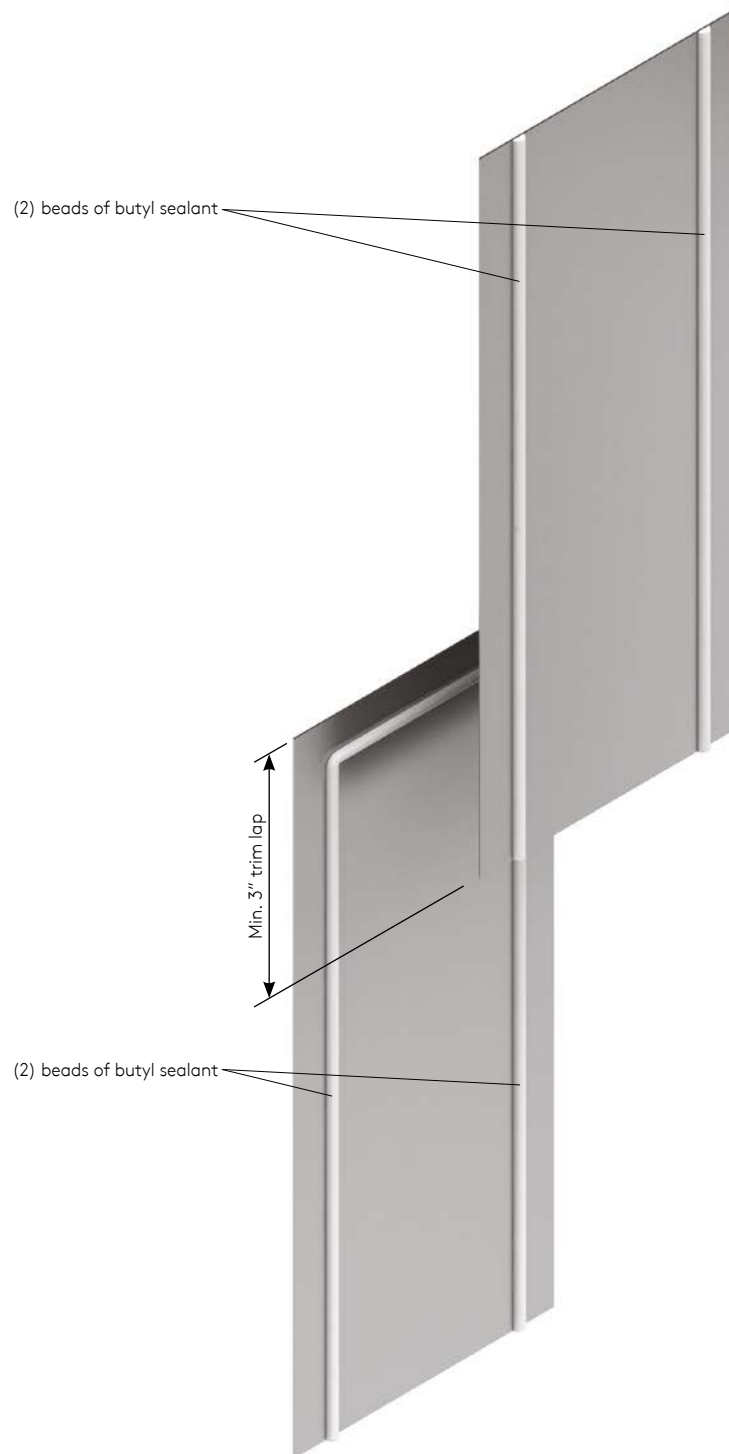


Horizontal Construction Details



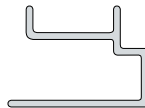
Horizontal Construction Details

Mending Plate "Shingle" Lap Detail



Horizontal Construction Details

Base Extrusion - Optional



Base extrusion

NOTE

Lap strips for horizontal extrusions should be set in two rows of butyl sealant at each end. Extrusions should be field drilled with weep holes within 2" of the ends of the lap strips to allow adequate drainage.

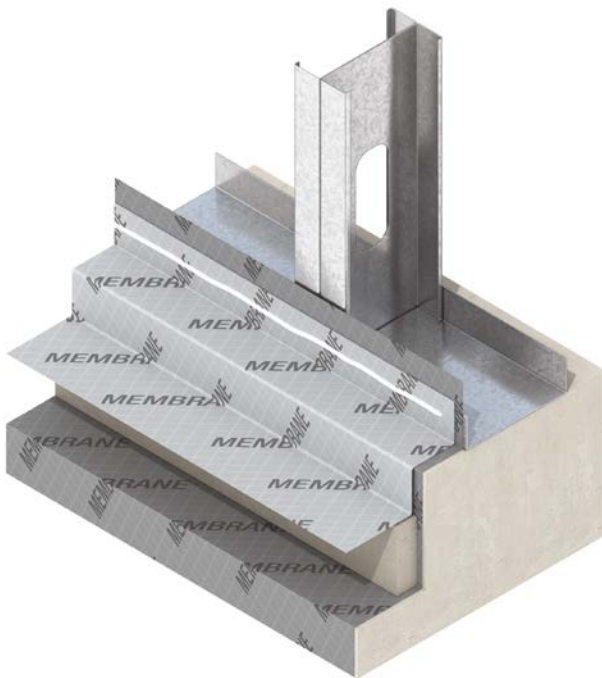
Notes

Horizontal Installation : Brick

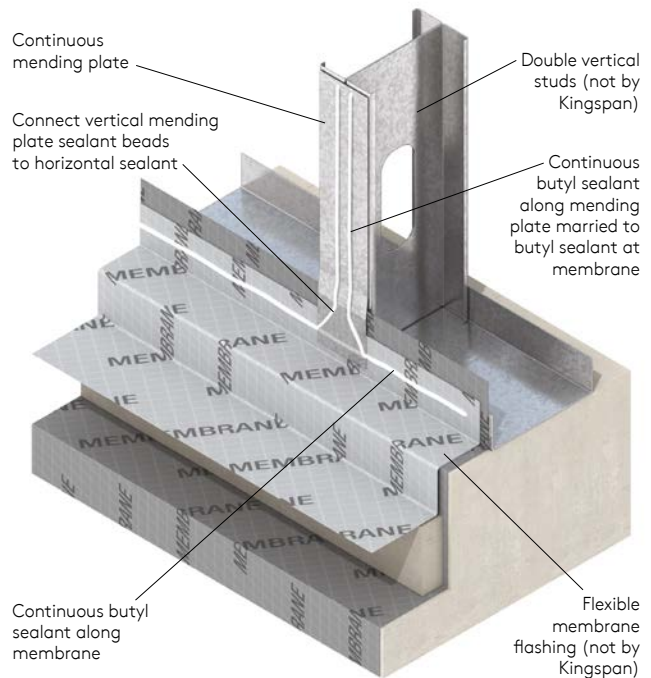
IMPORTANT INSTALLATION NOTES!

- Minimum width of load-bearing steel exposed behind two horizontal panels at vertical joint is 5" nominal (approx. 127mm) which could be provided by standard double steel stud configuration with steel backer plate. Optional I-beam or HSS steel sections.
- Minimum bearing face for intermediate support is 1.625" (approx. 42mm).
- Where long runs of integrated strip windows are installed, the vertical panel joints should terminate above and continue below the window units.
- Visually check all internal and external tongue-and-groove joints between two adjacent panels to ensure panels are engaged fully and the gaps do not exceed tolerances.
- Details shown in this guide are for reference only. Consult project shop drawings for actual details required.

- A** Verify that all structural supports are properly aligned before installing panels (refer to Section 8 Structural Alignment - Horizontal Panels).
- B** Verify flexible membrane flashings at base conditions are installed per project details (installed by masonry contractor).



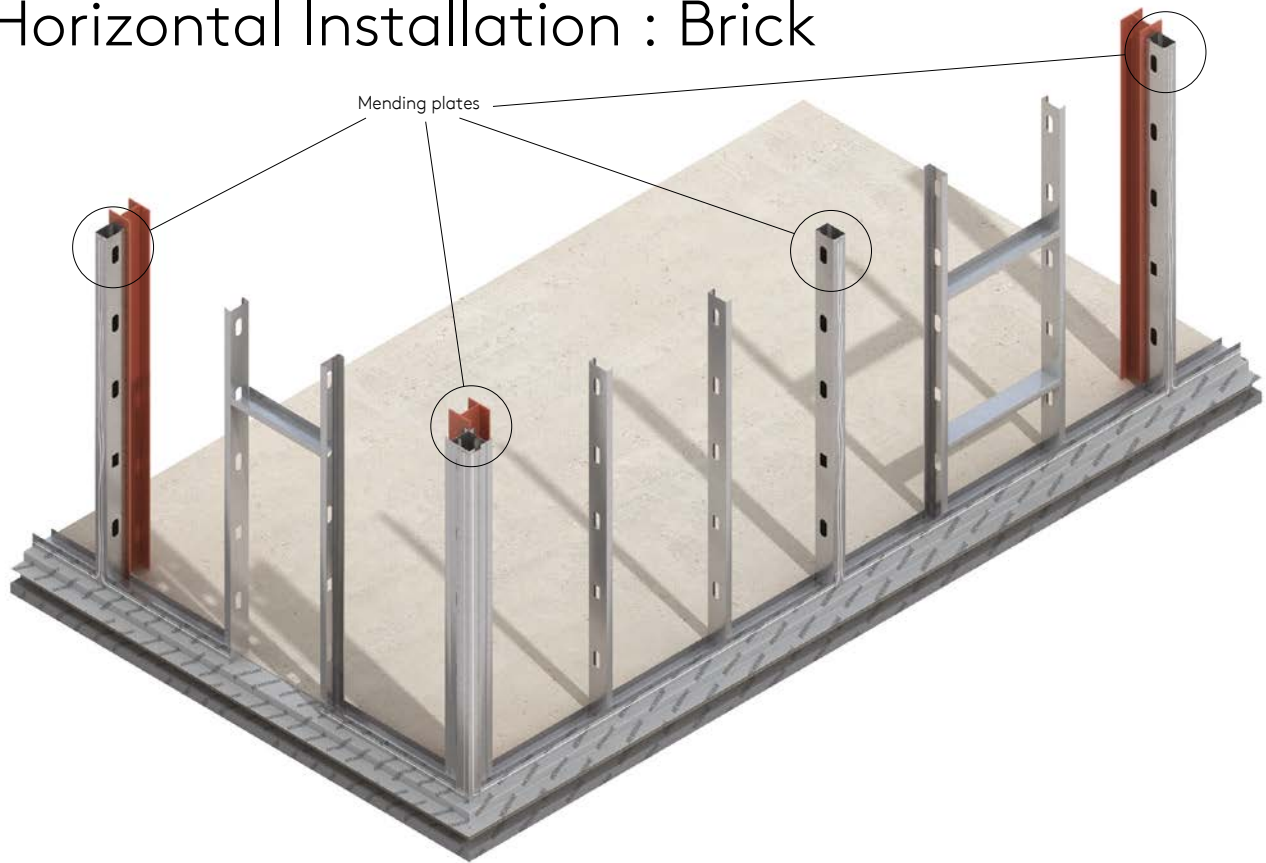
Mending Plate to Base Condition



NOTE

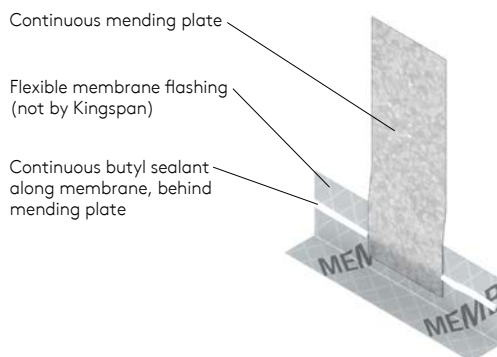
Typical base condition for brick wall shown - consult architect's drawings or masonry contractor's shop drawings for project specific conditions!

Horizontal Installation : Brick

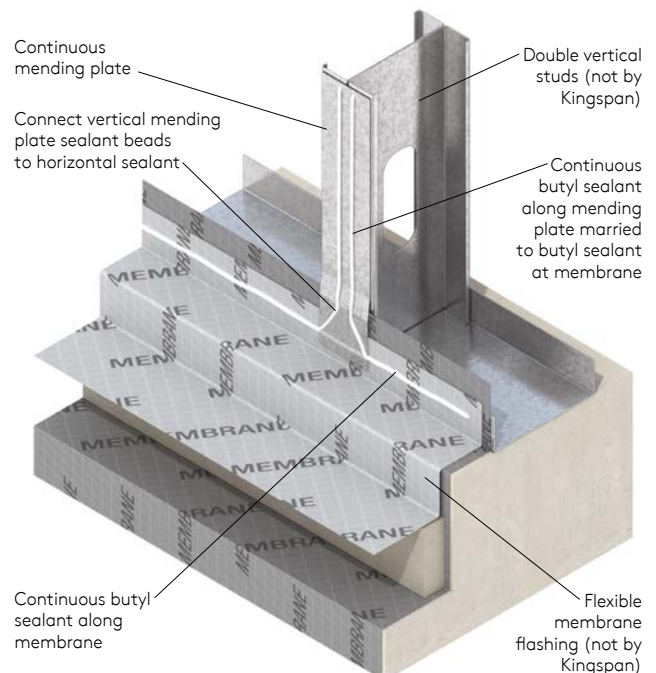


- C** Install continuous mending plates at all vertical joint locations. Seal to base membrane flashings as required. Using a level, mark the centerline of all vertical joints on mending plates to match locations shown on shop drawings.

Mending Plate to Membrane Flashing



Mending Plate to Base Condition



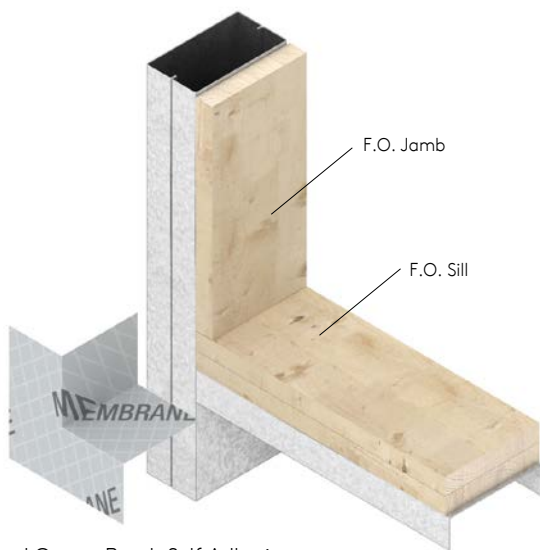
Horizontal Installation : Brick

- D** Verify that masonry contractor has installed membrane wraps at all window locations similar to below.

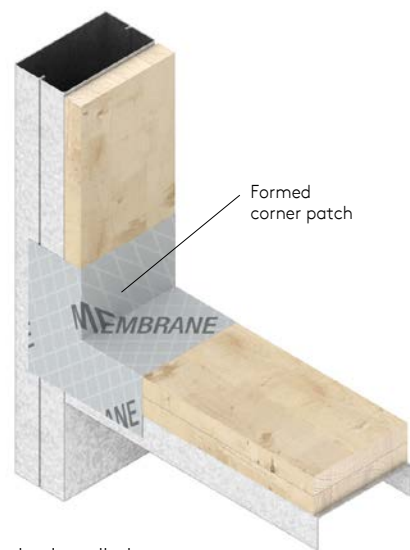
Disclaimer

ALL membrane and brick details shown here are informational only, and are provided to show typical interfaces and sequence of installation between the panel system and other materials. Consult the architect's drawings or masonry contractor's approved shop drawings for project specific details.

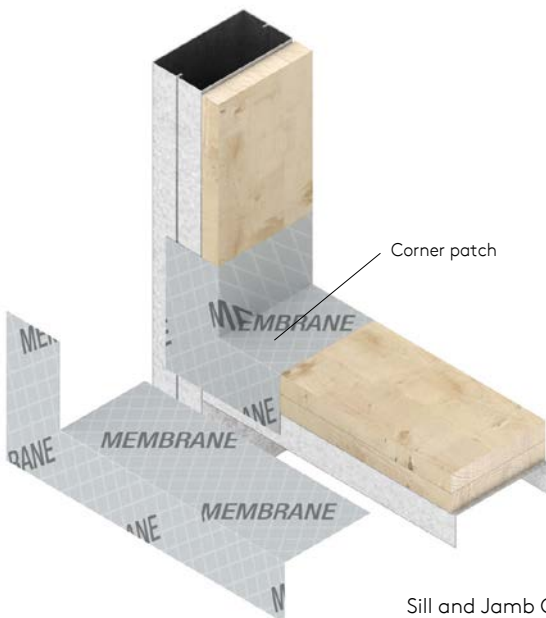
Jamb to Sill Membrane Wraps - Typical



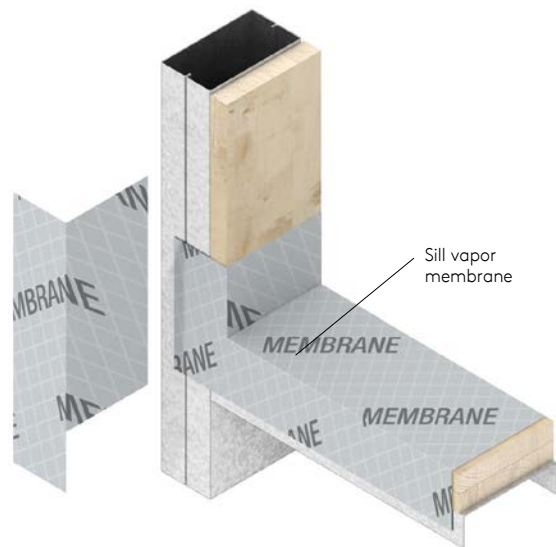
Formed Corner Patch Self Adhering Membrane



Formed Corner Patch - Installed

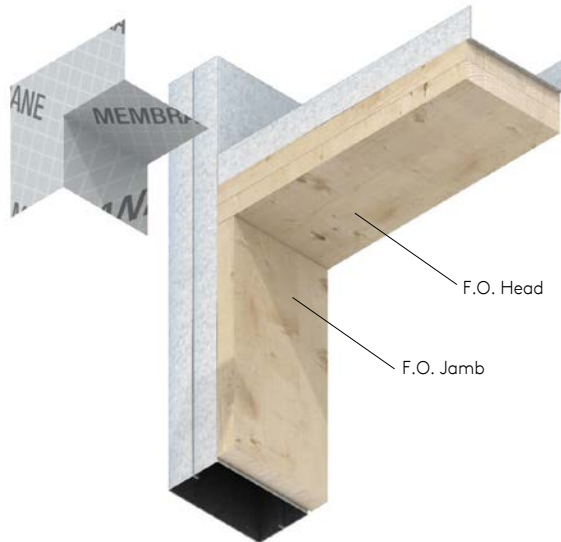


Sill and Jamb Continuous Membranes

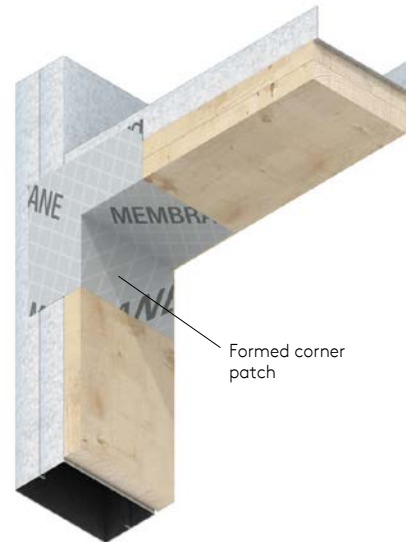


Horizontal Installation : Brick

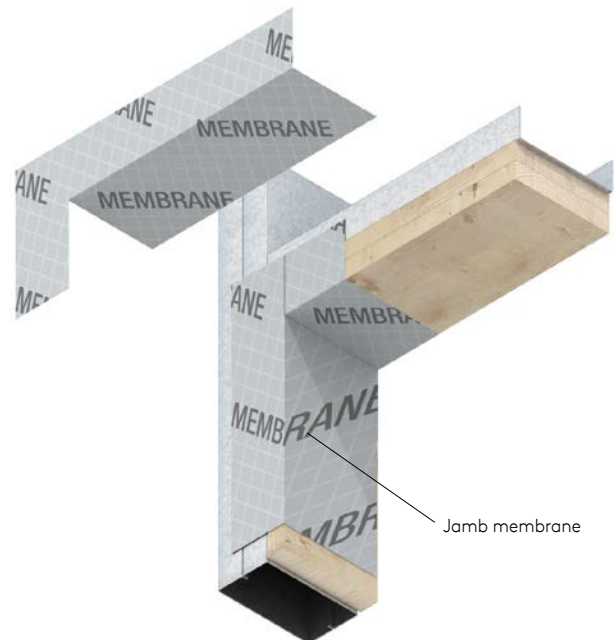
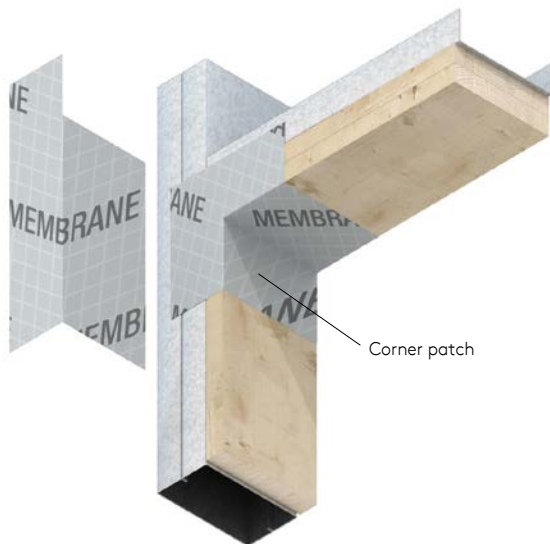
Jamb to Head Membrane Wraps - Typical



Formed Corner Patch
Self Adhering Membrane



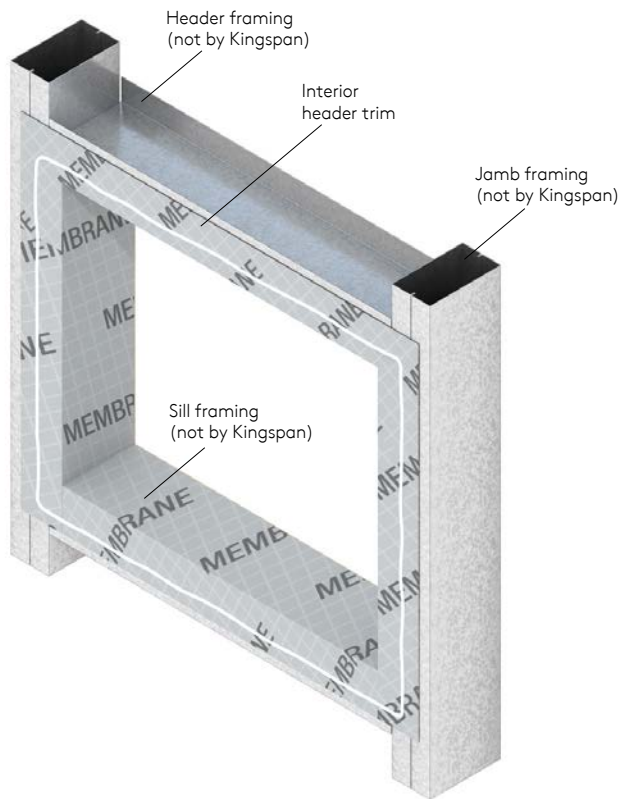
Membrane Corner Patch
Self Adhering Membrane



Head and jamb continuous membranes

Horizontal Installation : Brick

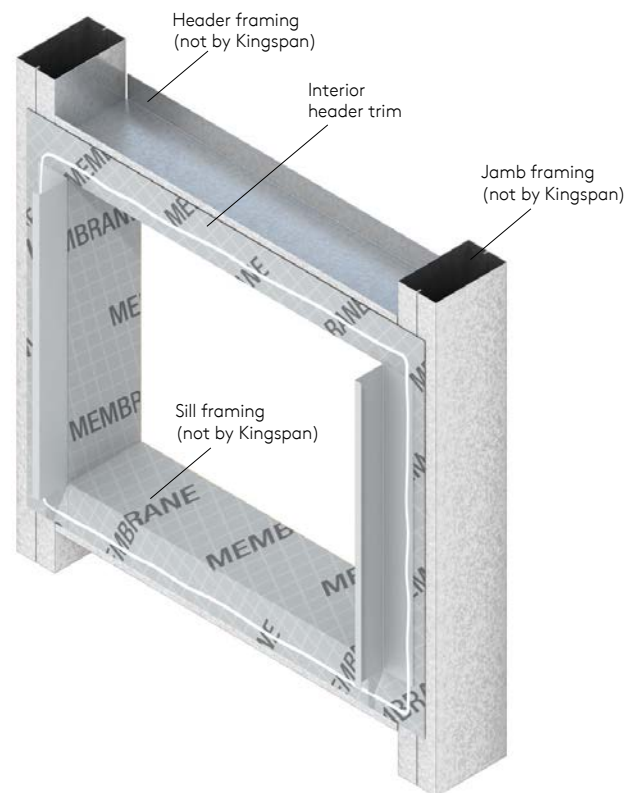
- E** Apply butyl sealant to membrane wrap around the perimeter of the framed opening.



NOTE

Verify that sealant is compatible with membrane material!

- F** Install vertical metal jamb trims and sealant as shown.

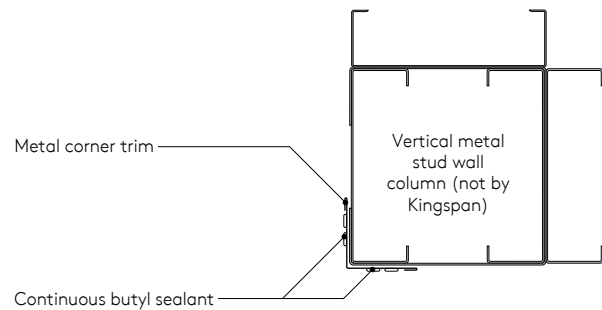


Horizontal Installation : Brick

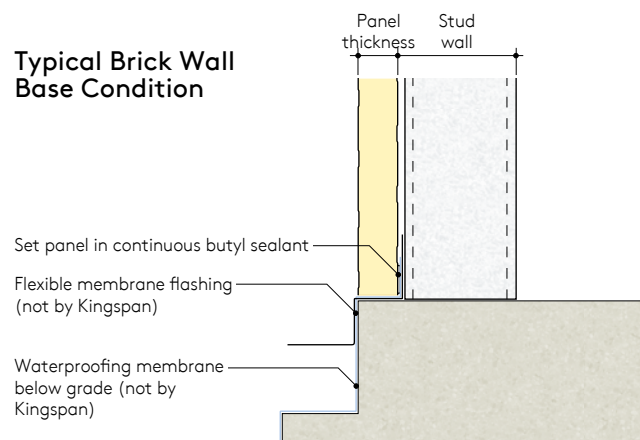
First Panel Attachment at the Base



- G** Install interior portion of outside corner trims at all corners.
- H** Starting from the lower left corner, field cut bottom edge of panel to remove panel joints.

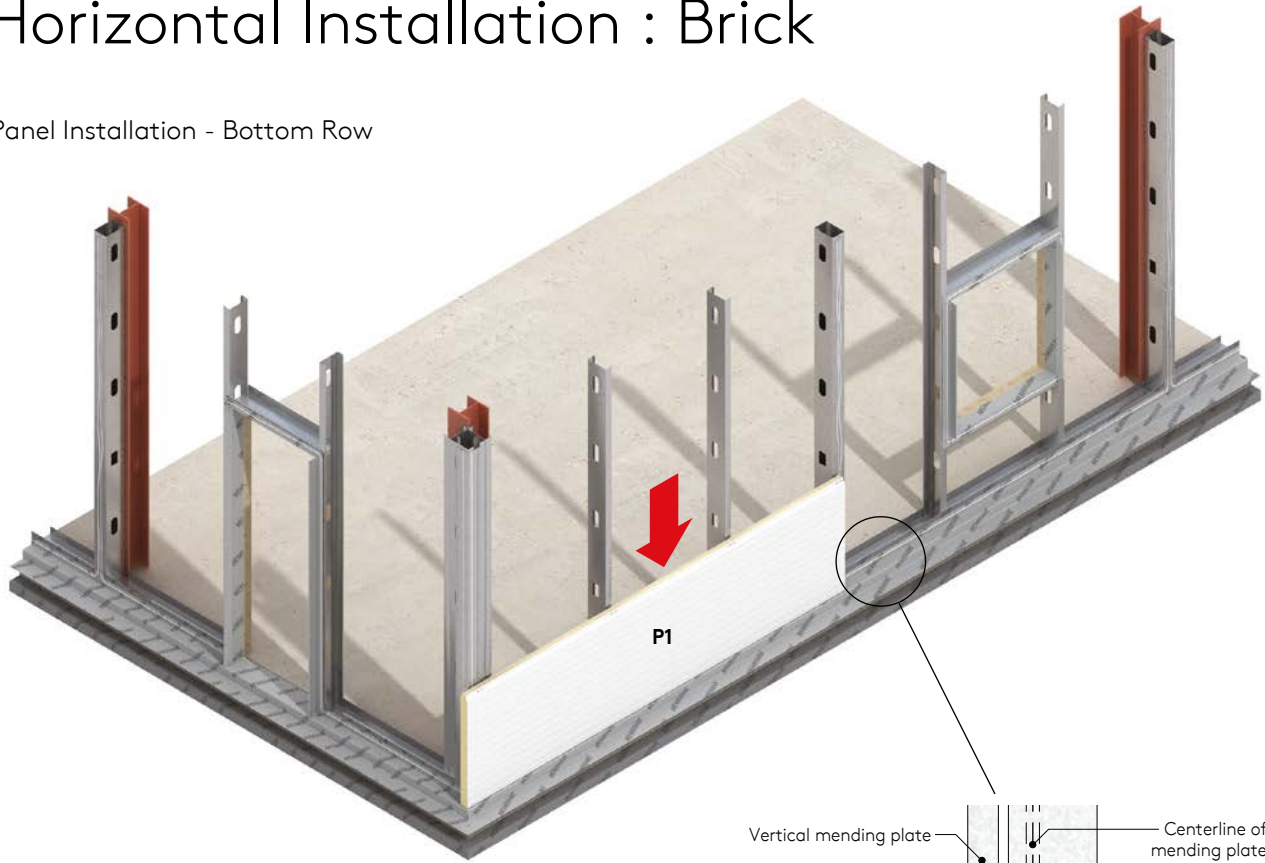


Typical Brick Wall Base Condition

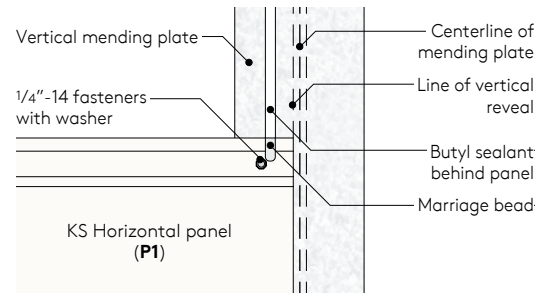


Horizontal Installation : Brick

Panel Installation - Bottom Row



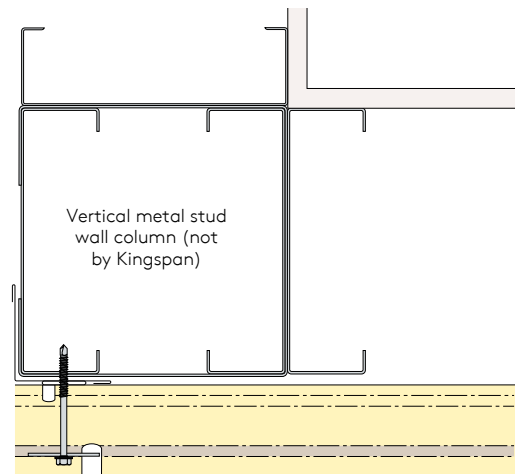
- I** Locate centerline of first vertical mending plate.
- J** Cut first panel to length.
- K** Set panel **P1** as shown.
- L** Fasten into supporting steel with appropriate clips and 1/4"-14 fasteners as indicated on shop drawings.
- M** Once panel is secured, apply butyl sealant over the interior male lip at both panel ends to create a marriage bead to the sealant on the vertical mending plate.



(See Vertical Joint Assembly - Panel **P1**)

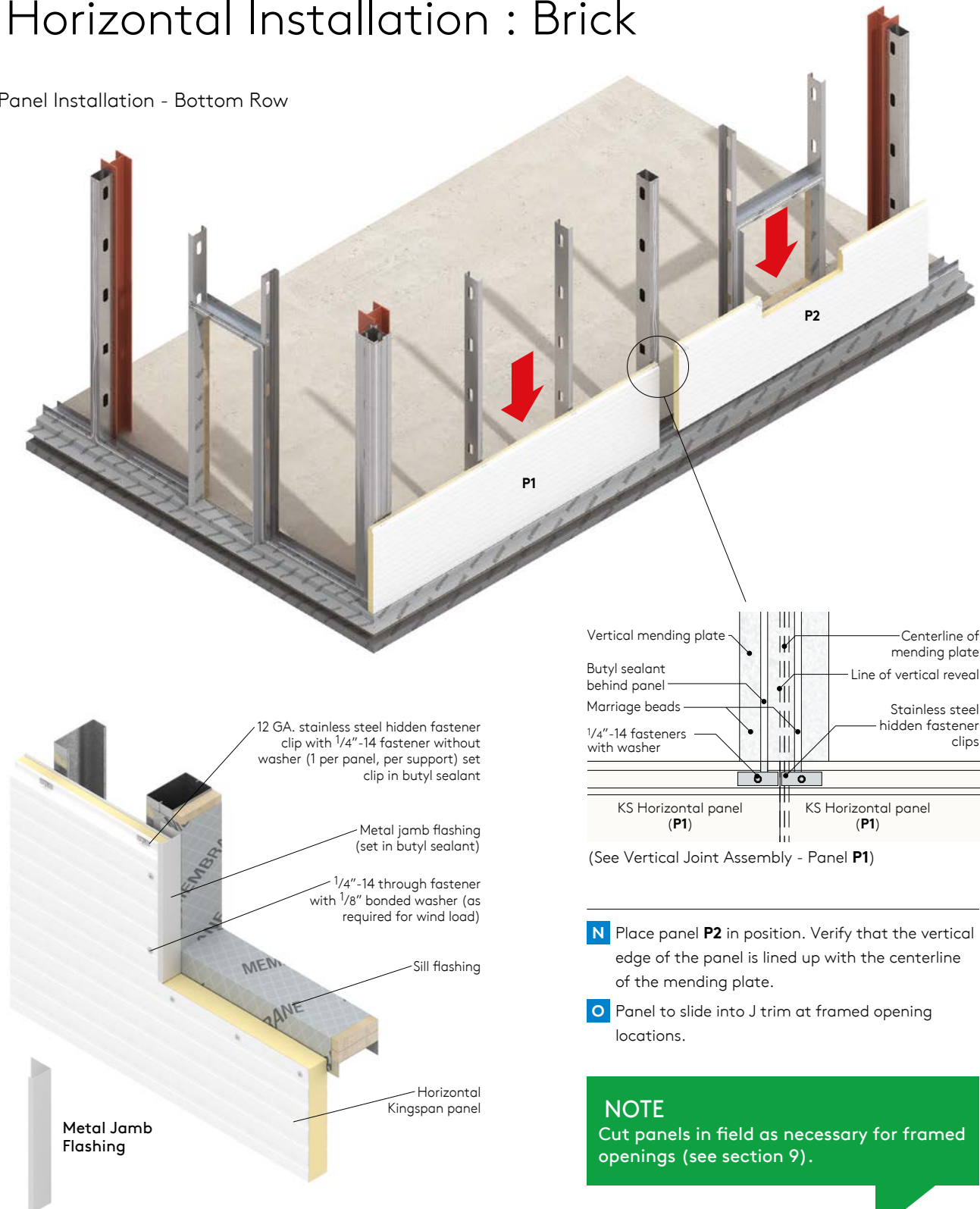
NOTE

Consult with Kingspan Technical Department for allowable panel loads, spans and fastening pattern.



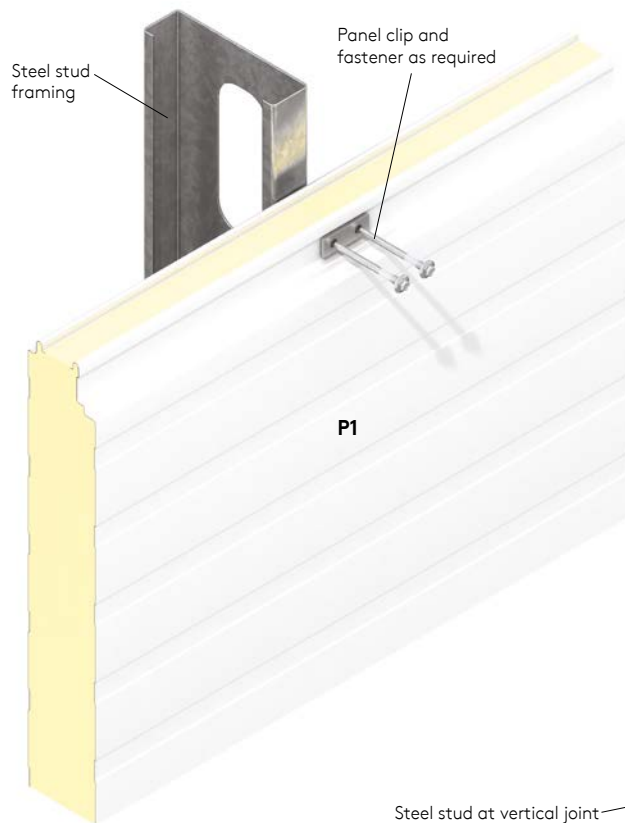
Horizontal Installation : Brick

Panel Installation - Bottom Row



Horizontal Installation : Brick

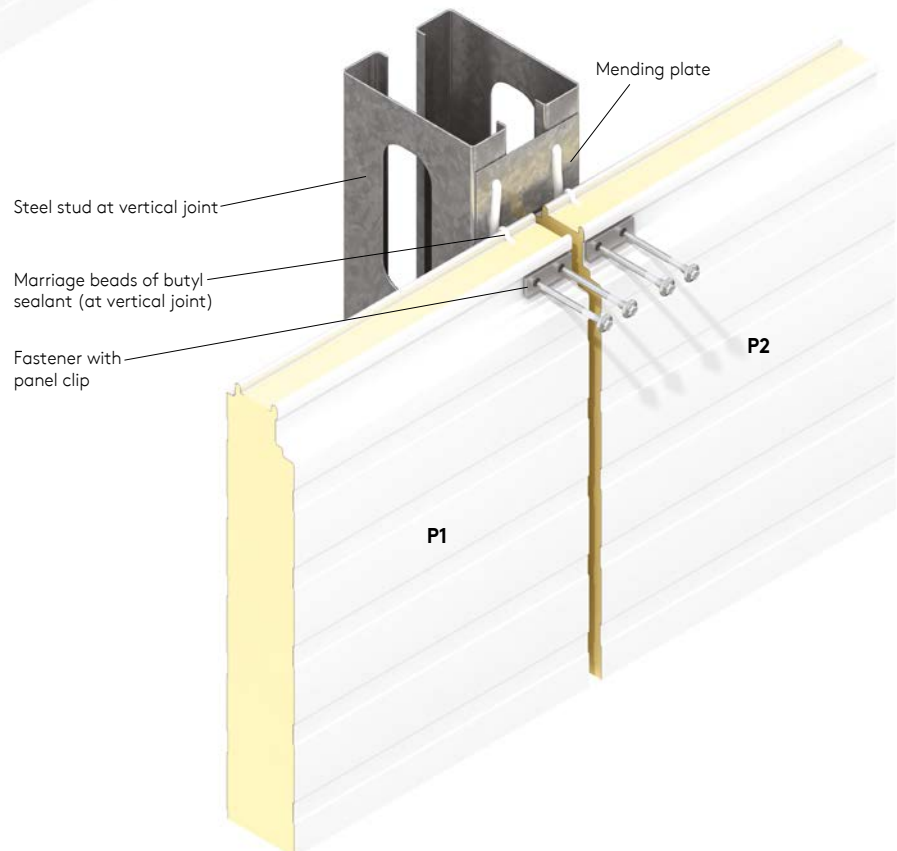
Intermediate Fastener Position



CAUTION

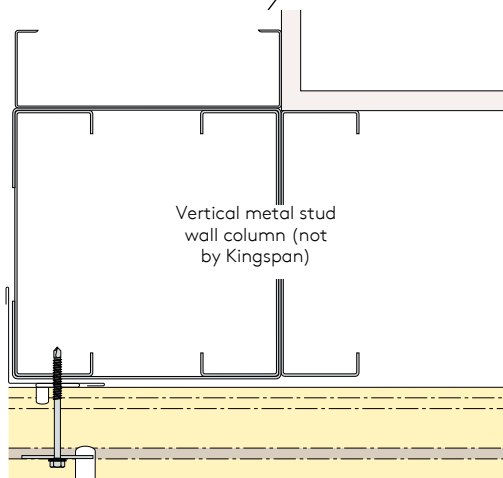
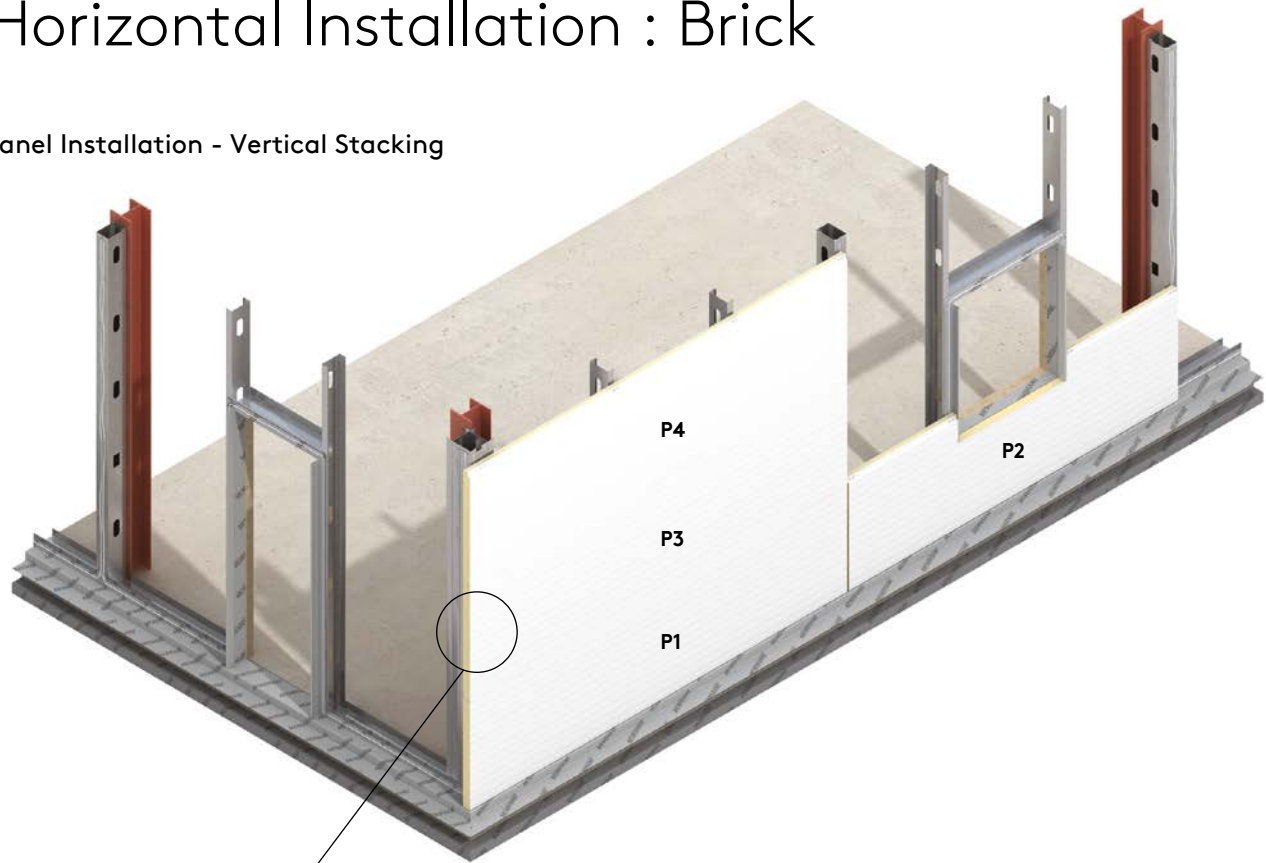
Do not over-tighten fasteners as damage to the panel core as well as facings will result.

Vertical Joint Assembly



Horizontal Installation : Brick

Panel Installation - Vertical Stacking



P Install panels **P3, P4.**

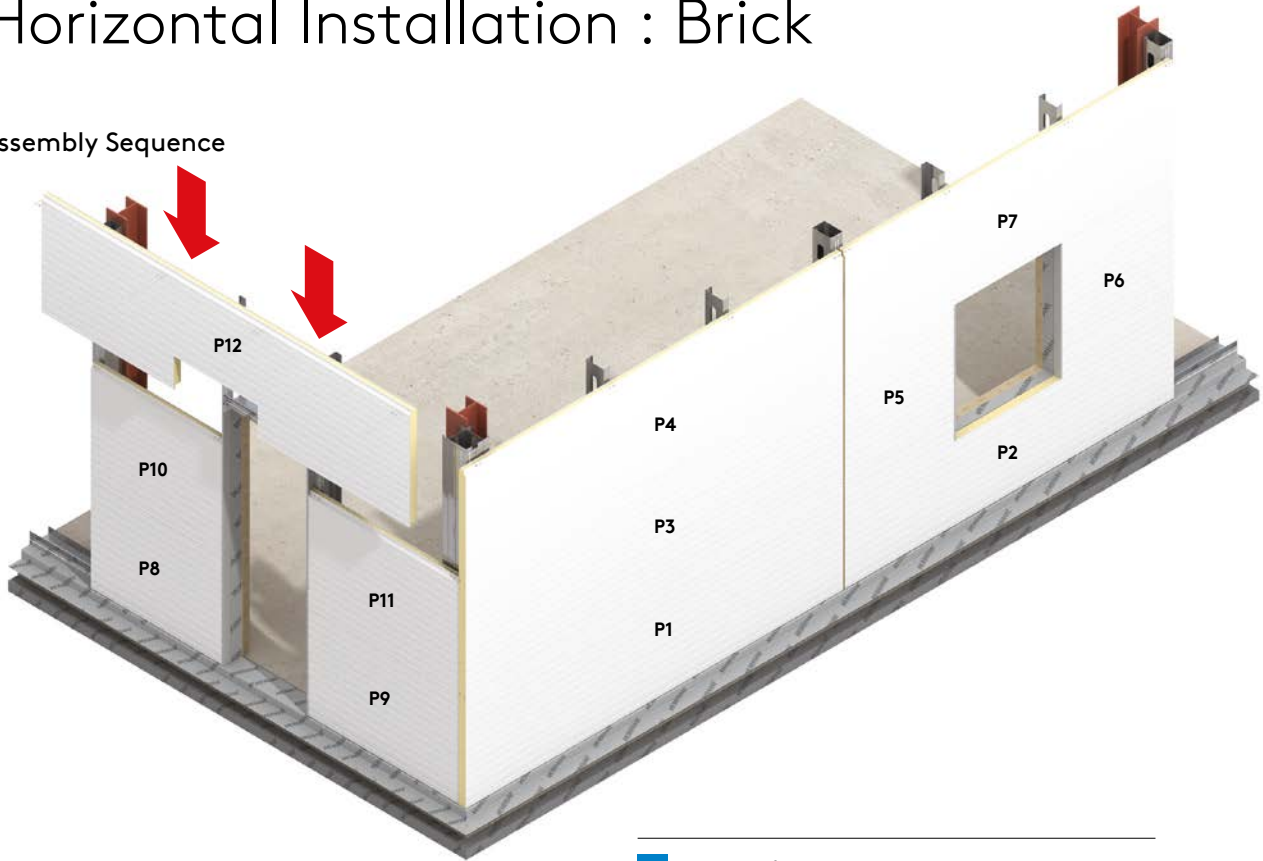
Q Install panels **P5, P6** and **P7.**

NOTE

Verify panels are completely engaged, with proper sealant contact and joint reveals.

Horizontal Installation : Brick

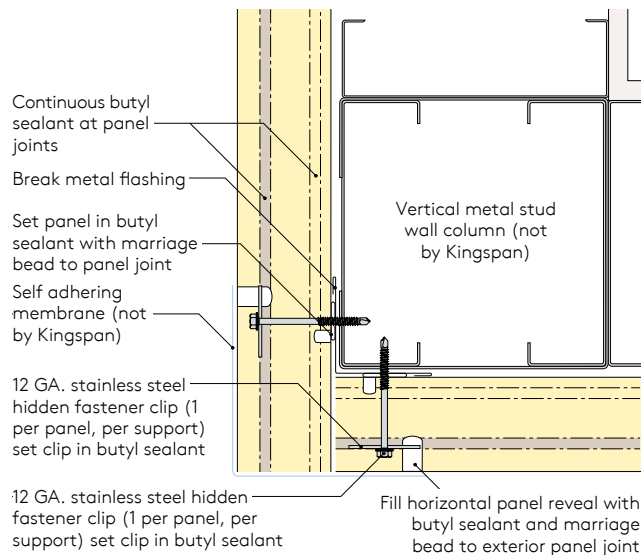
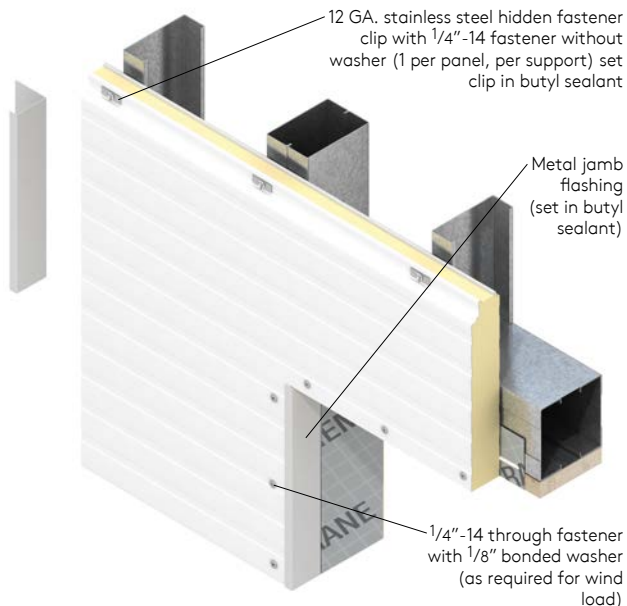
Assembly Sequence



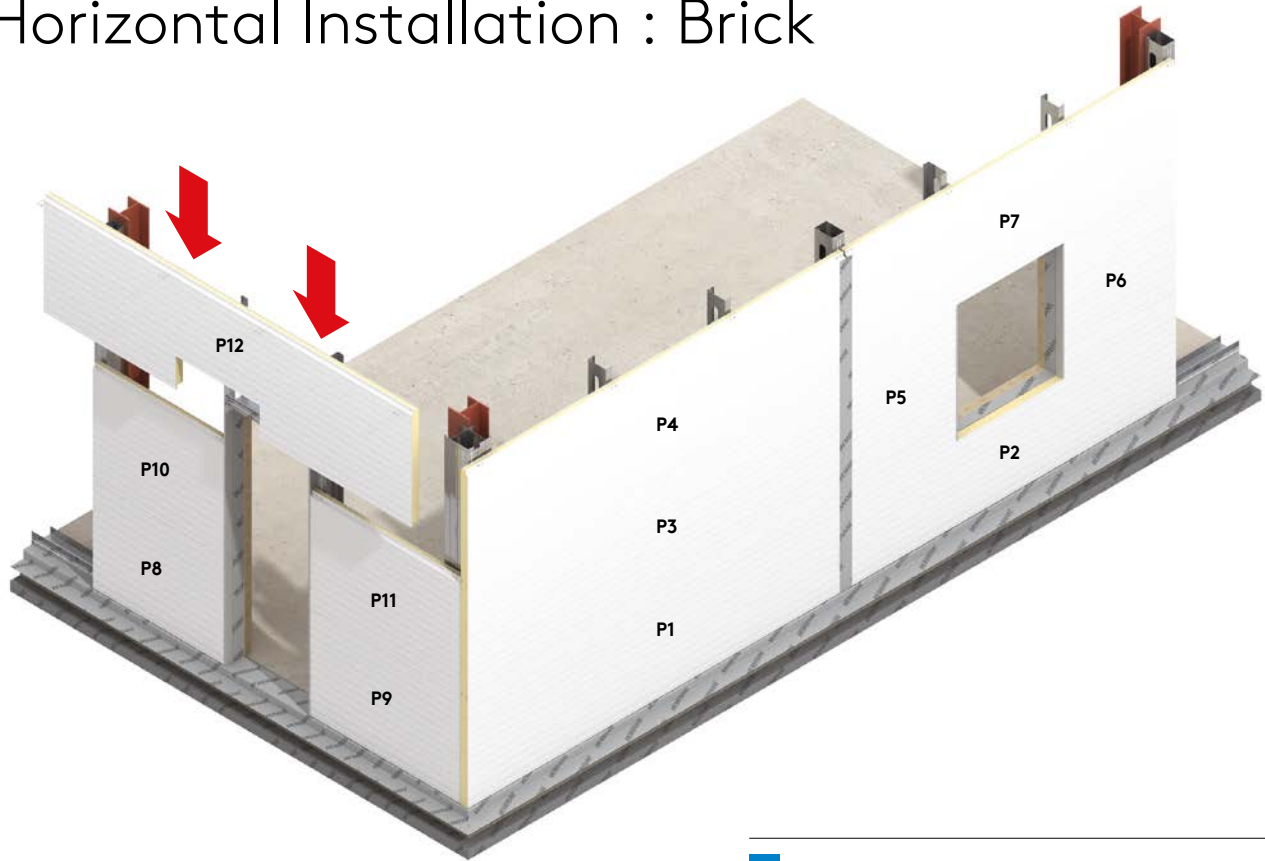
R Once the first elevation is completed (**P1-P7**), start around the corner on next elevation using the same sequence and method for **P8-12**.

S Install outside corner trims as required.

Metal Jamb Flashing

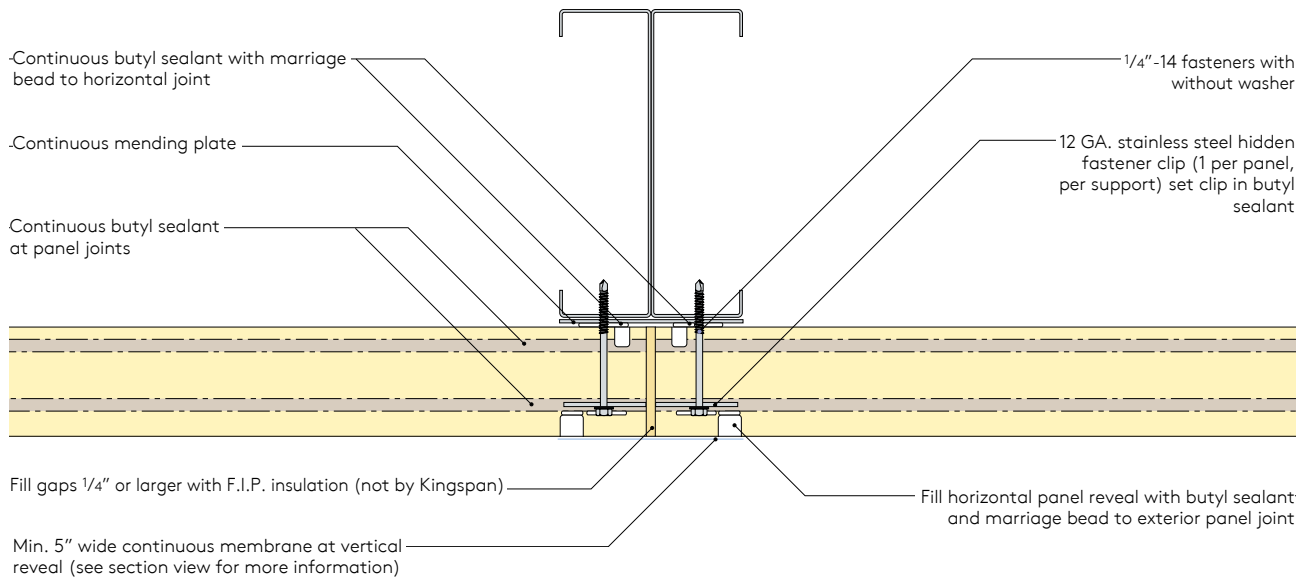


Horizontal Installation : Brick



T Install membrane at vertical joint locations (typically by masonry contractor).

Vertical Joint with Membrane - Plan View



Notes :

- 1 Care should be taken to avoid placing vertical joint reveals above window/door locations where possible
- 2 Use a metal file to remove any burrs at panel edges before installing membrane

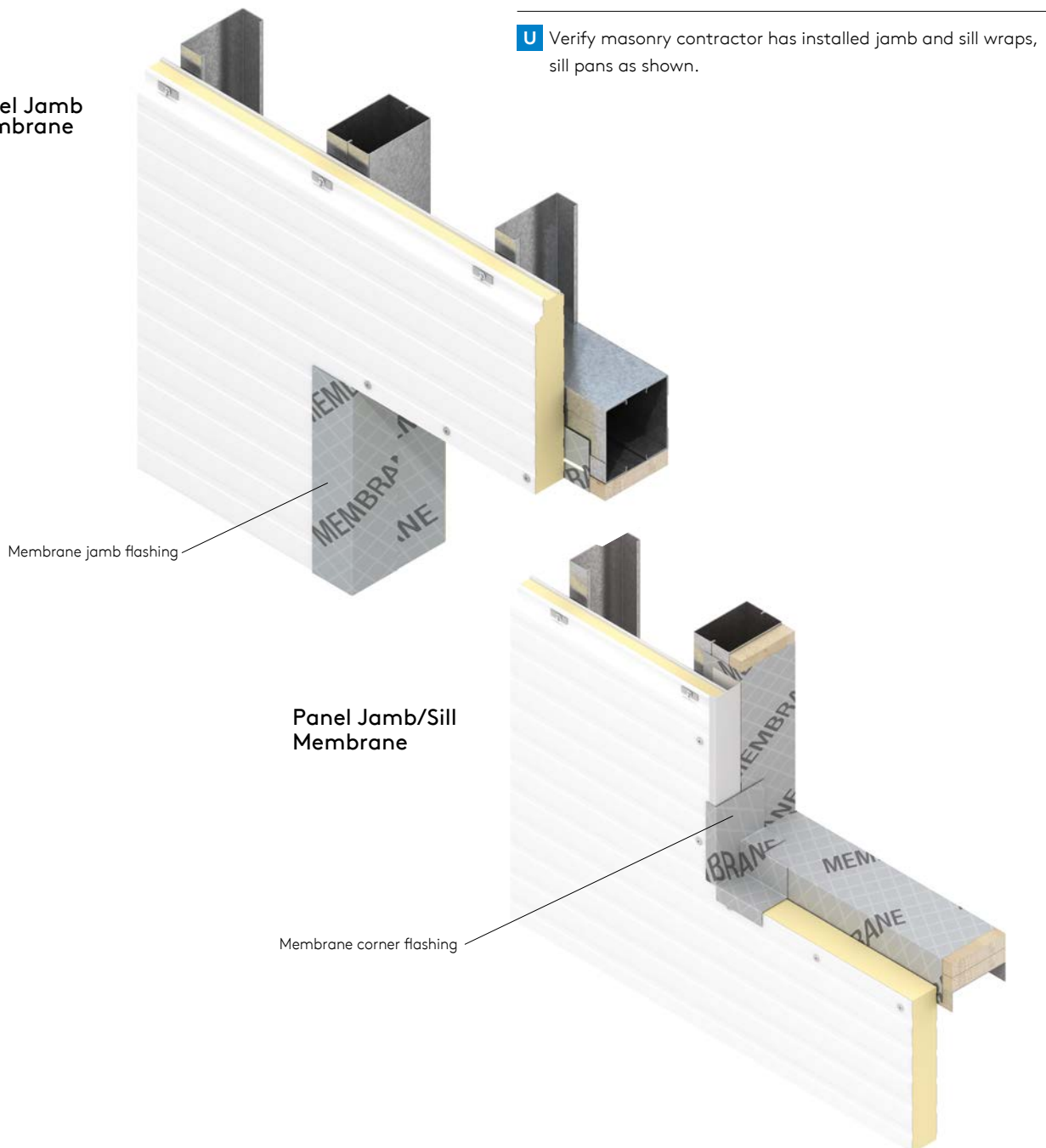
Horizontal Installation : Brick

Disclaimer

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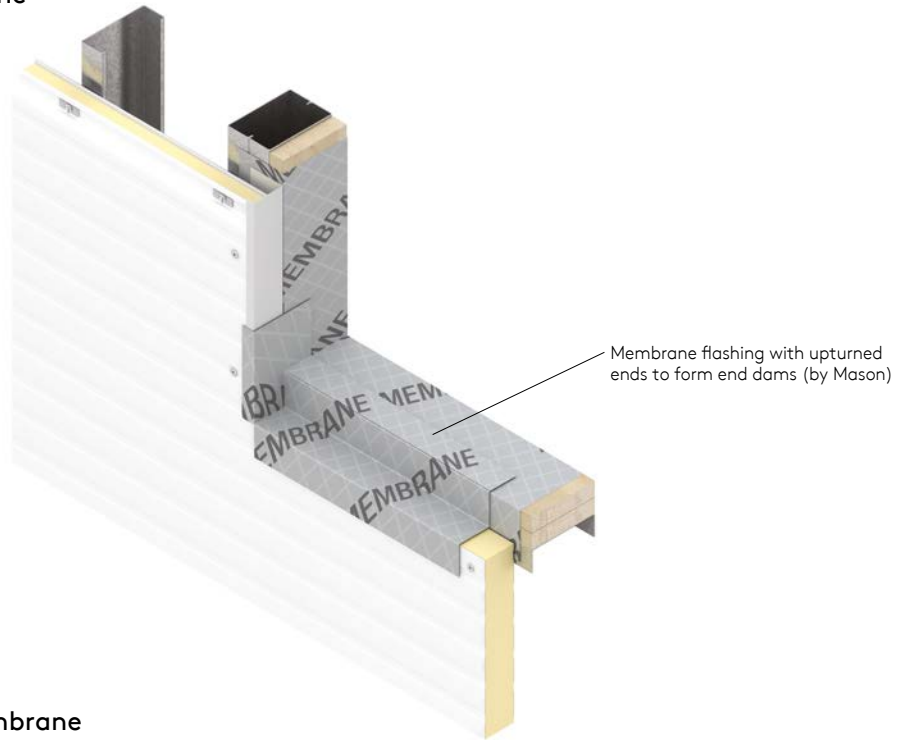
Consult the architect's drawings or masonry contractor's approved shop drawings for project specific details.

Panel Jamb Membrane

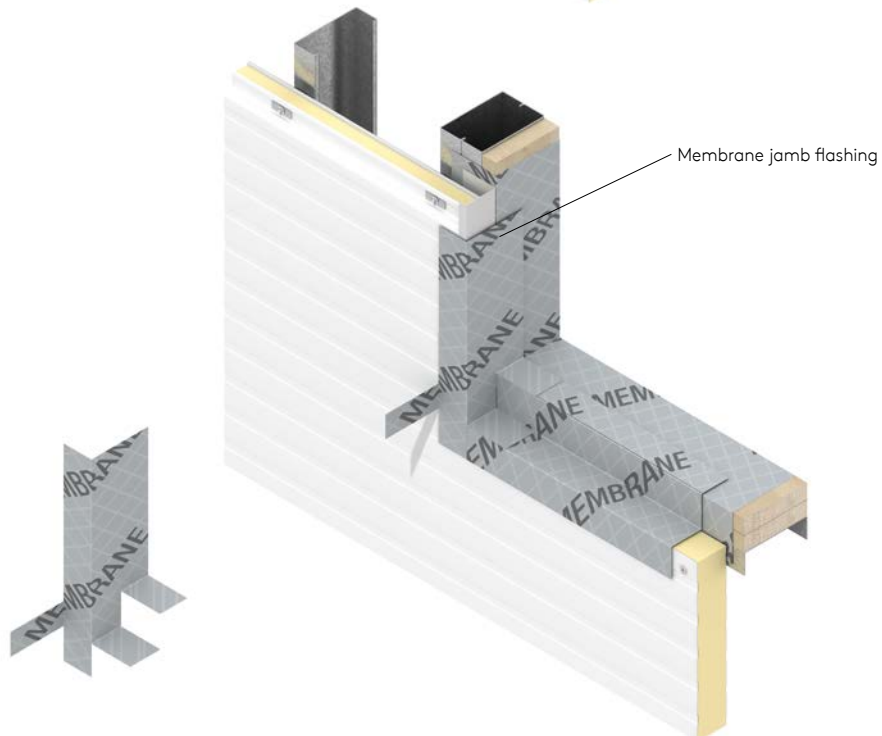


Horizontal Installation : Brick

Panel Sill Membrane



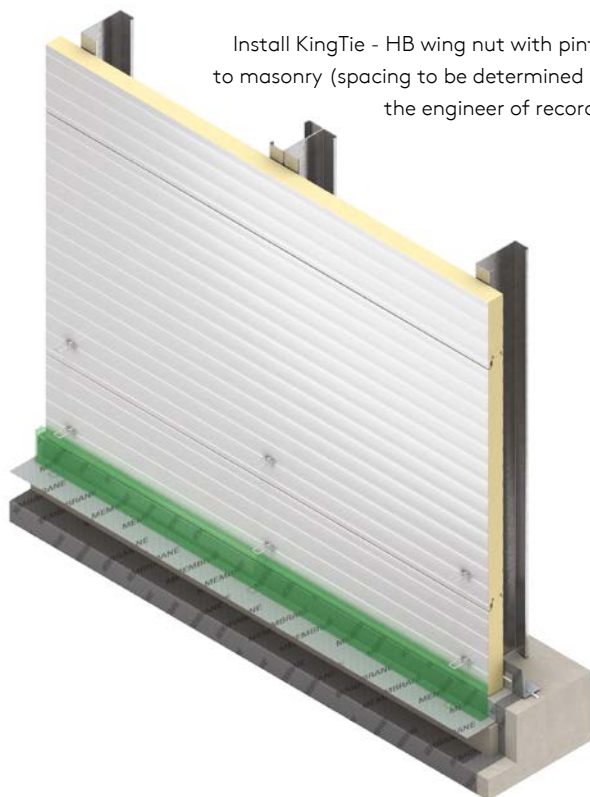
Jamb Membrane



Horizontal Installation : Brick

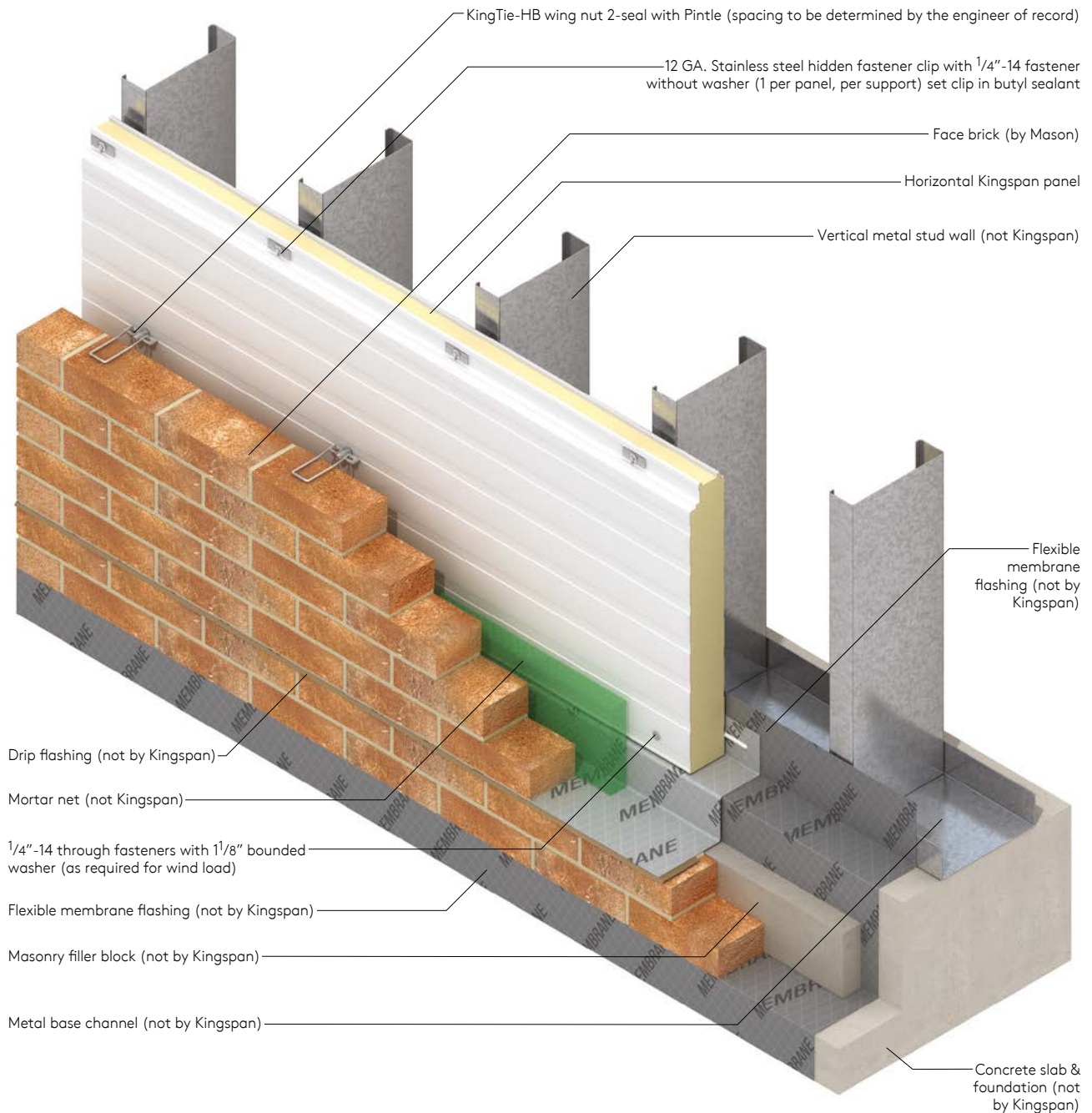
V Panels are now ready to receive brick system (by masonry contractor).

KingTies Fastened Into Panel Supports



Horizontal Installation : Brick

Base Layering - Typical



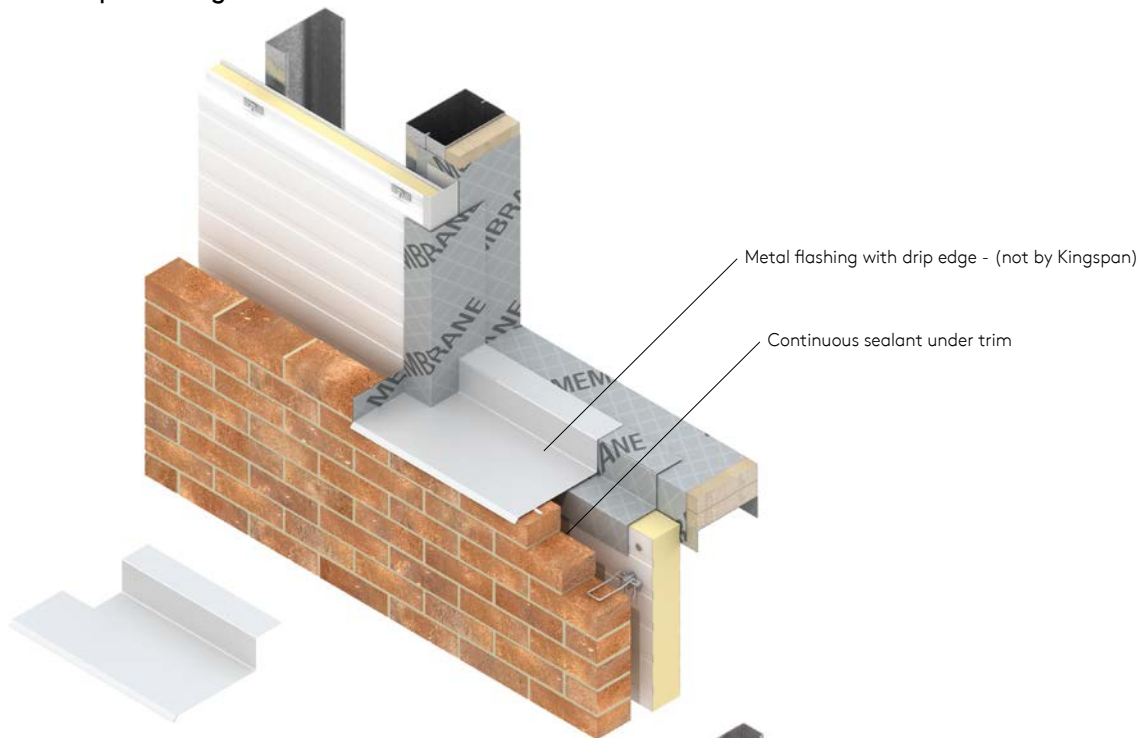
Note:

- 1 Use a metal file to remove any burrs at panel edges before installing membrane
- 2 Architect and/or contractor must verify compatibility of membrane materials with adjoining sealant materials

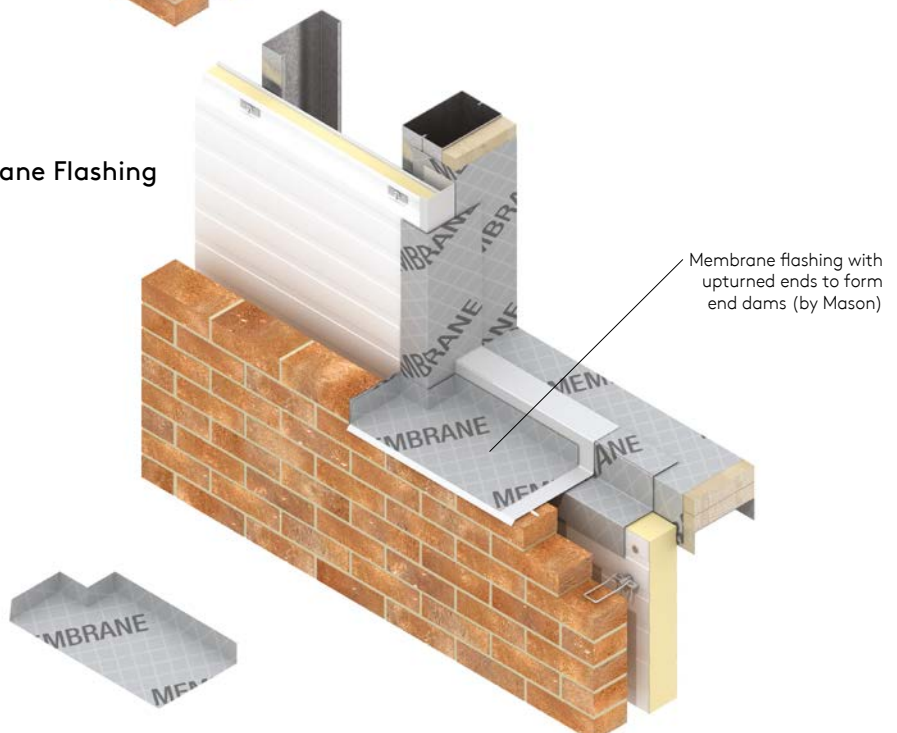
Horizontal Installation : Brick

W Window sill tie-ins from brick to panels.

Sill Drip Flashing



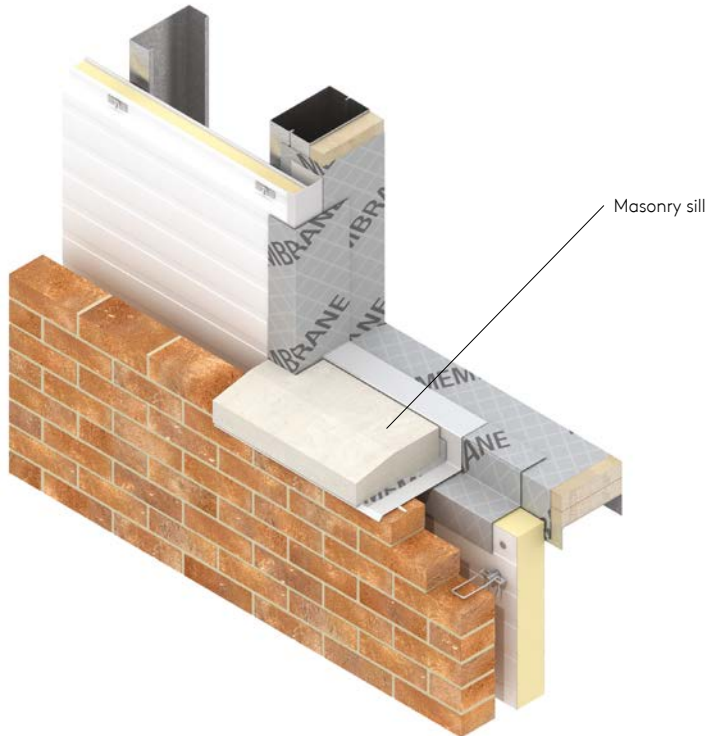
Sill Pan - Membrane Flashing



Horizontal Installation : Brick

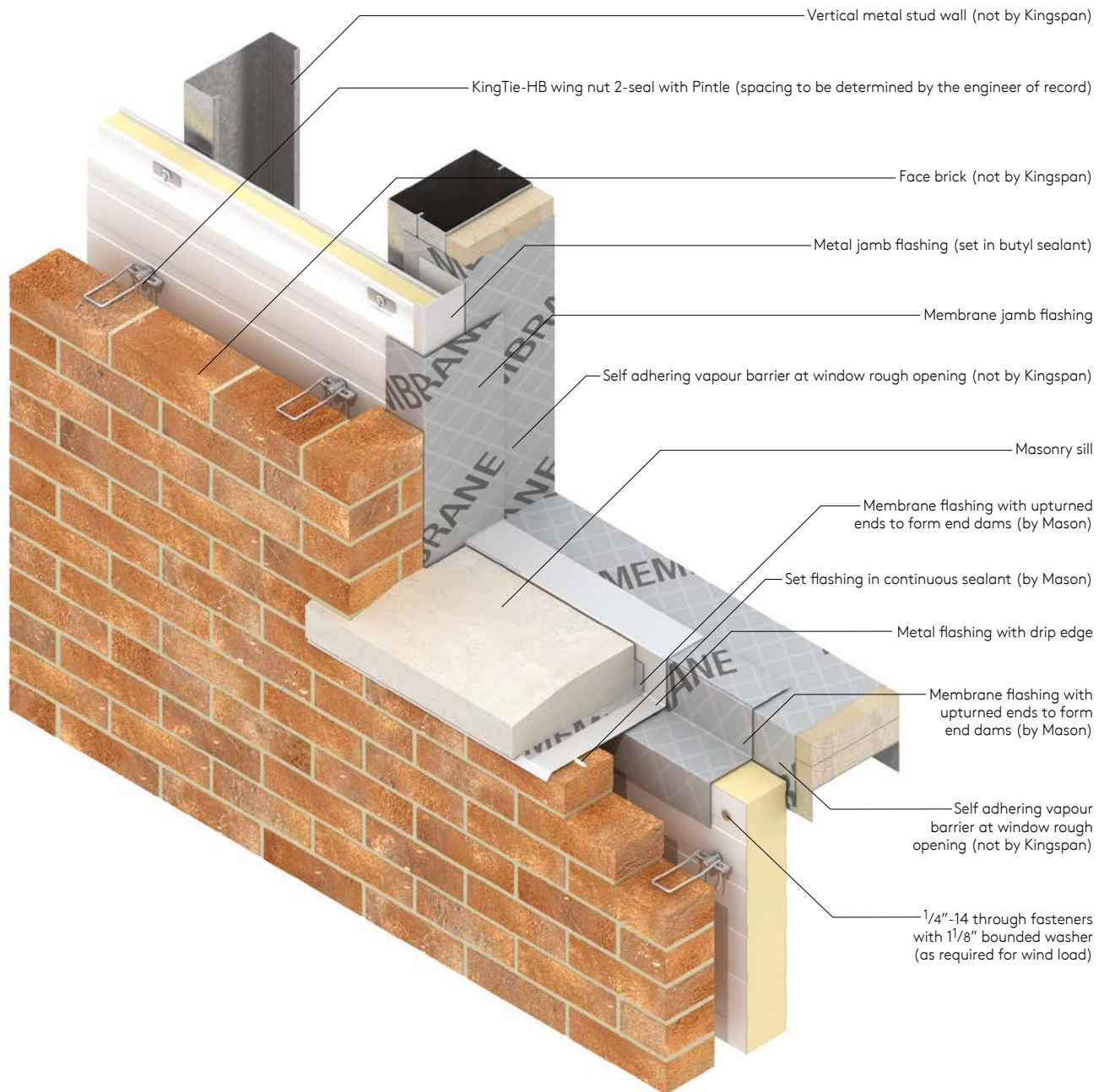
X Masonry sill installed.

Masonry Sill



Horizontal Installation : Brick

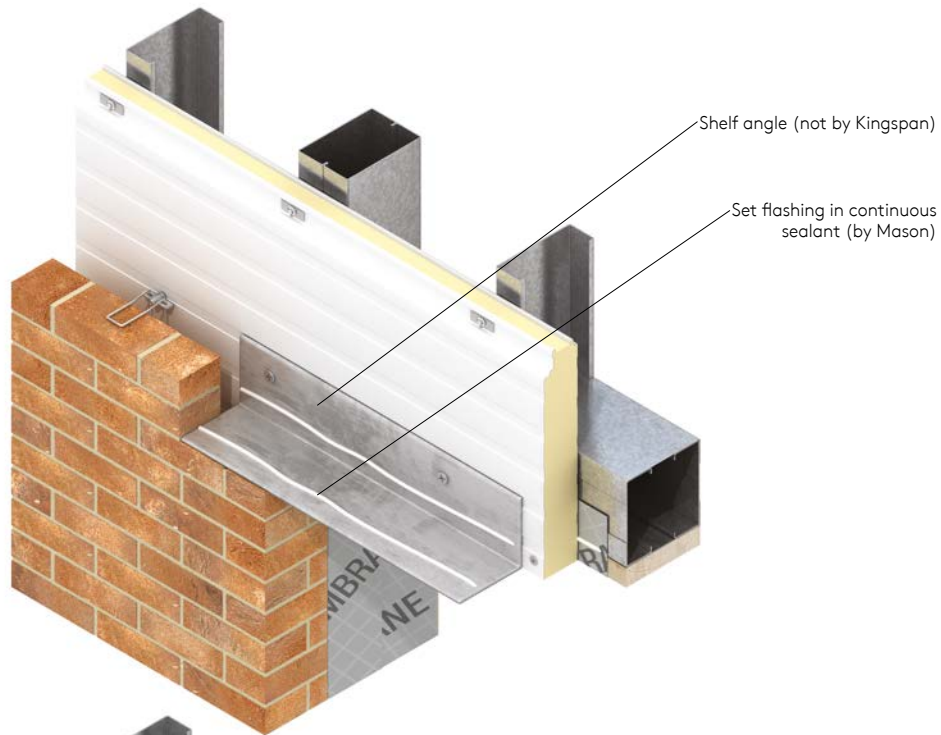
Completed Window Sill/Jamb Assembly - Typical



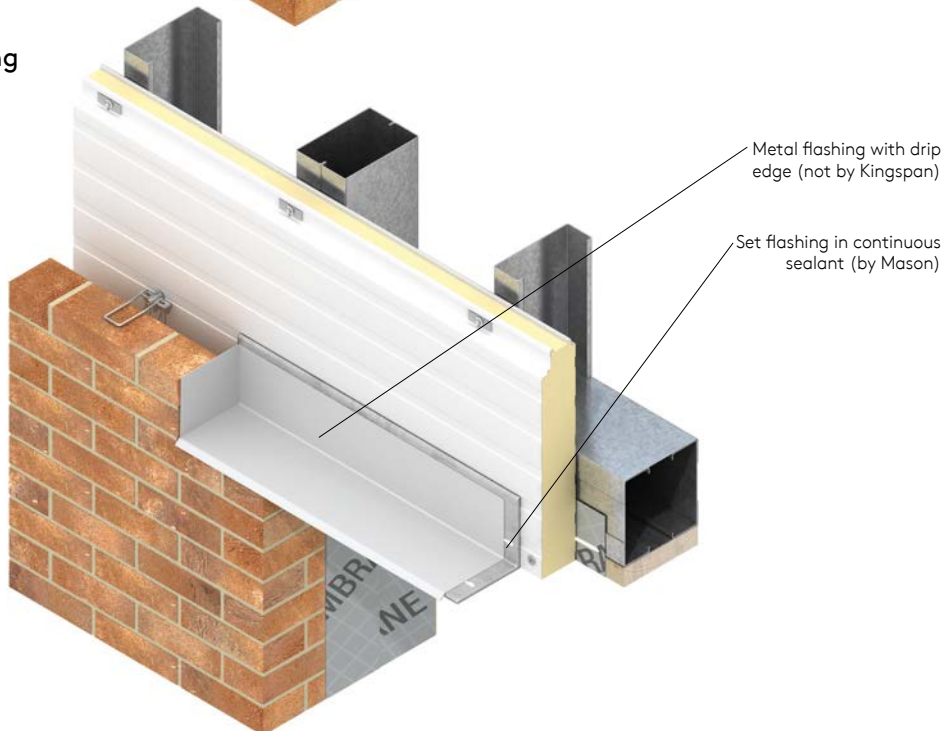
Horizontal Installation : Brick

Y Window head construction with shelf angle.

Framed Opening Shelf Angle

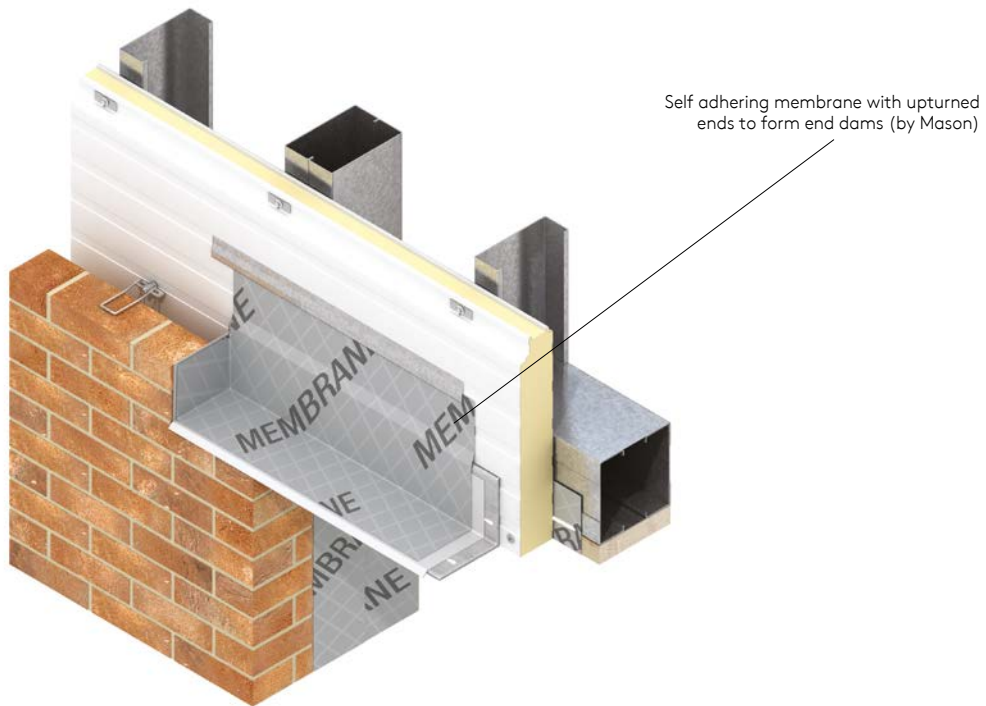


Framed Opening Head Drip Trim



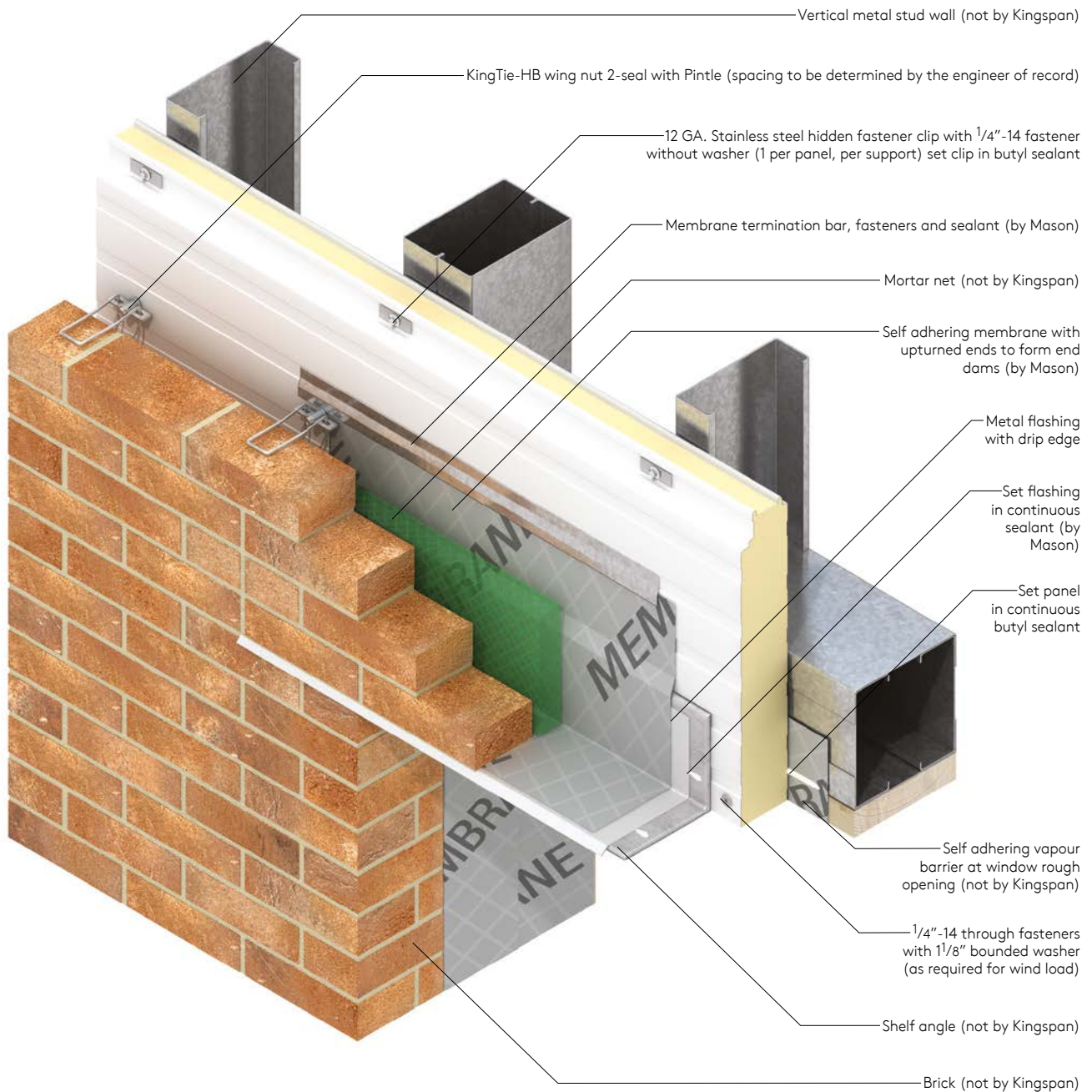
Horizontal Installation : Brick

Framed Opening Header Flashing



Horizontal Installation : Brick

Completed Window Sill/Jamb Assembly - Typical

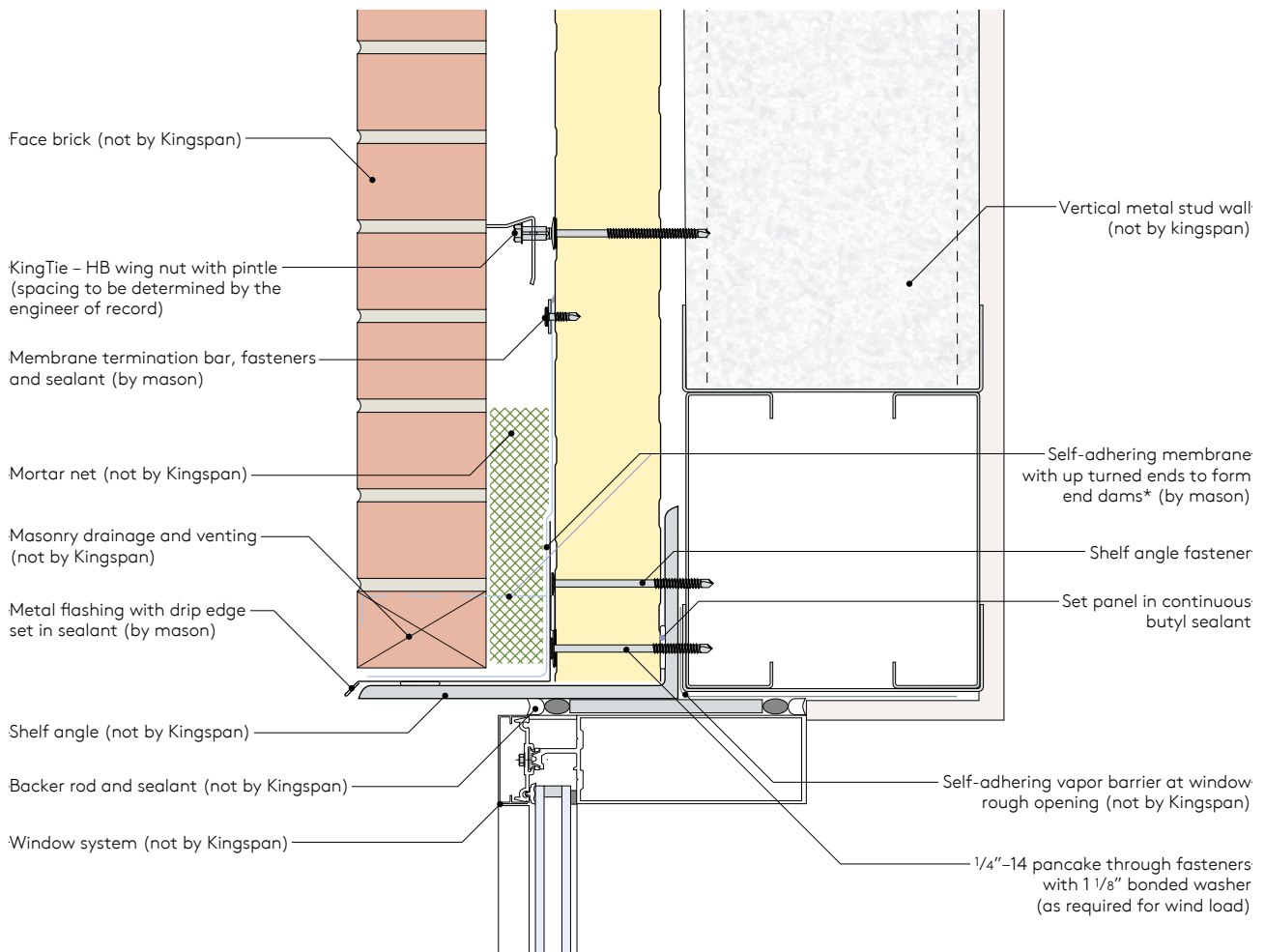


Horizontal Construction Details : Brick

Disclaimer

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Consult the architect's drawings or masonry contractor's approved shop drawings for project specific details.

Window Head Condition

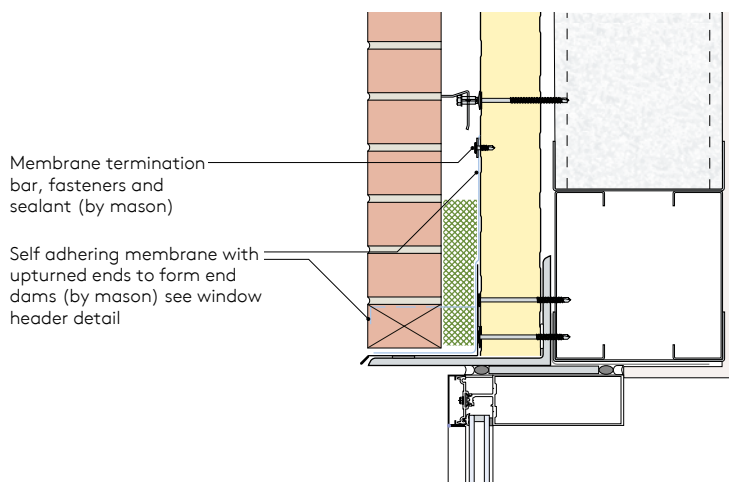
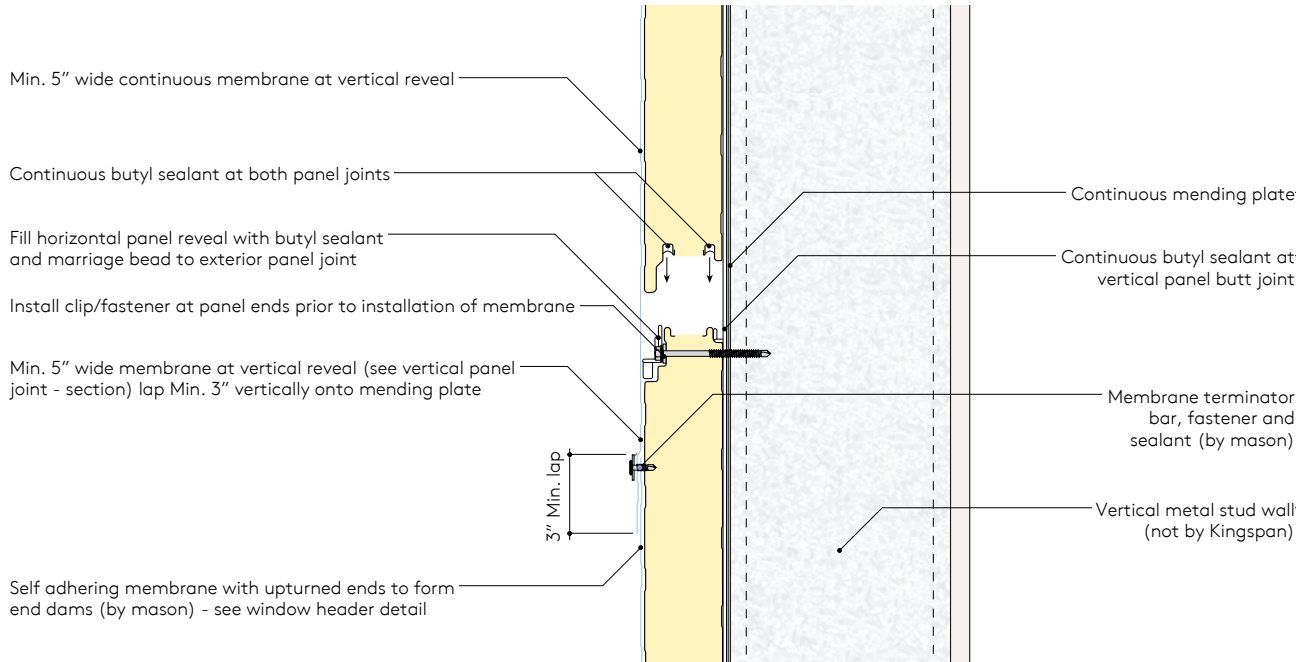


Notes :

- 1 Care should be taken to avoid placing vertical joint reveals above window/door locations where possible. If a vertical joint reveal exists special care must be used to marry the horizontal membrane (by mason) to the vertical membrane applied at the vertical panel butt joint locations
- 2* Membrane lined metal flashing pan with sealed end dams or corrosion resistant pan with soldered/sealed end dams acceptable alternates
- 3 Architect and/or contractor must verify compatibility of membrane materials with adjoining sealant materials

Horizontal Construction Details : Brick

Window Head Condition (alternate - vertical panel joint located above window)

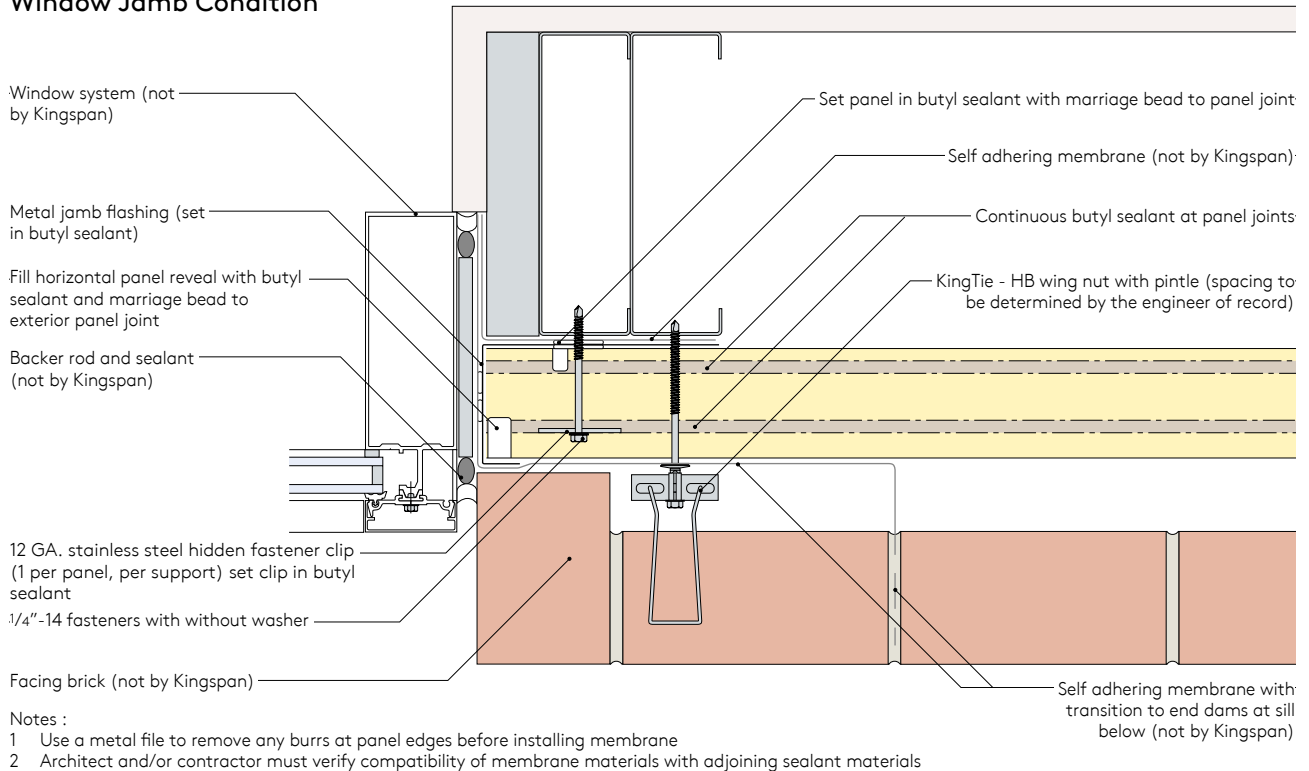


Notes :

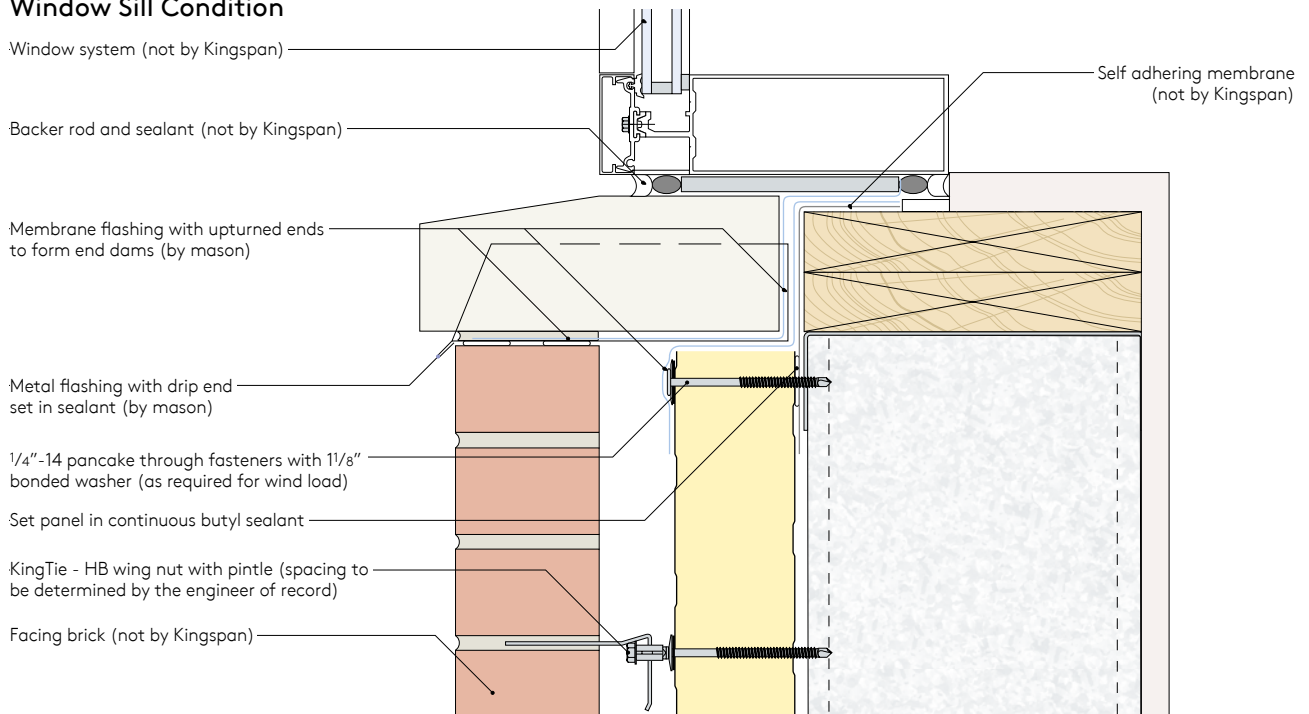
- 1 Brick and panel fastening not shown for clarity

Horizontal Construction Details : Brick

Window Jamb Condition

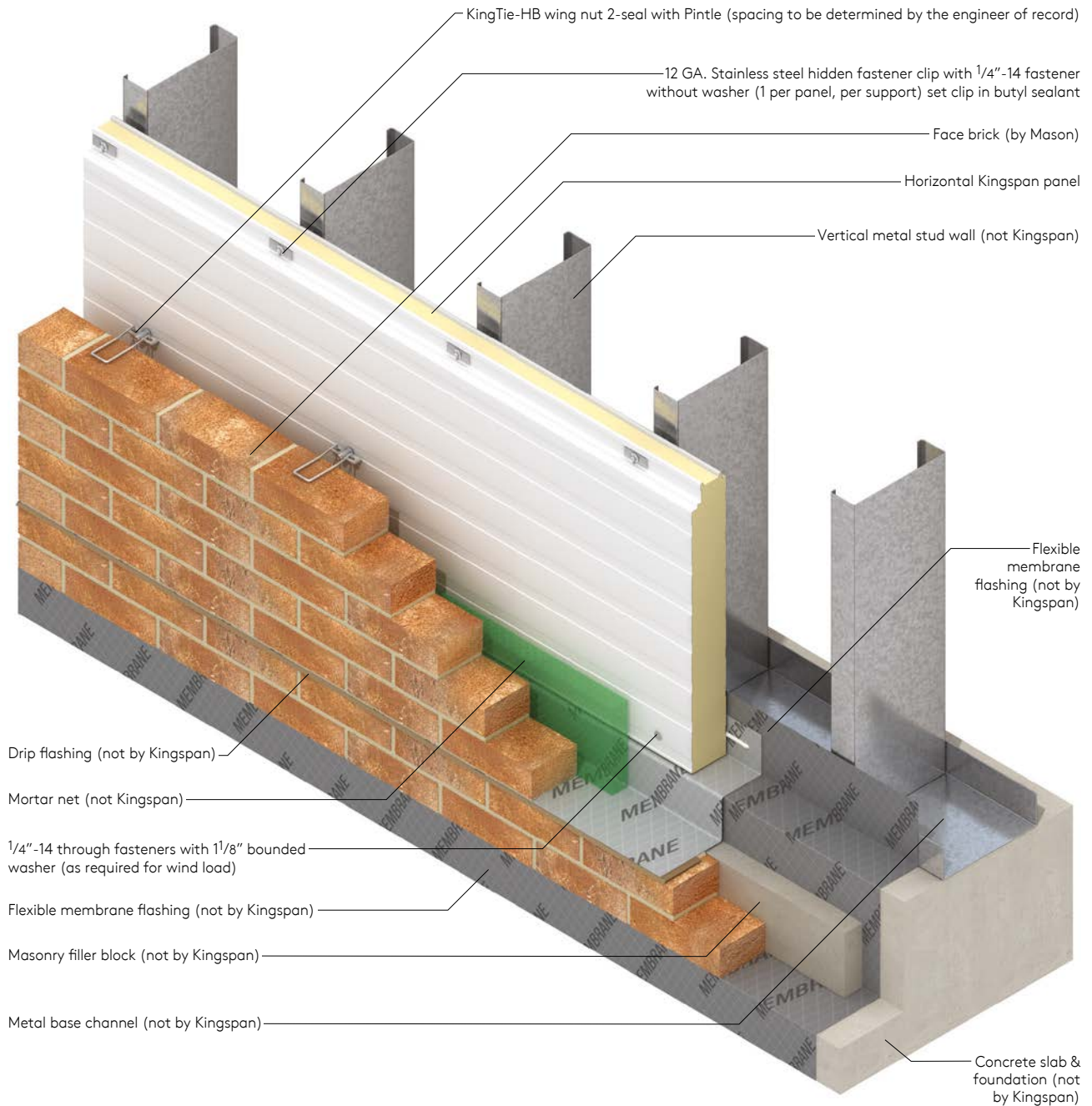


Window Sill Condition



Horizontal Construction Details : Brick

Base Condition - Typical

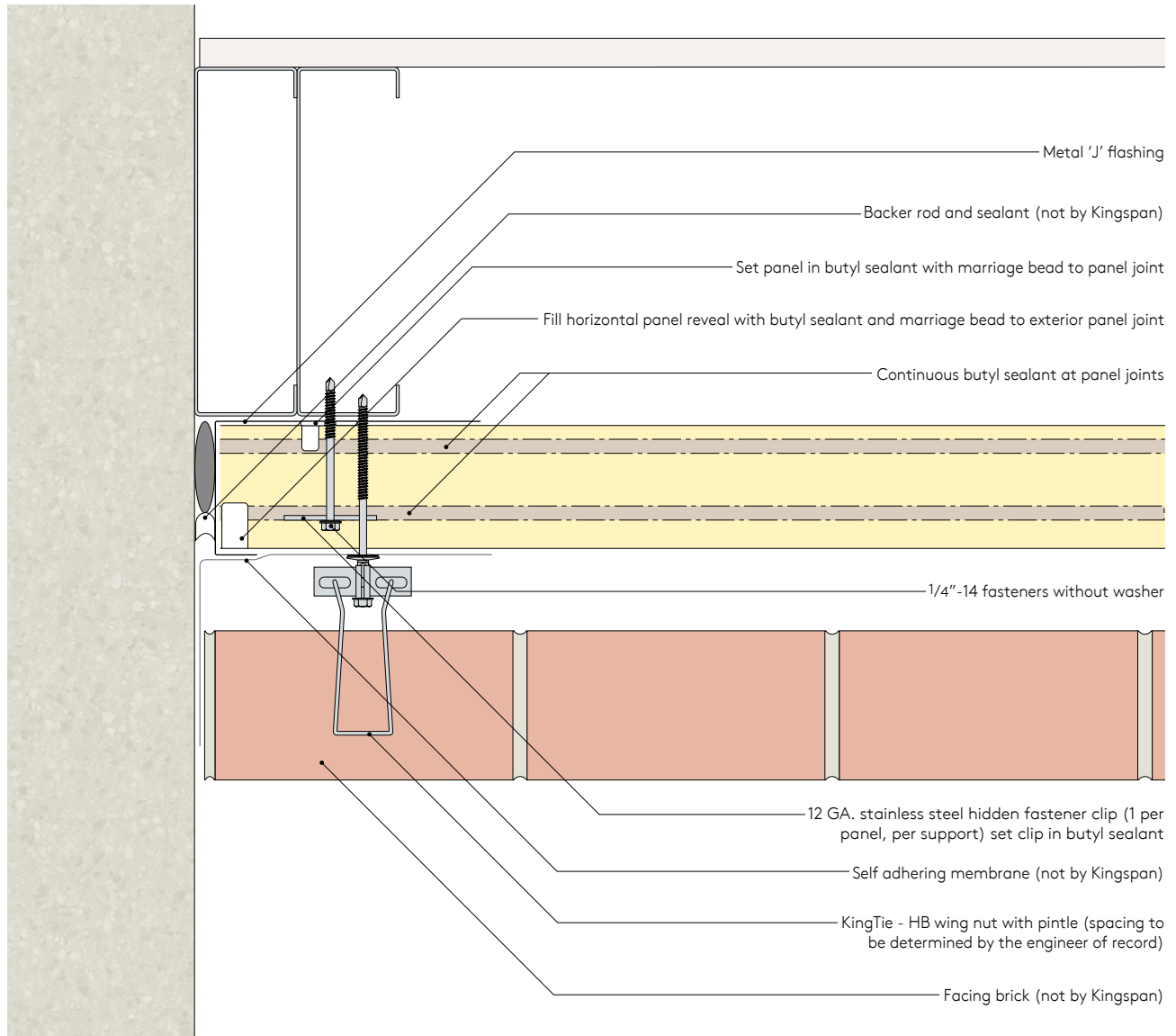


Note:

- 1 Use a metal file to remove any burrs at panel edges before installing membrane
- 2 Architect and/or contractor must verify compatibility of membrane materials with adjoining sealant materials

Horizontal Construction Details : Brick

Vertical Transition

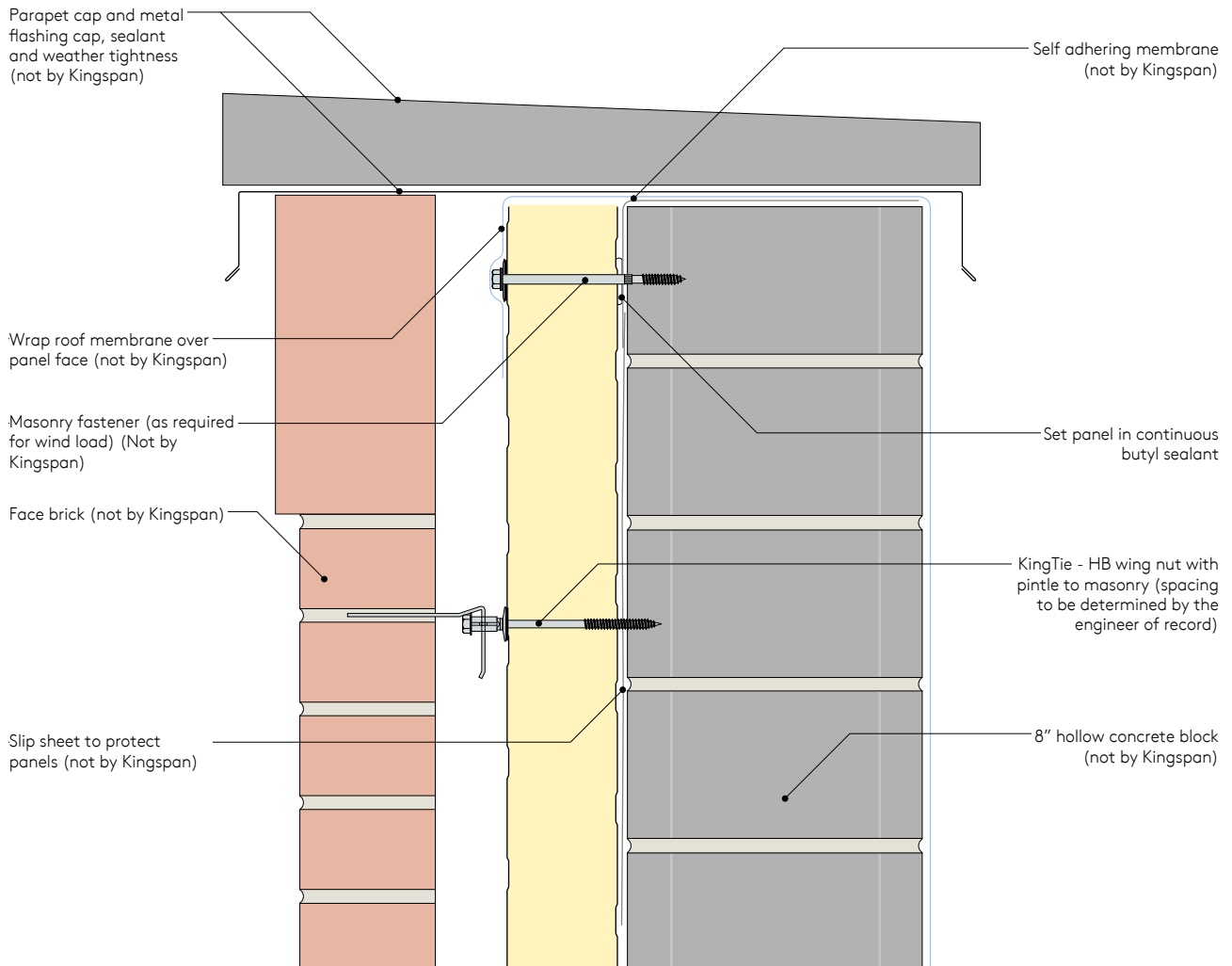


Notes :

- 1 Use a metal file to remove any burrs at panel edges before installing membrane
- 2 Architect and/or contractor must verify compatibility of membrane materials with adjoining sealant materials

Horizontal Construction Details : Brick

Parapet Condition

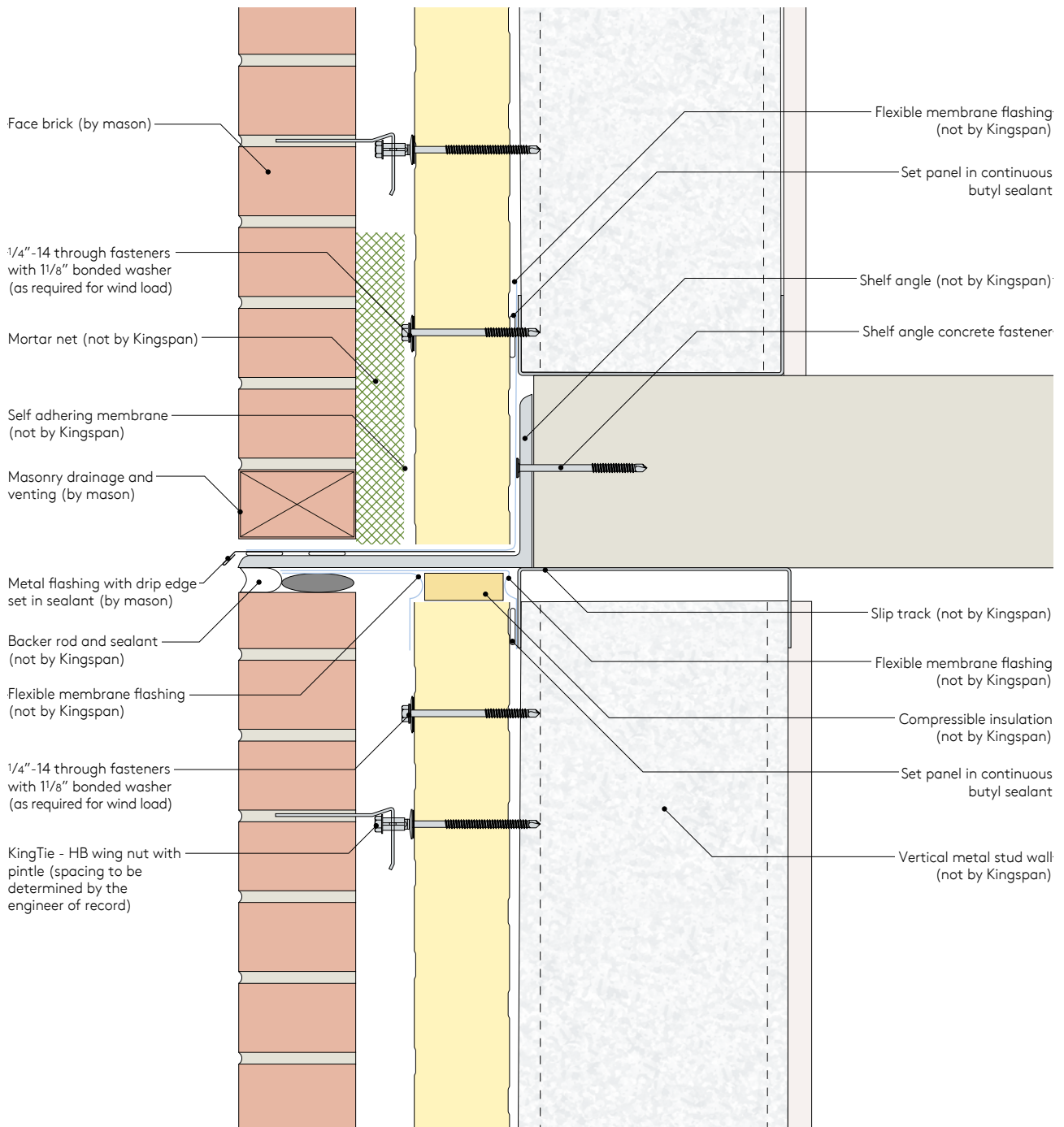


Notes :

- 1 Use a metal file to remove any burrs at panel edges before installing membrane
- 2 Architect and/or contractor must verify compatibility of membrane materials with adjoining sealant materials

Horizontal Construction Details : Brick

Expansion Joint - horizontal



Fastener Information - KarrierRail™

This chart is based on data from fastener manufacturers laboratory test results. Since actual job site conditions will vary, chart is a basic guideline. If in doubt, field drilling and pull tests are recommended.

If #14 type 'B' plated fasteners are to be used, pre-drilling is required. Use the drill bit sizes listed below.

Suggested Fastener Driving Speeds

Quarter inch diameter self drilling, self tapping TEK type and B point self tapping type

Carbon and 410 stainless	1,800 rpm
304 Stainless	1,000 rpm

Note: Proper tools are required to produce consistent drilling and minimize potential fastener or application failures due to over or under driven fasteners. A torque control or depth sensing nose piece for the screw gun is recommended for proper installation.

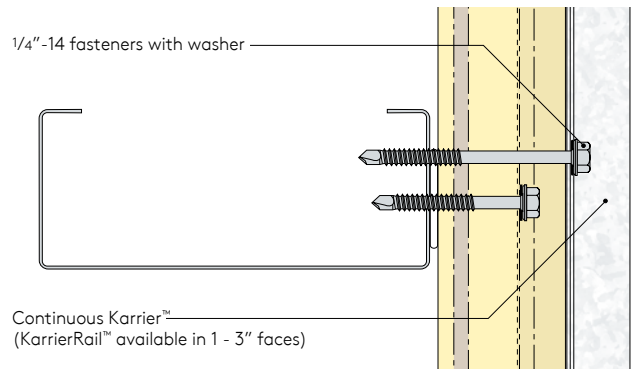
Recommended TEK type for 1/4" diameter (self-drilling, self tapping) fasteners

Steel Thickness	TEK	Threads / inch
16 Ga. (0.060)	#2, #3	14
14 Ga. (0.075)	#2, #3	14
12 Ga. (0.105)	#3	14
1/8" (0.125)	#3	14
10 Ga. (0.134)	#3	14
3/16" (0.187)	#3	14
1/4" (0.250)	#3, #5	14 (#3)/20 minimum (#5)
3/8" (0.375)	#5	20 minimum
1/2" (0.500)	#5	20 minimum

Pilot Hole Chart for 1/4" diameter B Point Fasteners (self tapping)

Steel Thickness	Drill Size
16 Ga. (0.060)	#8 (0.199)
14 Ga. (0.075)	#7 (0.201)
12 Ga. (0.105)	#7 (0.201)
1/8" (0.125)	#2 (0.221)
10 Ga. (0.134)	#2 (0.221)
3/16" (0.187)	#2 (0.221)
1/4" (0.250)	#2 (0.221)
3/8" (0.375)	#2 (0.221)
1/2" (0.500)	#1 (0.228)

To install type 'B' fastener, pre-drill using the correct drill size from chart on previous page. Insert fastener through KarrierRail™ and tighten down until assembly is snug. Panels are to be fastened at every support. Fastener requirements are based on design loads. Consult Kingspan Technical Services for allowable panel and fastener design loads. Do not use impact tools. Do not over tighten. After drilling always remove metal chips that have fallen onto flashings or panels.



NOTE

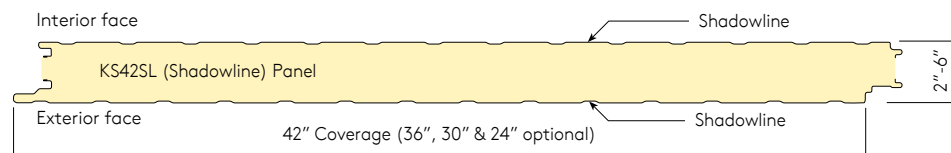
The rail replaces the use of individual panel clips, and needs to be fastened with two fasteners at every structural location.

NOTE

Contact Kingspan's Technical Services Department for specific project fastening recommendations.

NOTE

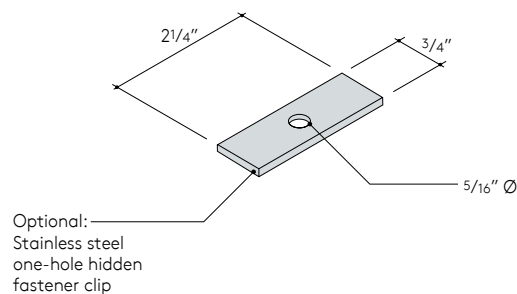
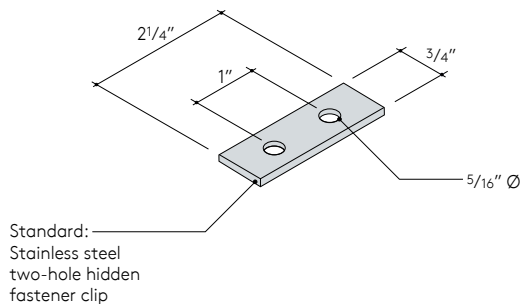
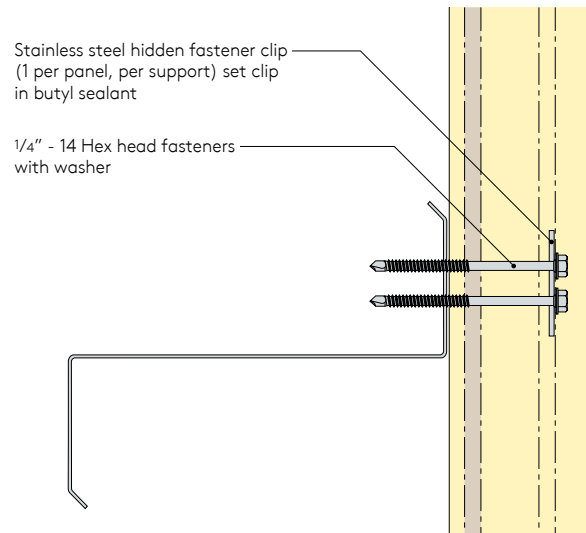
KarrierRails are designed for short-span fastening. Support spacing should not exceed 3 ft for Flat KarrierRail™ or 5 ft for 1" deep KarrierRail™ under normal wind loading. Contact Kingspan Technical Services Department for high wind pressures or for spans exceeding these limits. Additional reinforcement behind joint may be required.



Fastener Information - KarrierPanel with Brick

To install type 'B' fastener, pre-drill using the correct drill size from chart on previous page. Insert fastener through clip and tighten down until assembly is snug. Panels are to be fastened at every support. Fastener requirements are based on design loads. Consult Kingspan Technical Services for allowable panel and fastener design loads. Do not use impact tools. Do not over tighten.

After drilling always remove metal chips that have fallen onto flashings or panels.



NOTE

Contact Kingspan's Technical Services Department for specific project fastening recommendations.

Materials, Tools and Hardware

Tools and Sealants



Electric snips



Circular saw with
fine tooth carbide
blade



Power nibbler



Power drill



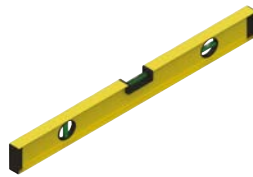
Drive bits and sockets



Expandable foam



Caulking gun



Laser or gravity
levellers



Grip clamp

Fastening Hardware



Primary fastener



Through fastener
(primary fastener
extended by 1")



Low profile fastener



Secondary fastener



Rivet fastener



Hidden fastener
wall panel clip



Knife and Scraper



KingTie



KarrierRail™

Contact Details

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