

Installation Guide

Cold Storage and Temperature Controlled Environments

Exterior Applications



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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 Technical Service Department is available to assist the panel contractor in the review of detail conditions.

This guide is intended to provide the panel contractor with recommended methods, procedures and guidelines for the installation of the Kingspan insulated metal wall systems for commercial / industrial and controlled environments 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 1-877-638-3266 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.

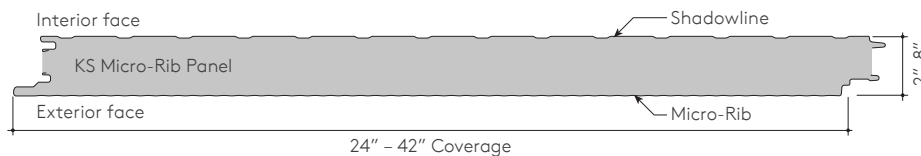
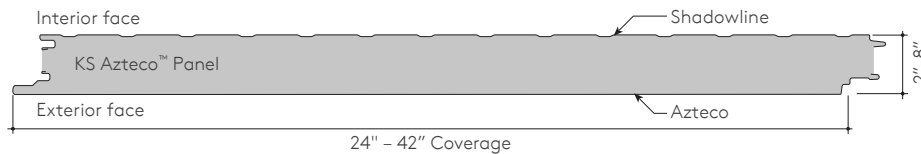
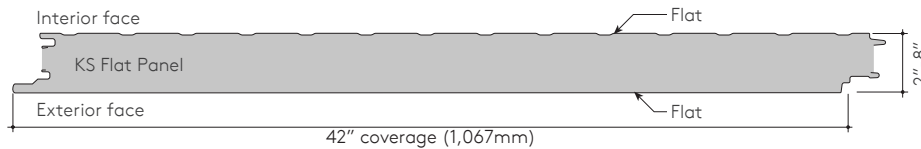
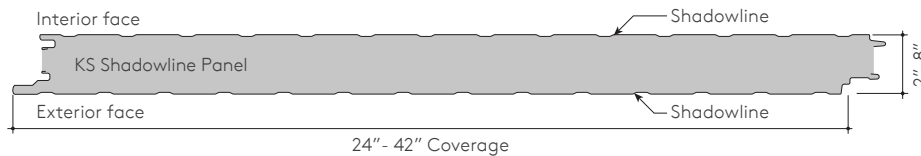
1 Introduction

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 Kingspan controlled environments wall panel systems.

The Kingspan controlled environments product range is suitable for large scale industrial and commercial applications where vertical panels are required.

1. Single component wall panels provide exterior weather barrier, insulating core and interior vapor barrier all-in-one
2. Unique side joint clip system eliminates the need for exposed fasteners
3. Panels are lightweight, easy to install under most weather conditions
4. Wide variety of profiles and textures provide architecturally appealing solutions
5. Panels are available in lengths of up to 53' to minimize the number of stack joints required
6. Accessory items including metal flashings and aluminum extrusions are also available (contact Kingspan for more information).



1 Introduction

1.2 Insulation Values

Kingspan controlled environments panels feature an insulating core which offers the building designer R-values of approximately 8.0 per inch and 9.0 per inch when tested per ASTM C518 at 75°F and 35°F mean temperatures respectively, 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

Standard Material Workmanship & Standard Finish Warranties

At Kingspan, we understand the unique challenges that design, and construction professionals face every day. To do our part in meeting these demands, Kingspan products are offered with our team's guidance and technical expertise, followed up after construction is completed with our product warranties:

- 2-year standard panel material workmanship warranty
- Up to 20 years standard panel exterior finish warranty

Contact our sales or customer service departments for information regarding our additional 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

Kingspan controlled environments 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 International Building Codes specify wall cladding to be designed for a deflection of L/180. The project designer and /or engineer of record should always check the applicable code(s) for deflection limits. For deflection limits other than L/180, please contact Kingspan Technical Services for evaluation.

2.2 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.

2.3 Seismic

Kingspan 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.

2.4 Fire Performance

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

2.5 Air and Water Infiltration

Air and Water Infiltration testing has been successfully conducted on the Kingspan controlled environments 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:
technical.NA@kingspanpanels.com

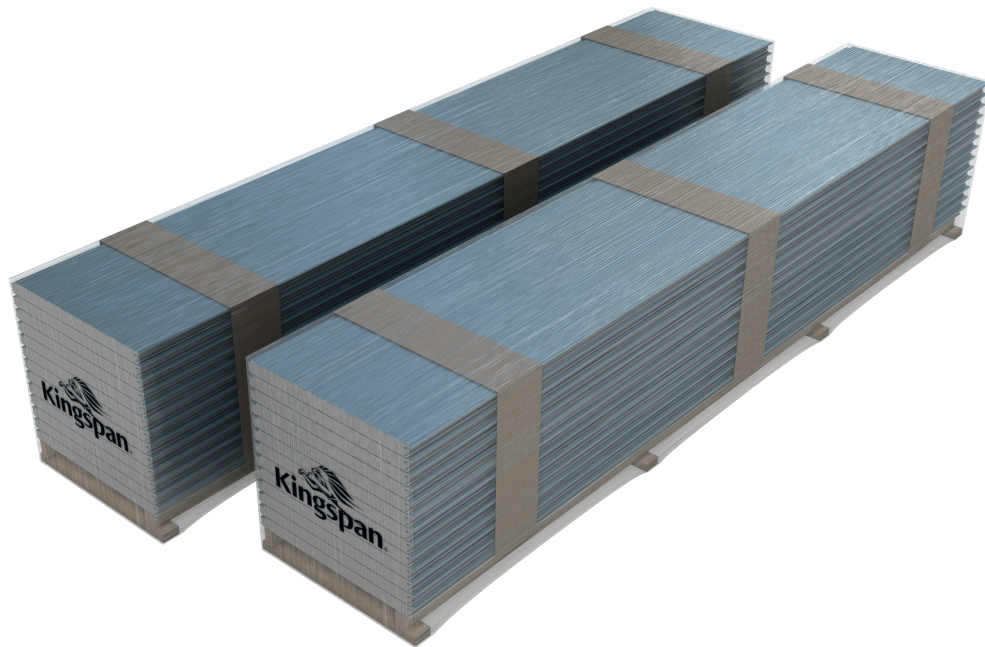
The information contained in this guide is thought to be reliable and correct, but is subject to change without notice.

For all the latest information on testing, certifications 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, and without report, it is implied that product was received in full and without damage.

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. Photos taken of damaged panels while on the truck will help facilitate your claim with the shipping company.



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.

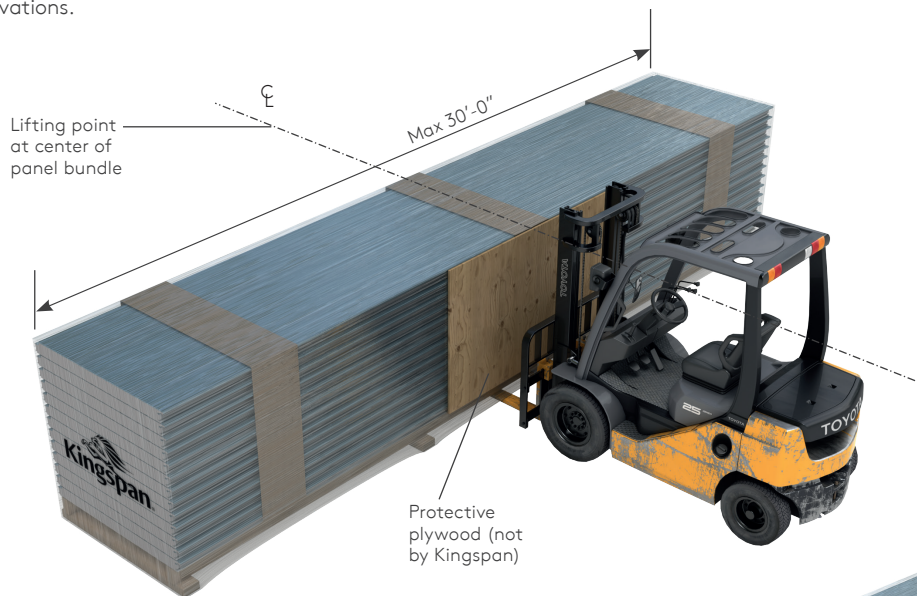


Fig. 4.1a



Fig. 4.1b

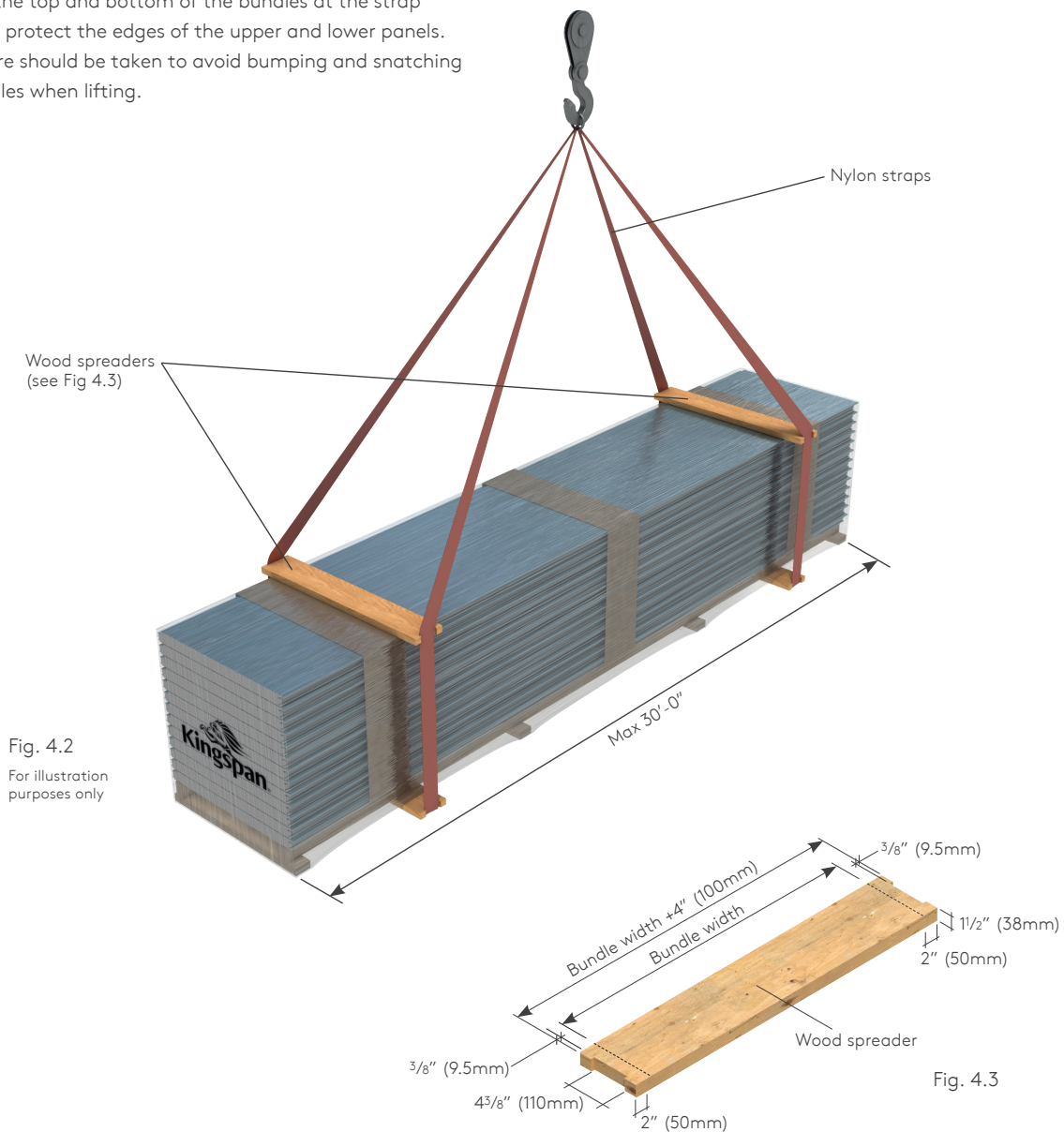
4 Panel Handling

4.2 Panels Handled by Crane

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

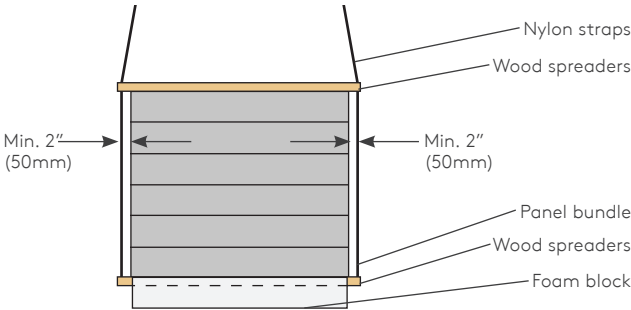
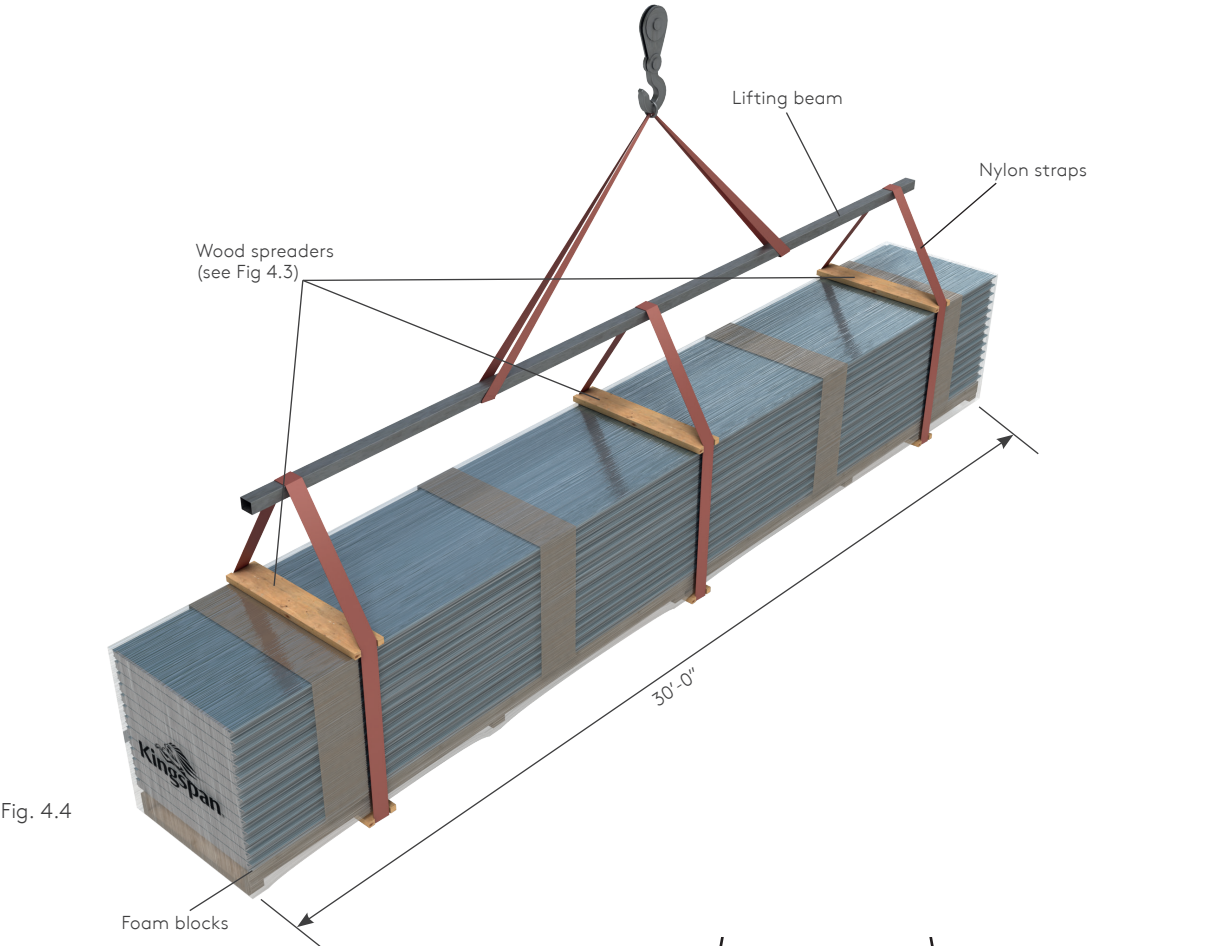
4.2.1 The recommended crane lifting method is to use nylon straps positioned at a minimum of two points along the length of the bundle. Suitable wood spreaders should be used and located at the top and bottom of the bundles at the strap positions to protect the edges of the upper and lower panels. Extreme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



4 Panel Handling

4.3 Handling Individual Panels

CAUTION

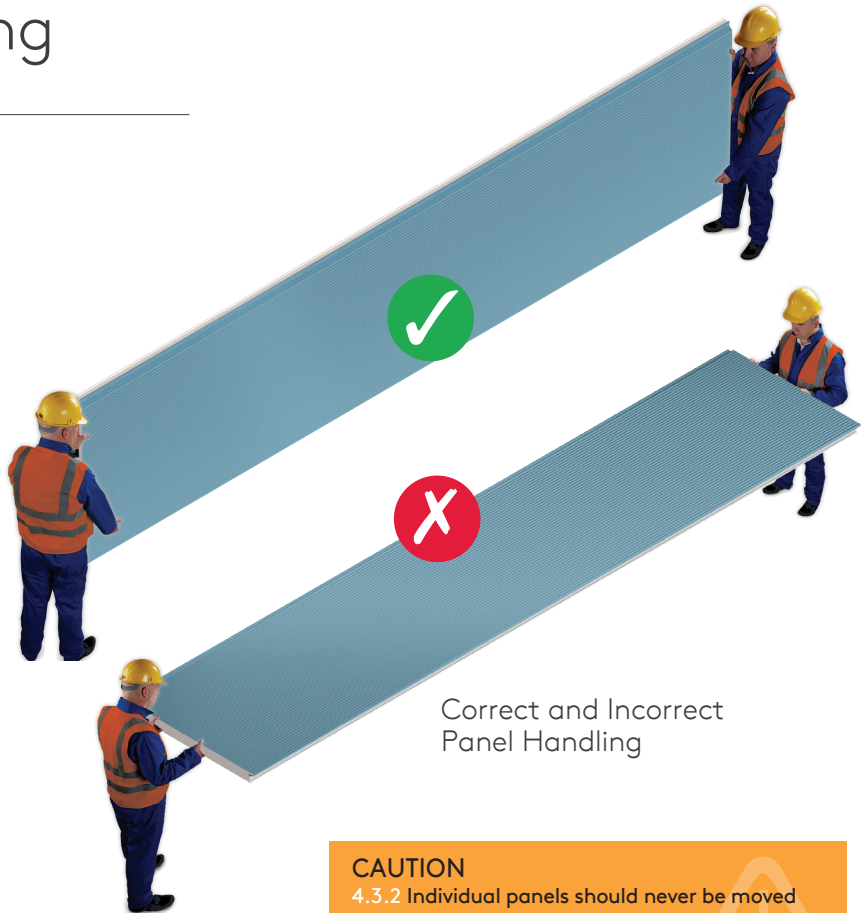
4.3.1 Workers must wear appropriate protective gear at all times when handling panels. Failure to do so may cause injury.

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.

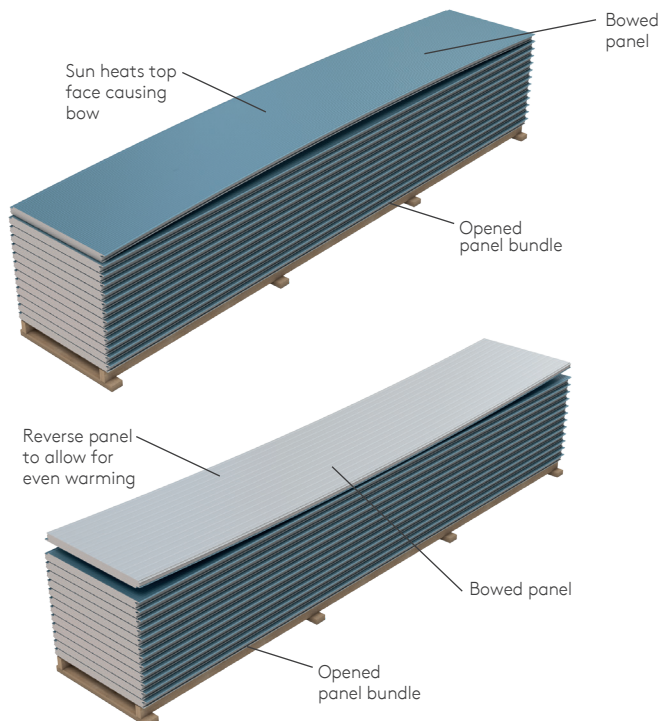


Correct and Incorrect
Panel Handling

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 delamination. 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.

Thermal Bowing



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. Refer to the shop drawings for the correct fastening, or contact Kingspan Technical Services for assistance.

4 Panel Handling

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, staining or a condition called wet stack. Staining of any kind is not considered to be a cause for rejection. It is the installer's responsibility to protect panels from the elements prior to installation. Tarping is always recommended and providing ventilation to prevent condensation inside the bundle wrap is also recommended.

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.

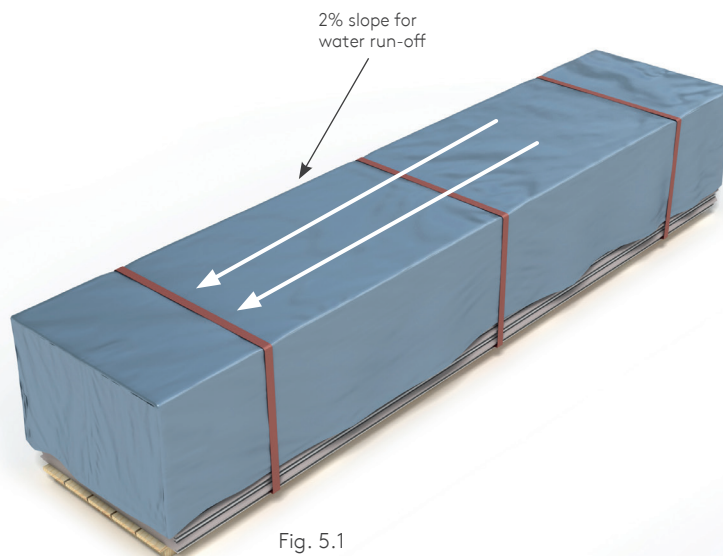


Fig. 5.1

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. Refer to the Manufacturer's Material Safety Data Sheet for storage requirements.

7 Removal of Protective Film

7.1

IMPORTANT!

If panels will not be installed within 60 days of production, the bundles should be unstacked and the protective film removed from each panel. Carefully re-stack 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 transfer of adhesive residue. Careful material handling should be considered as to not scratch the finish.

Film removal and panel cleaning are the responsibility of the installation contractor.

7.2

It is recommended to remove protective film as panels are installed.

7.3

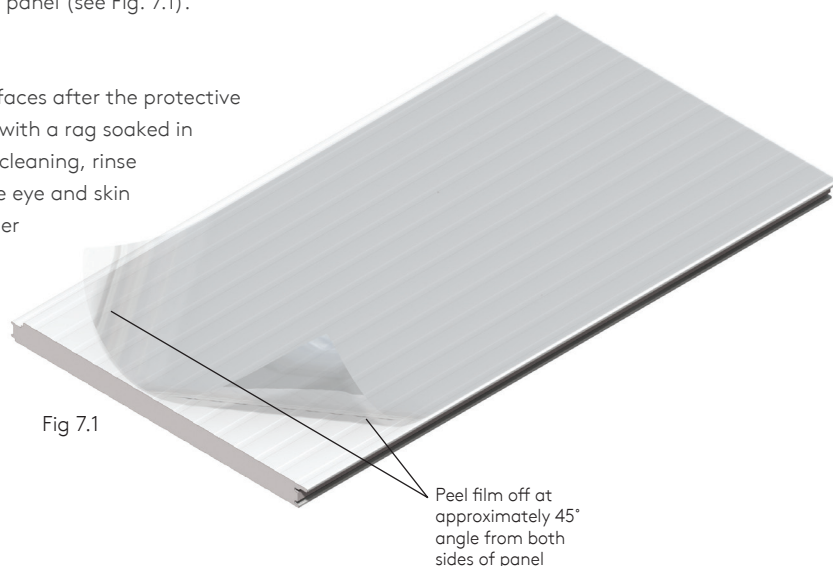
Loosen film along both edges, grab corners together and peel off while walking down the length of the panel (see Fig. 7.1).

7.4

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

7.5

Care should be taken when cleaning panels, the amount of force and time spent rubbing the surface can result in a polishing effect on the panel's surface. You should always trial methods and products in an inconspicuous area first. Refer to Kingspan Maintenance Manual for proper cleaning procedures.



8 Structural Steel Framing

IMPORTANT

The building structural steel alignment is extremely important with the KS Series panels. Proper steel alignment should be verified before starting the installation of any panel.

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.

8.3

For vertically installed panels, support members shall be:

- a. Plus or minus $\frac{1}{8}$ " (3.17 mm) in 5 feet (1524 mm) in any direction along plane of framing
- b. Plus or minus $\frac{1}{4}$ " (6.35 mm) in 20 feet (6096 mm) cumulative in any direction along plane of framing
- c. Plus or minus $\frac{1}{2}$ " (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.

NOTE

Shimming of panels may compromise rear seal and is not recommended.

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 and we recommend to remove all metal shavings from the panel during the installation. 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 router may be used to cut each face of the panel, and a serrated 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.

NOTE

Thermal breaks cuts are required on most panels. Refer to your project details and make all thermal break cuts before applying sealants.



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.

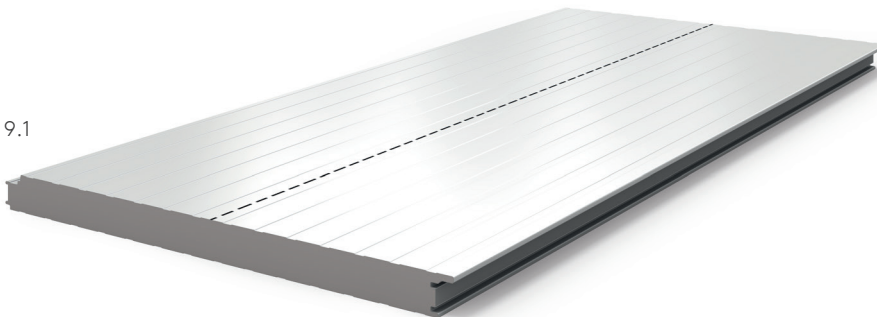
For penetrations and framed openings:

Step 4: 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 knife to fully cut through the foam and remove the cut section of panel. Contact Kingspan Technical Services for support recommendations for penetrations.

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 female joint on the warm side of the panel 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 / remove as necessary during panel installation to maintain proper panel seal.

Applying sealant on site (Fig. 10.1).

NOTE

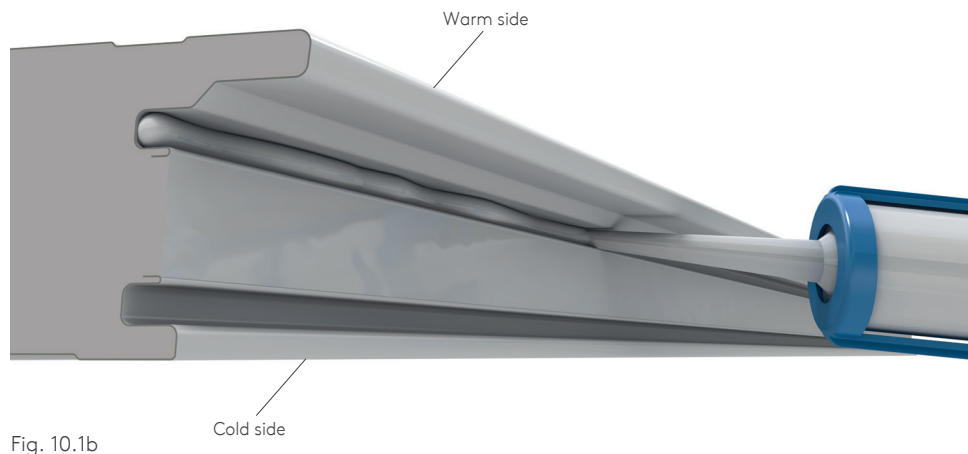
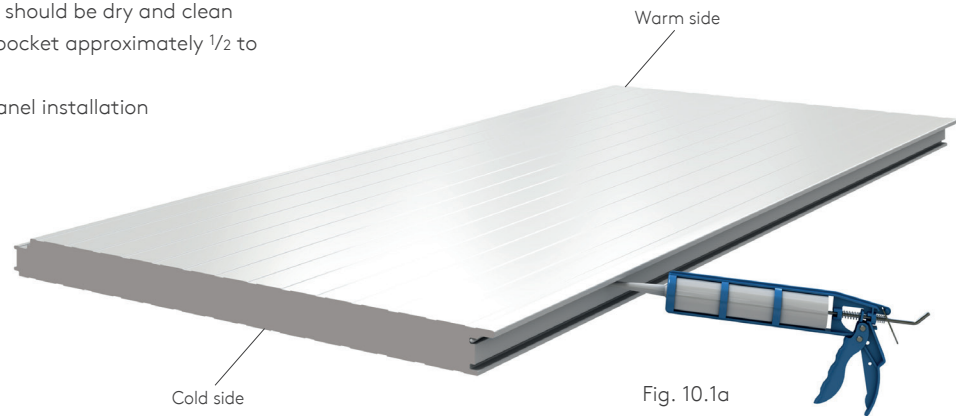
Pull (not push) caulk tube along length of side joint for more uniform sealant bead.

NOTE

In wash down applications, it is recommended that the cold side joint also be sealed with butyl.

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, using a low pressure hose to wash the building with plain water will be adequate. In areas of heavy dirt deposits, a solution of water and detergent 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), 1 quart sodium hypo chlorite 5% solution (Clorox), 3 quarts water.

NOTE

In washdown applications it is advisable to seal inside the cold side joint with butyl and also to apply polyurethane sealant along all panel reveals and around edges of all trim edges (optional).

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, use rubbing alcohol for tar, grease, and oil paint. 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, reference Kingspan Panel Maintenance Manual. This should be followed with a thorough rinsing. Wire brushing or any abrasive material may damage the painted surface and should not be used.

CAUTION

Strong solvents and abrasive cleaners should be avoided.

NOTE

Any cleaning method should be trailed in an inconspicuous area first to assure no ill effect results.

12.9

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

13 Fastener Information

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 type B self tapping type

Carbon and 410 stainless	2,000 rpm
304 Stainless	1,200 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)	DP1 #2, #3	14
14 Ga. (0.075)	DP1 #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)	#1	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 type B Fasteners

Steel Thickness	Drill Bit 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)	#7 (0.201)
10 Ga. (0.134)	#7 (0.201)
3/16" (0.187)	#1 (0.228)
1/4" (0.250)	#1 (0.228)
3/8" (0.375)	#1 (0.228)
1/2" (0.500)	#1 (0.228)

To install type 'B' fastener, pre-drill using the correct drill bit 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

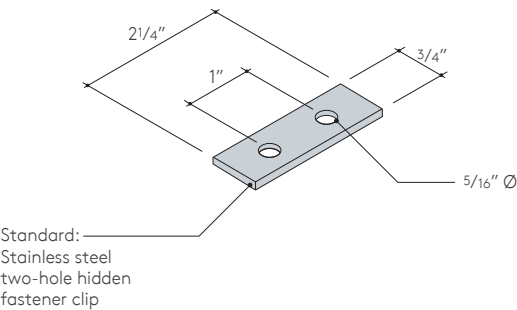
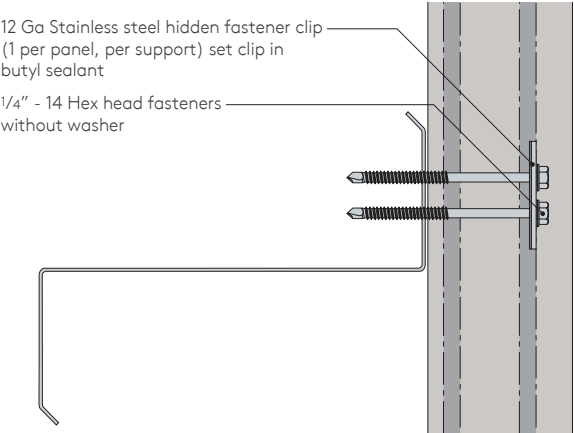
Contact Kingspan's Technical Services Department for specific project fastening recommendations.

NOTE

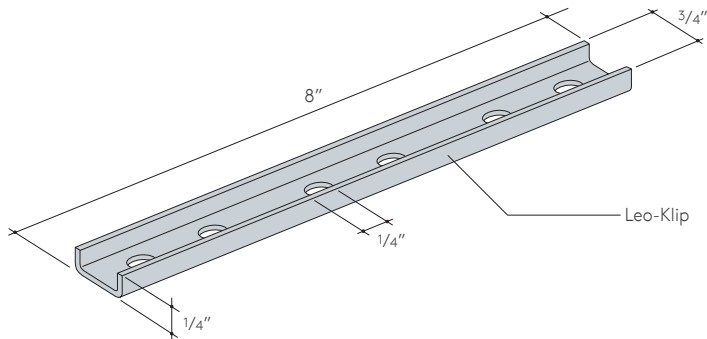
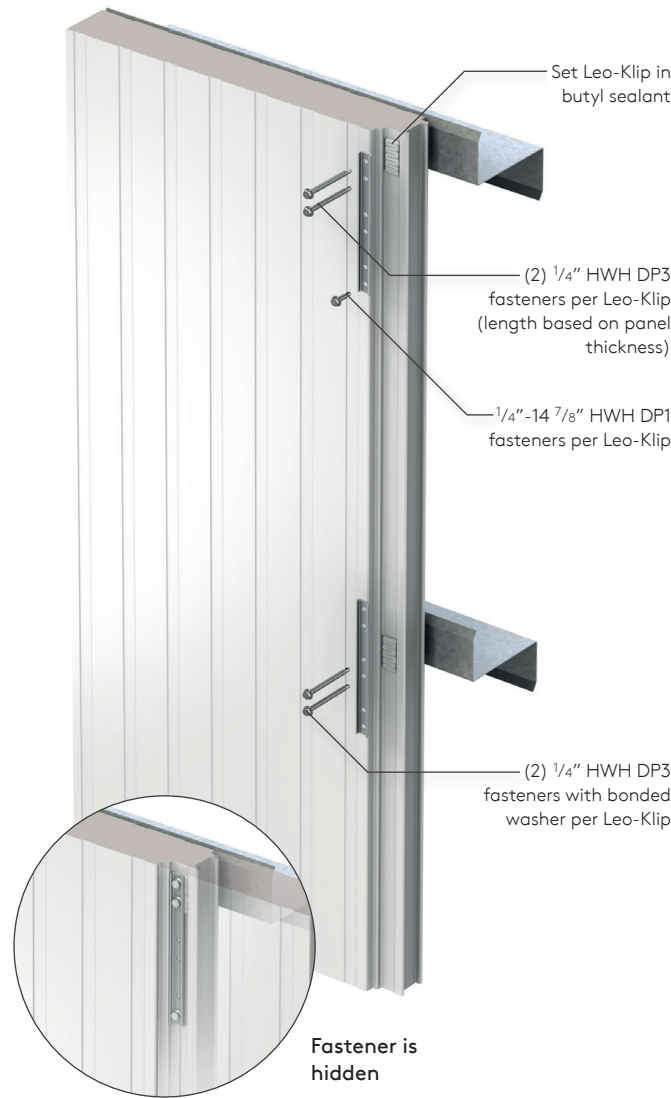
It is recommended to test self-drilling, self-tapping fasteners. It may be beneficial to predrill 3/16" pilot holes in some substrate materials and/or thicknesses.

13 Fastener Information

Hidden Fastener Clip

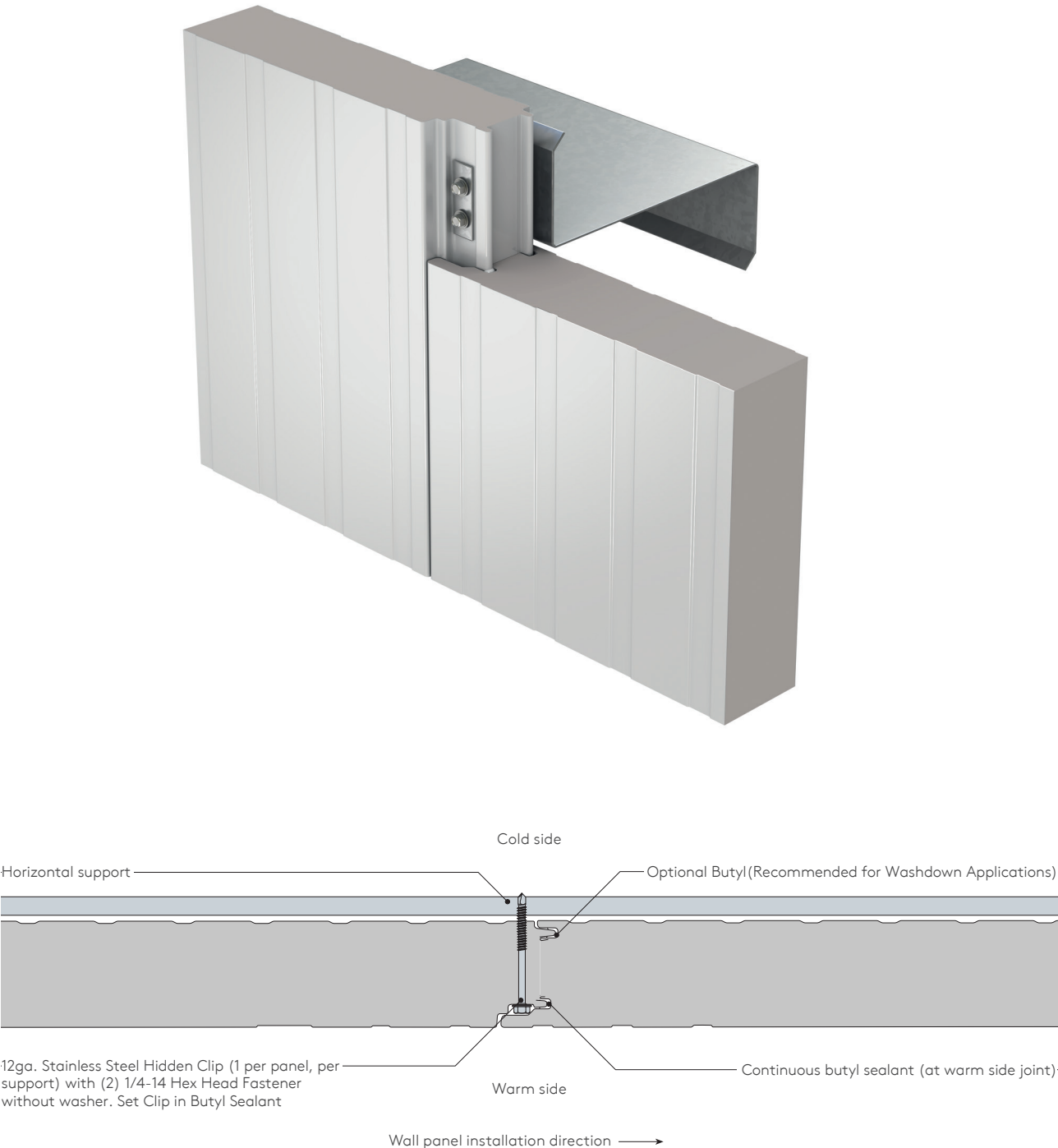


Leo-Klip Fastener Clip Configuration



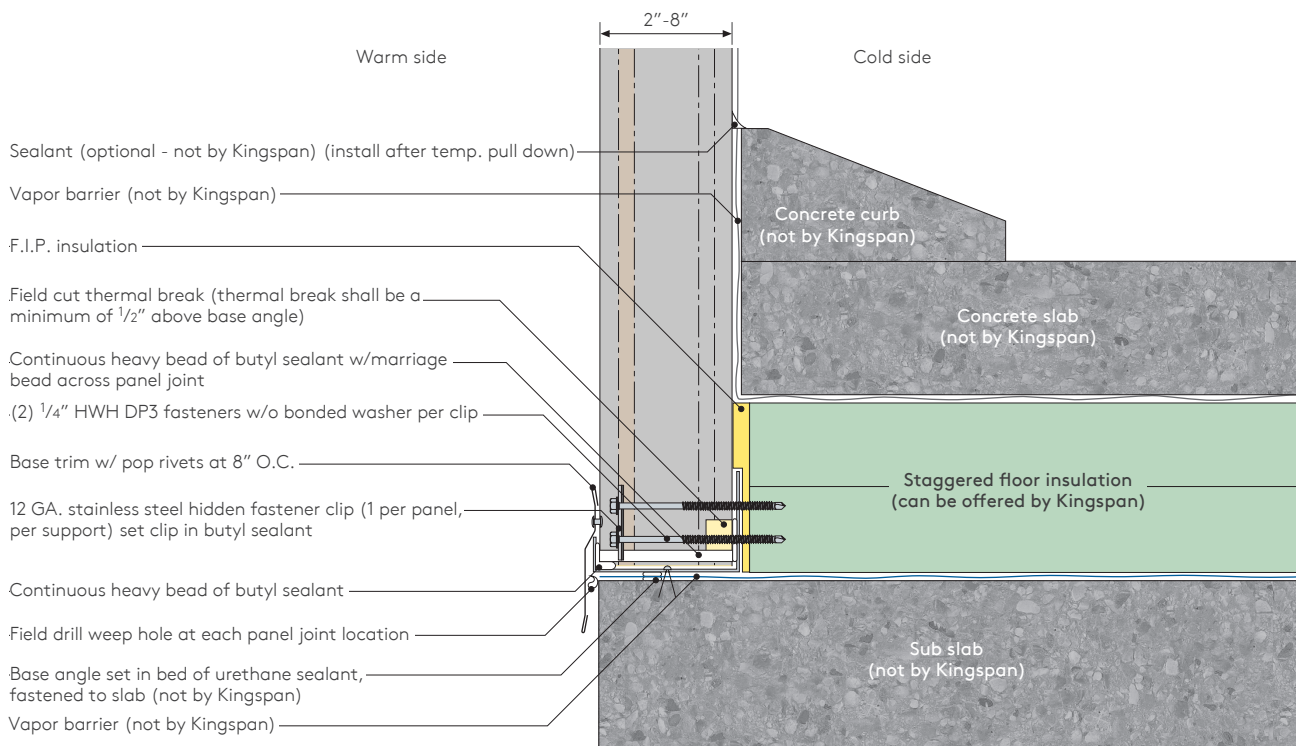
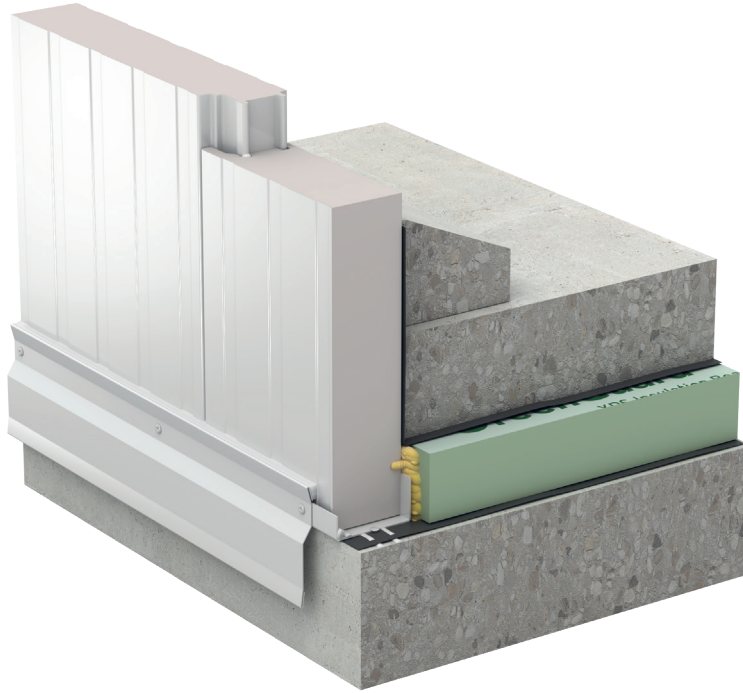
Construction Details

KS Shadowline Engaged Panel Joint



Construction Details

KS Shadowline Base with Insulated Slab

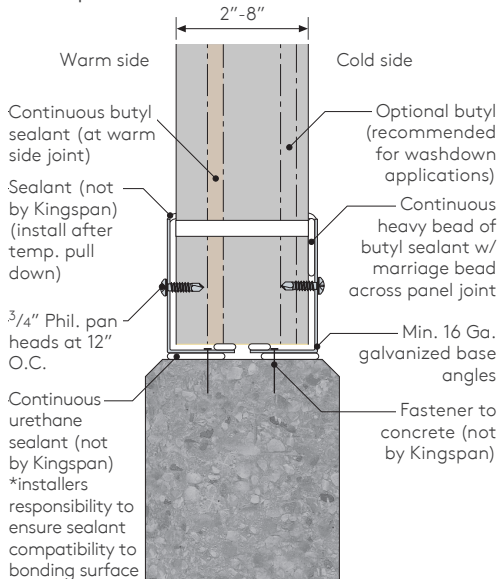


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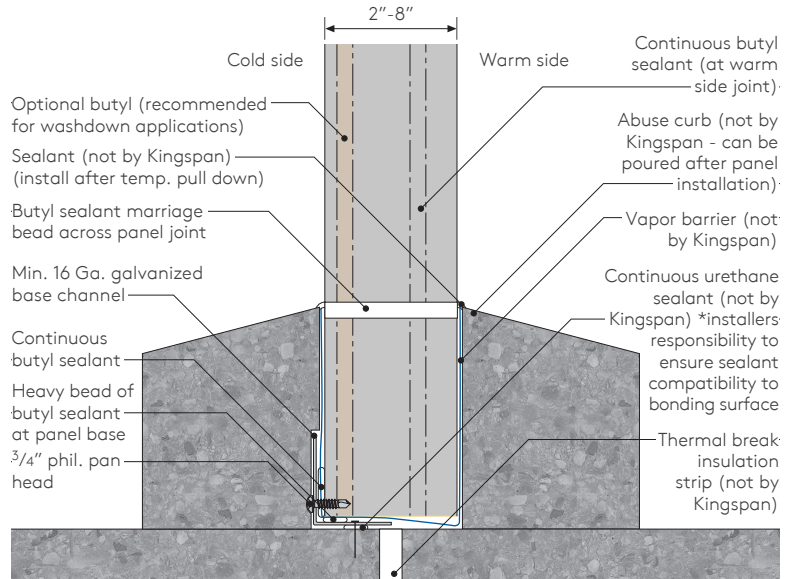
KS Shadowline Partition Base



On top of curbs

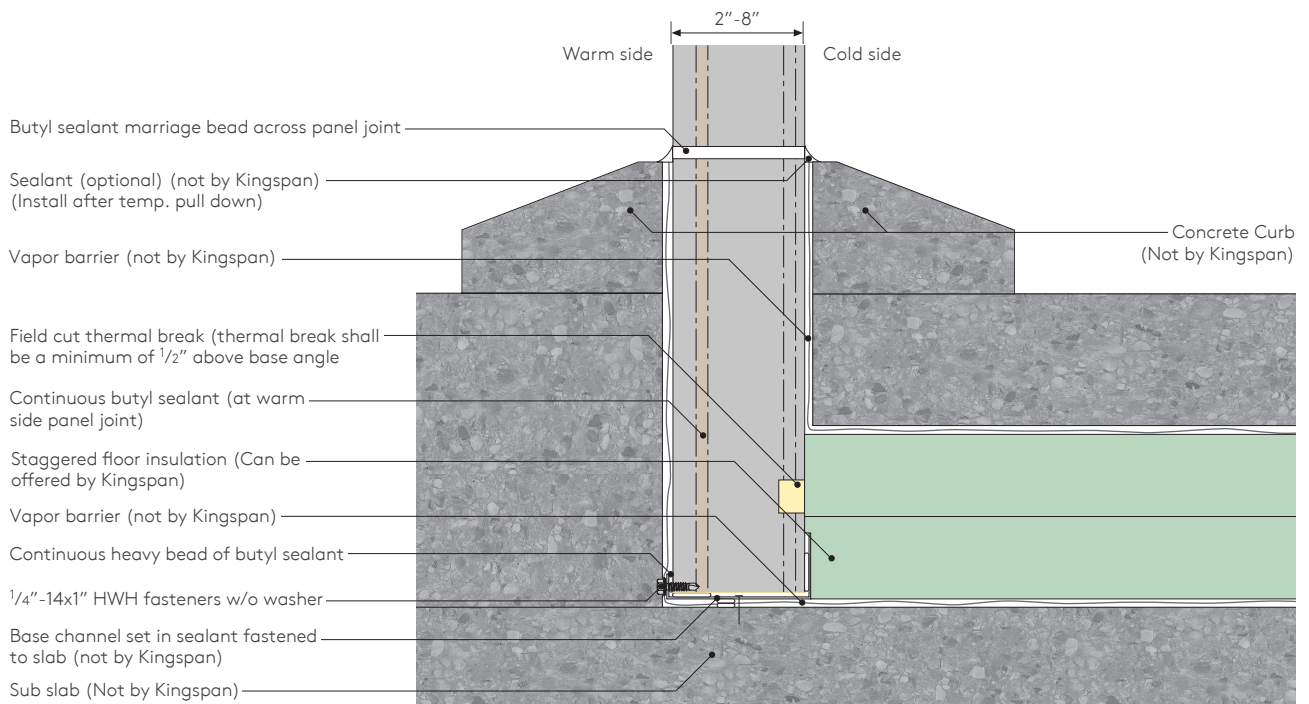
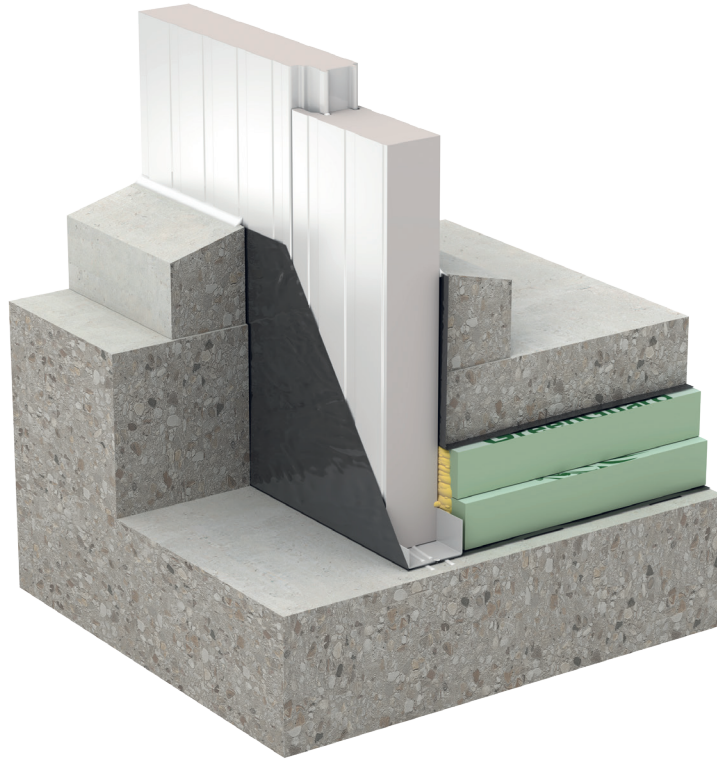


With curbs



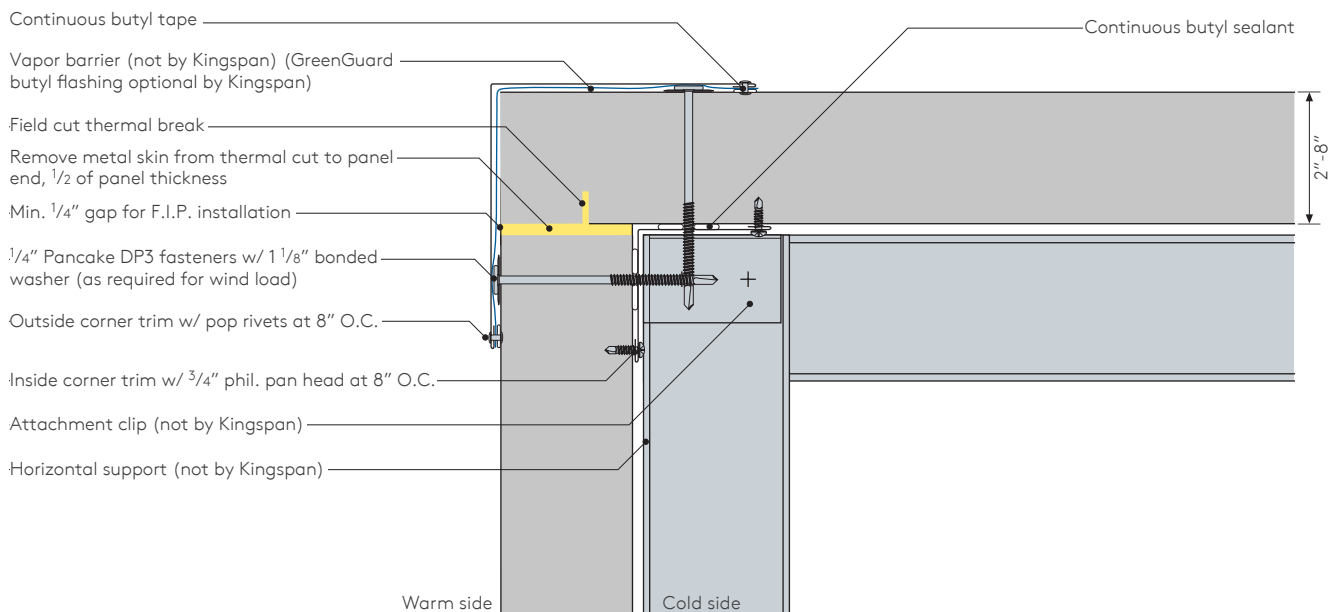
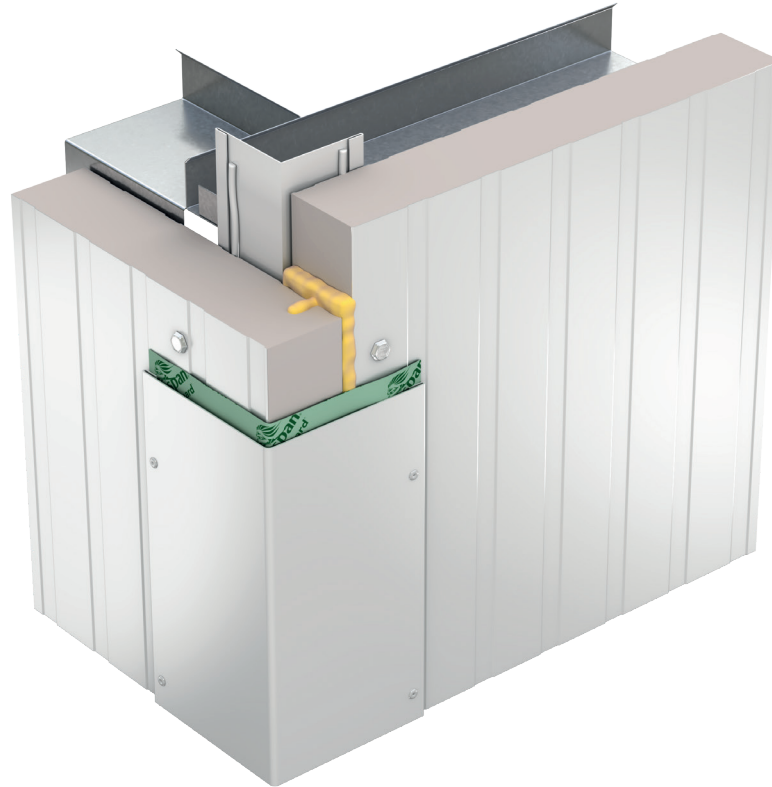
Construction Details

KS Shadowline Partition Base



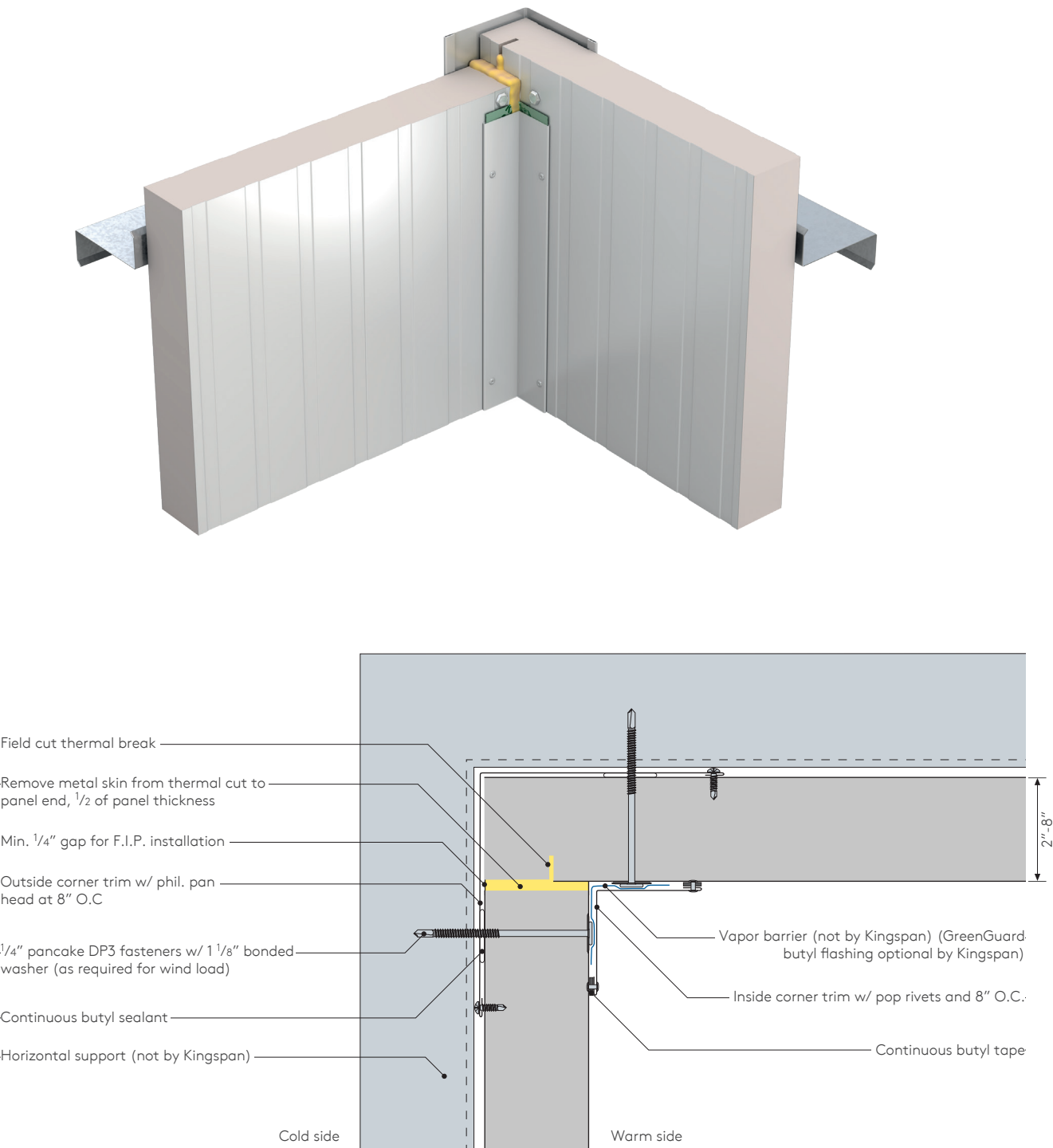
Construction Details

KS Shadowline Outside Corner Flush Trim



Construction Details

KS Shadowline Inside Corner Flush Trim

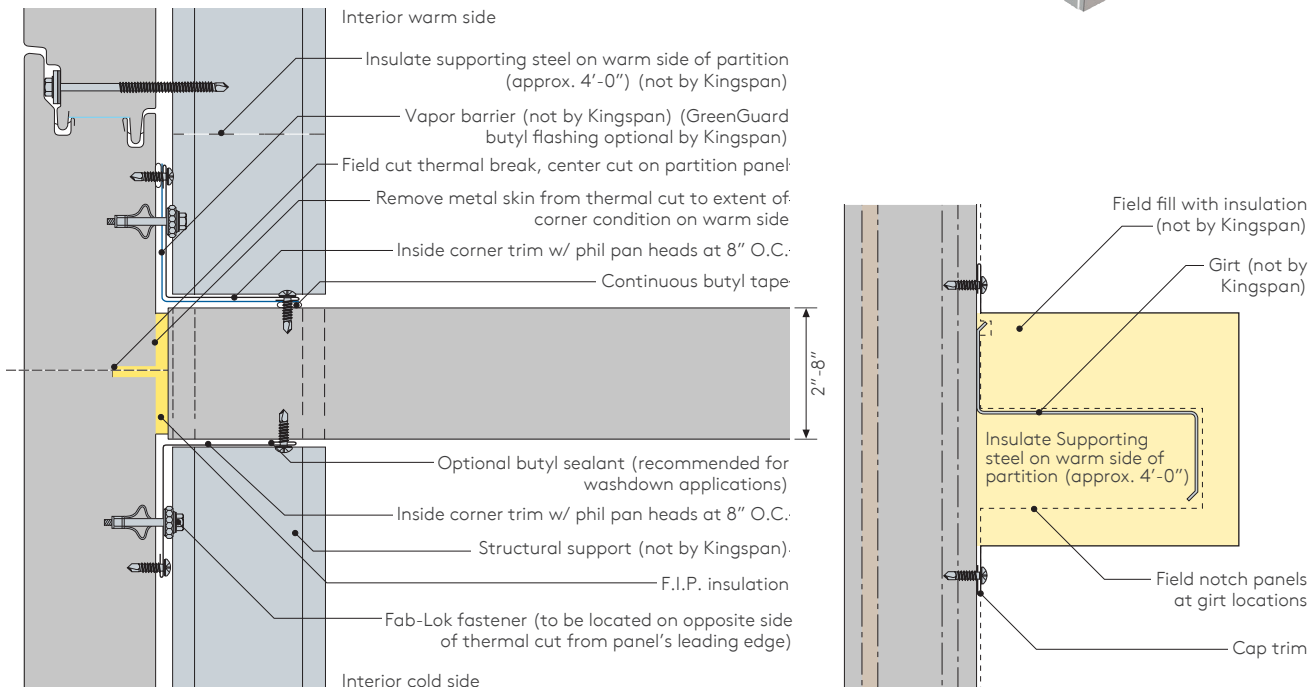
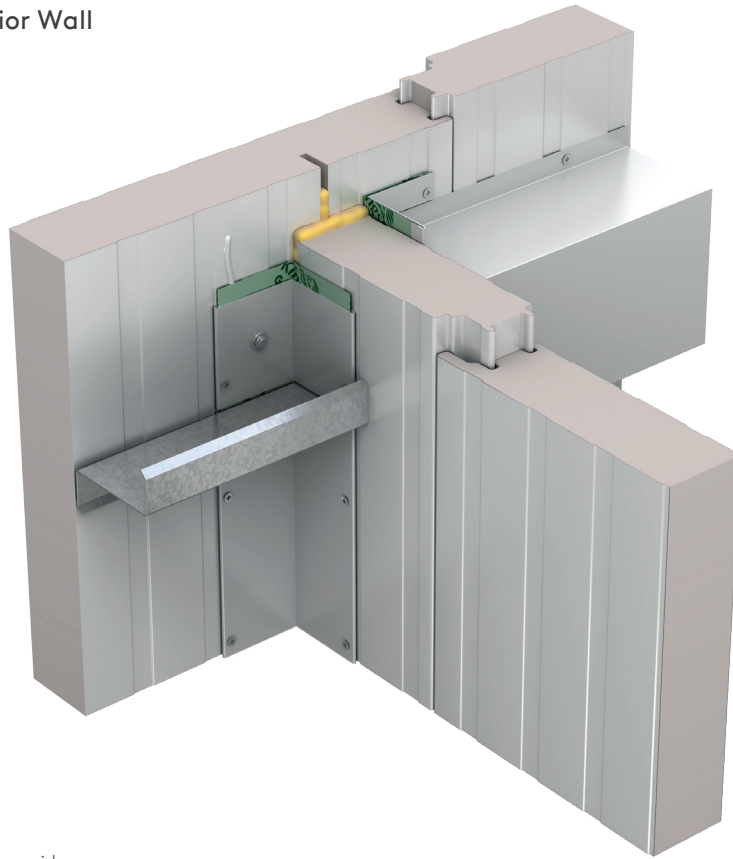


Construction Details

KS Shadowline Partition to Exterior Wall

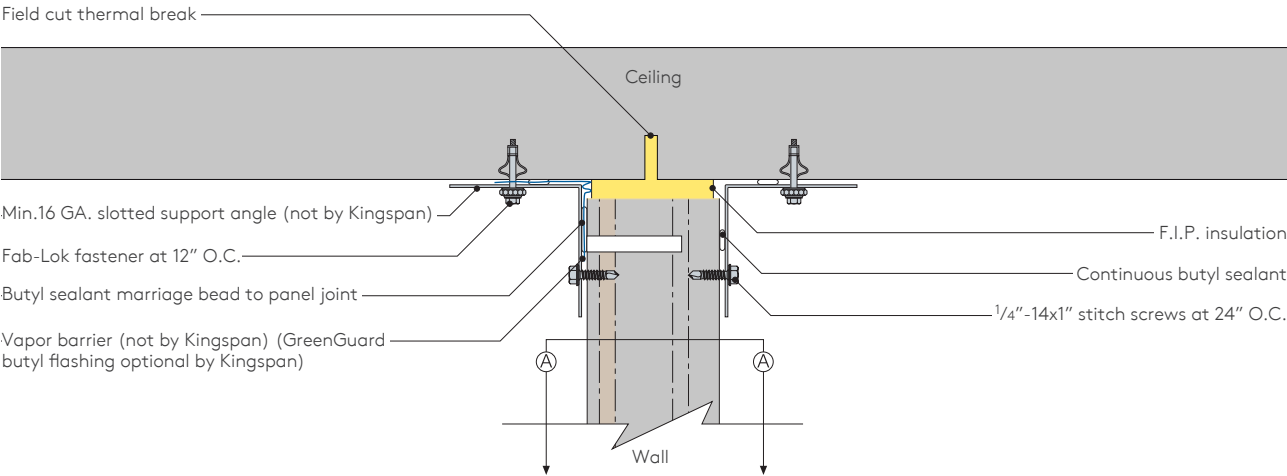
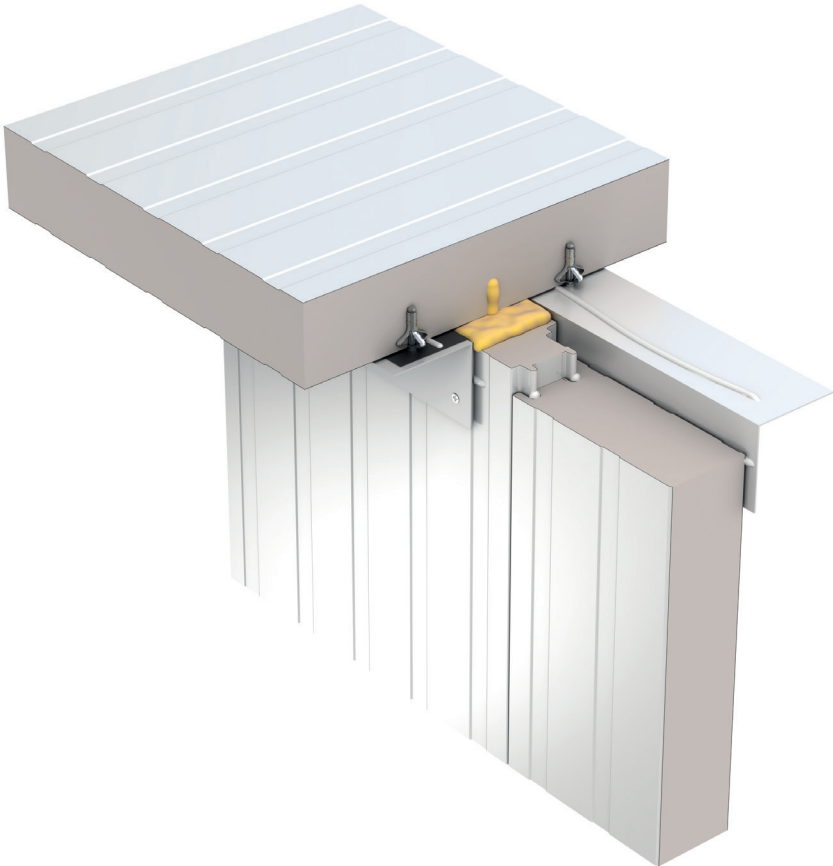
NOTE

Additional fasteners may be required on either side of the field cut thermal break based on actual design loads and thermal requirements.



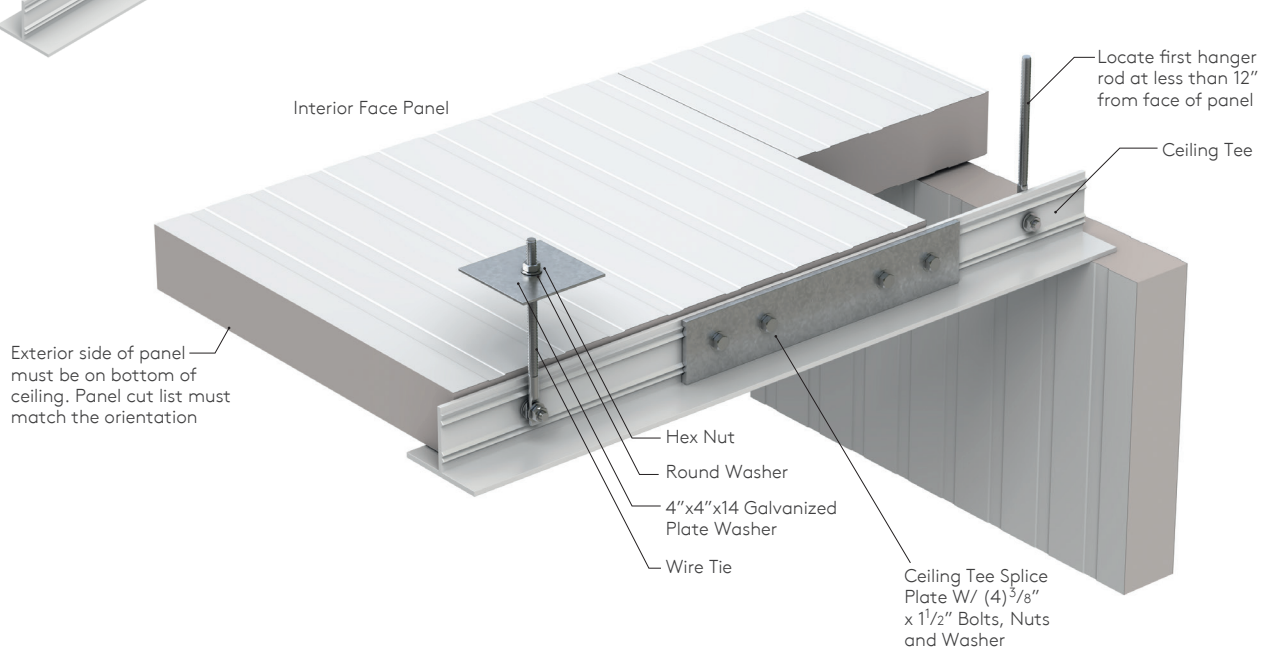
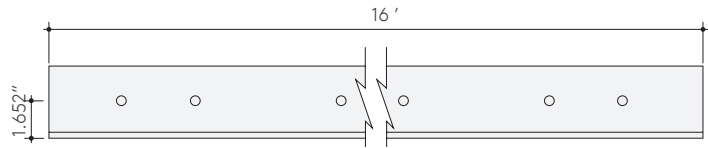
Construction Details

KS Shadowline Wall to Ceiling Intersection



Suspended Ceiling Assembly

Ceiling Tee



Standard Tee Support

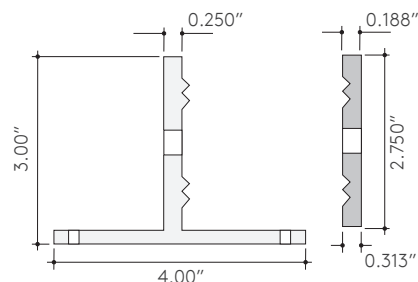
Designed for max 10 psf for non-accessible ceilings.

6063-T6 Alloy

Pre-drilled

16'-0" White and Bare Options

Rod spacing based on Engineering Design



Heavy Duty Tee Support

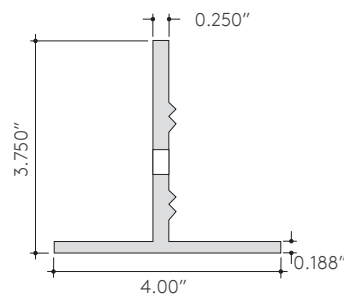
Designed for min 20psf for Limited Access and 25psf for Walkable ceilings.

6063-T6 Alloy

Pre-drilled

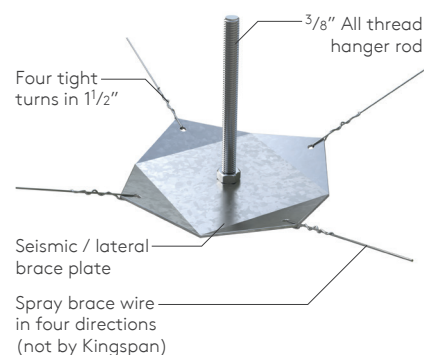
16'-0" White and Bare Options

Rod spacing based on Engineering Design



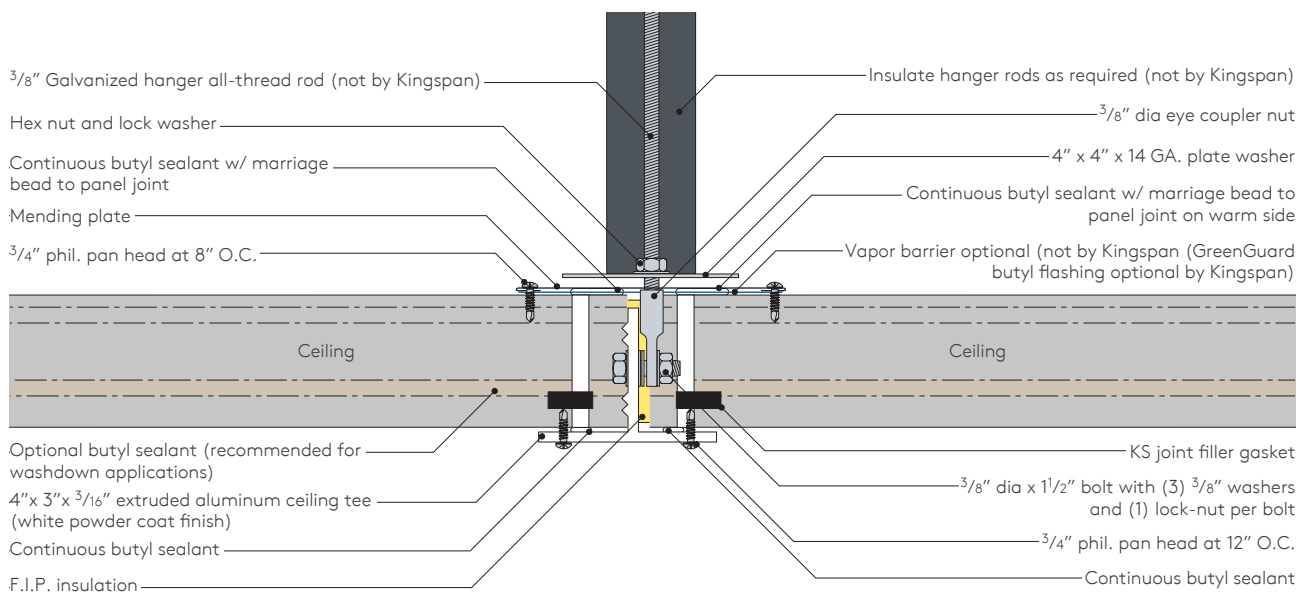
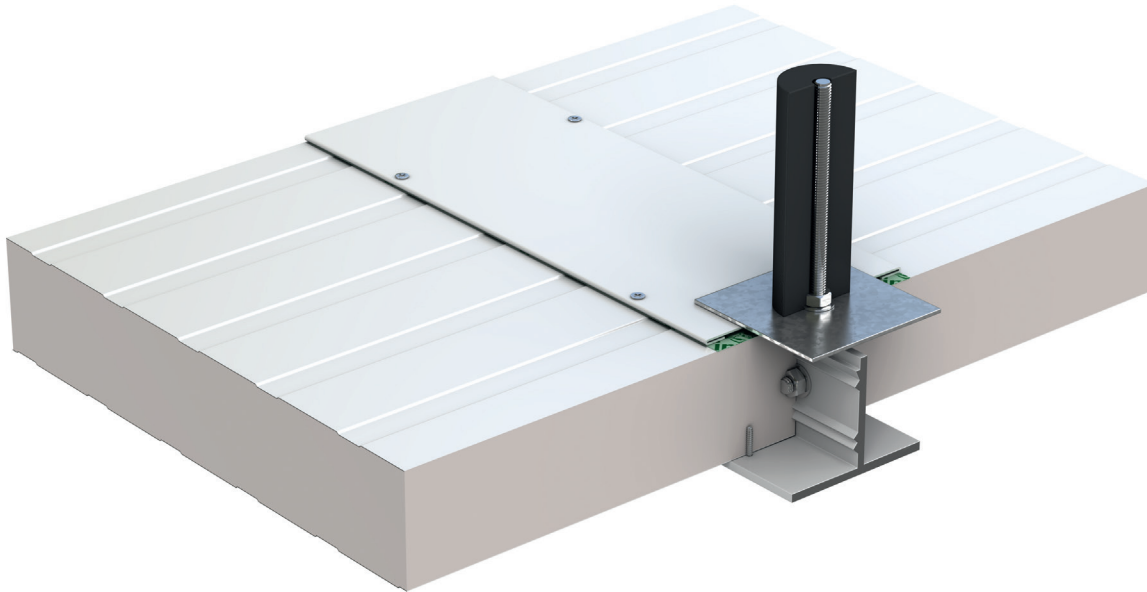
Splice plate (if required)

To be located based on engineering design in lieu of plate washer.



Construction Details

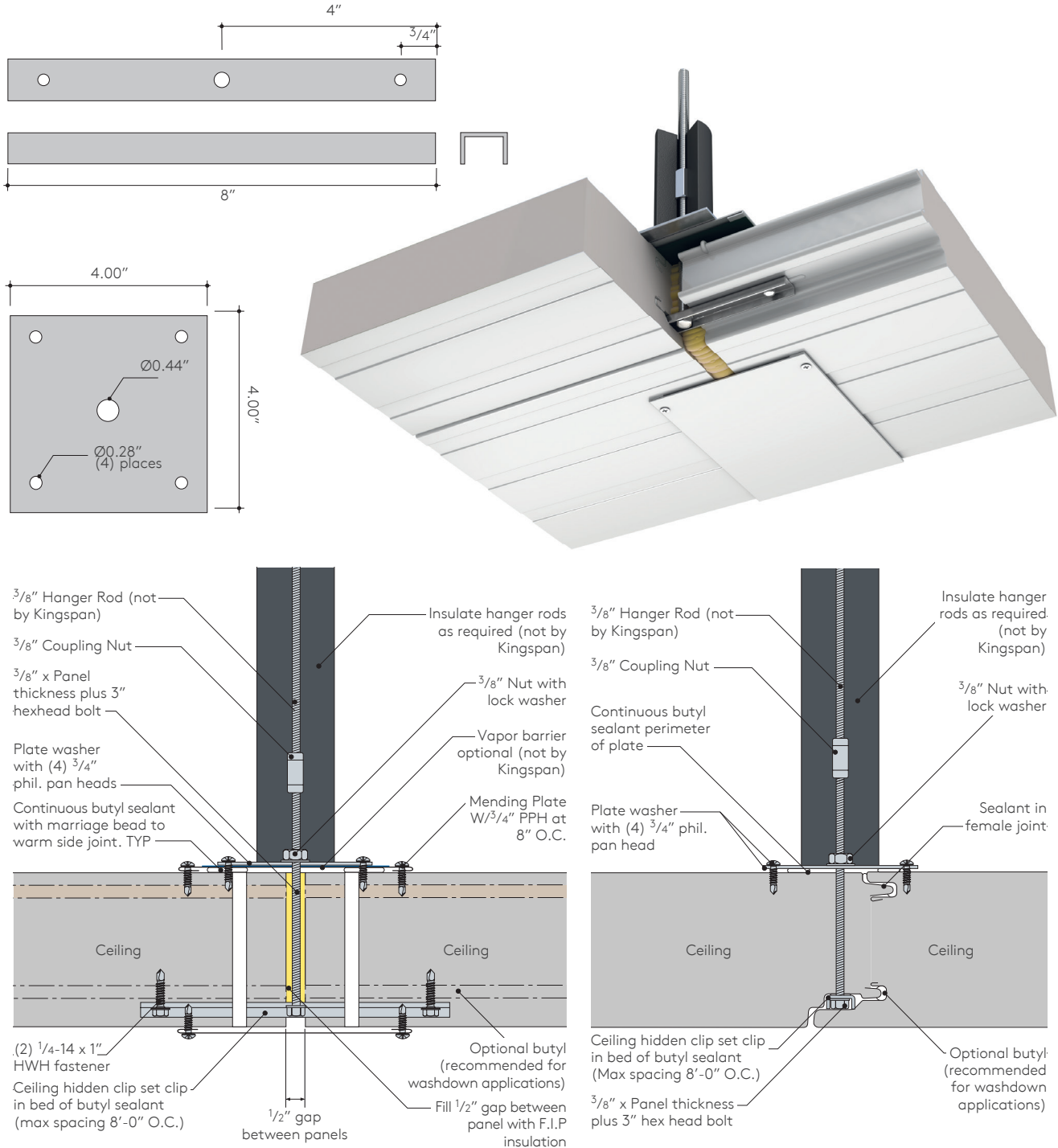
KS Shadowline Interior Ceiling Tee



Suspended Ceiling Assembly

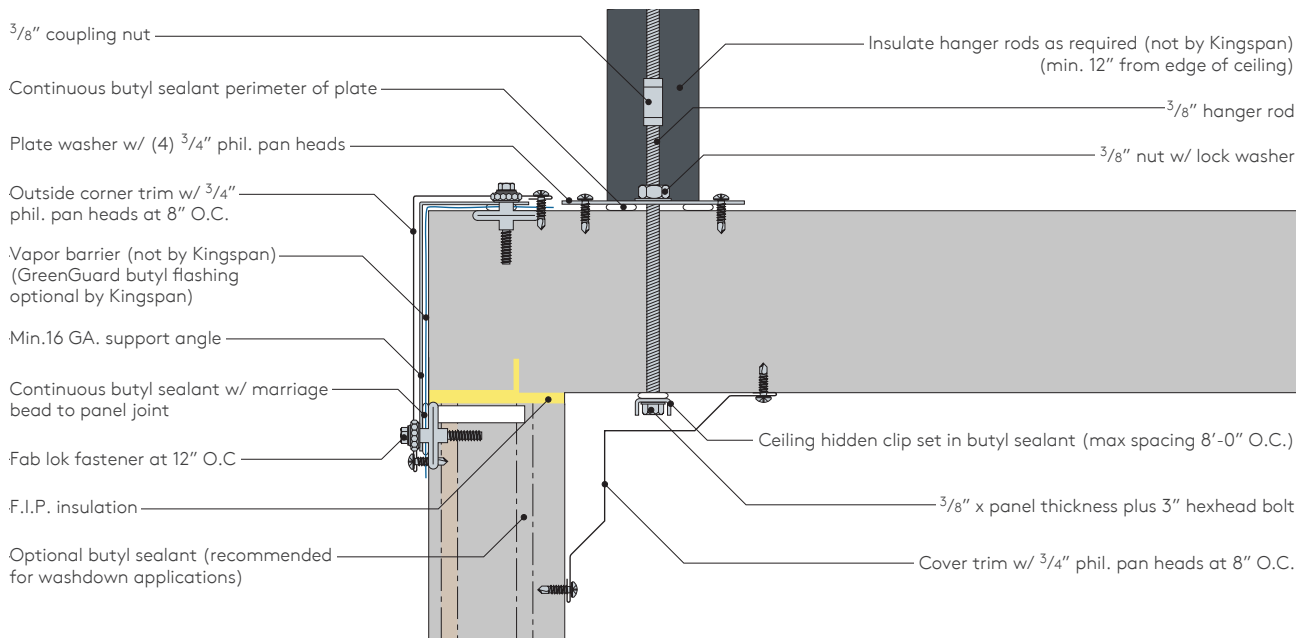
Concealed Ceiling Clip Assembly

Minimum 25psf walkable on design @ 6'-0" Rod Spacing
Standard 10psf non-accessible at 12'-0" Rod Spacing
Supplemental to any Tee Support System for flexibility based on project conditions.



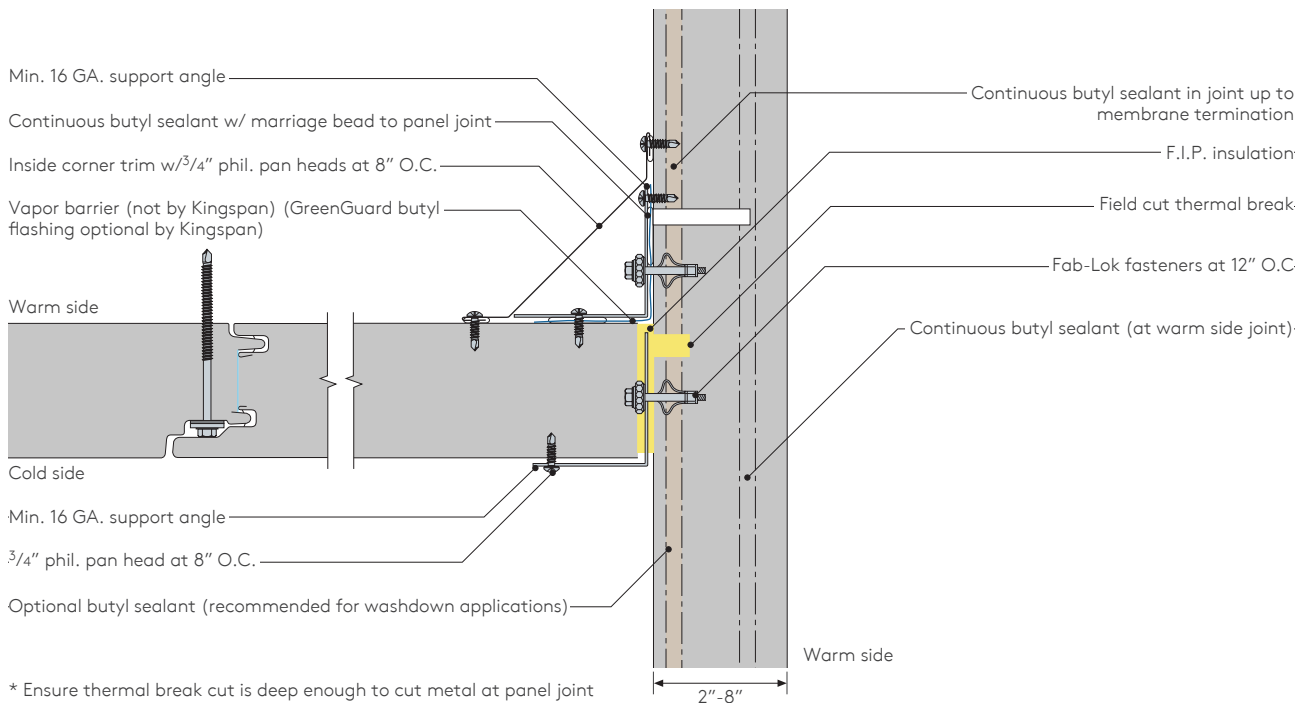
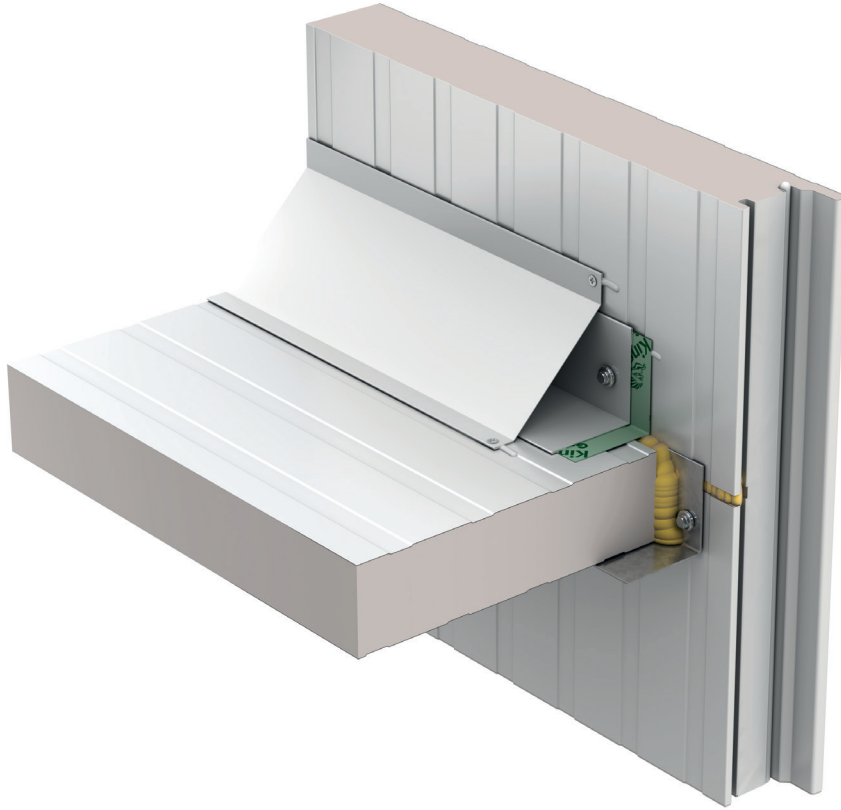
Construction Details

KS Shadowline Ceiling Hidden Clip Ceiling to Wall



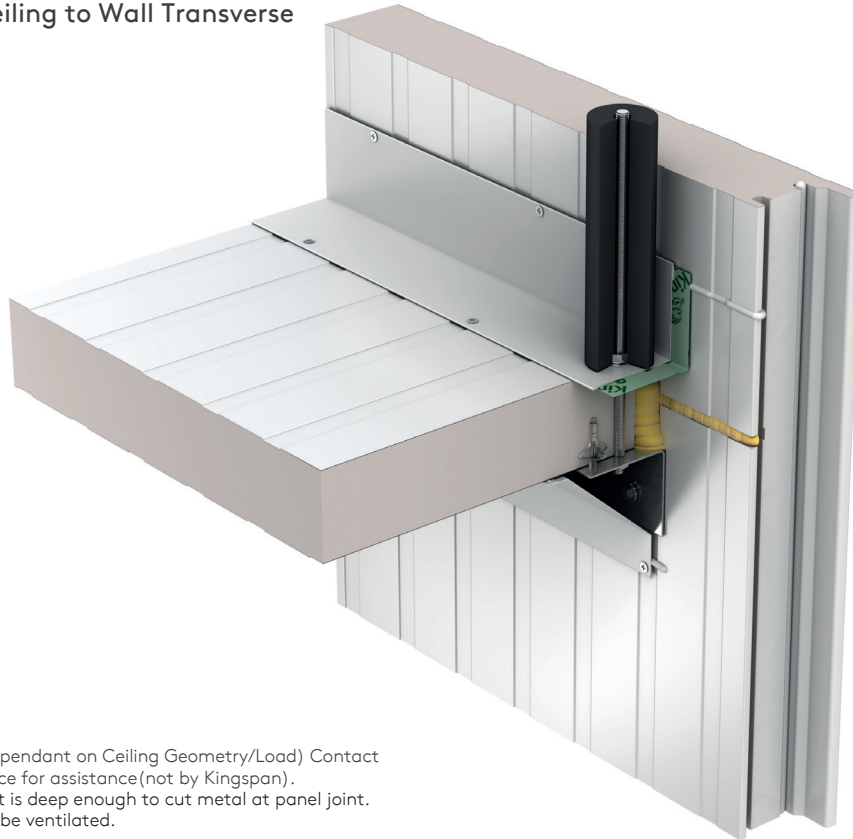
Construction Details

KS Shadowline Ceiling to Wall Longitudinal

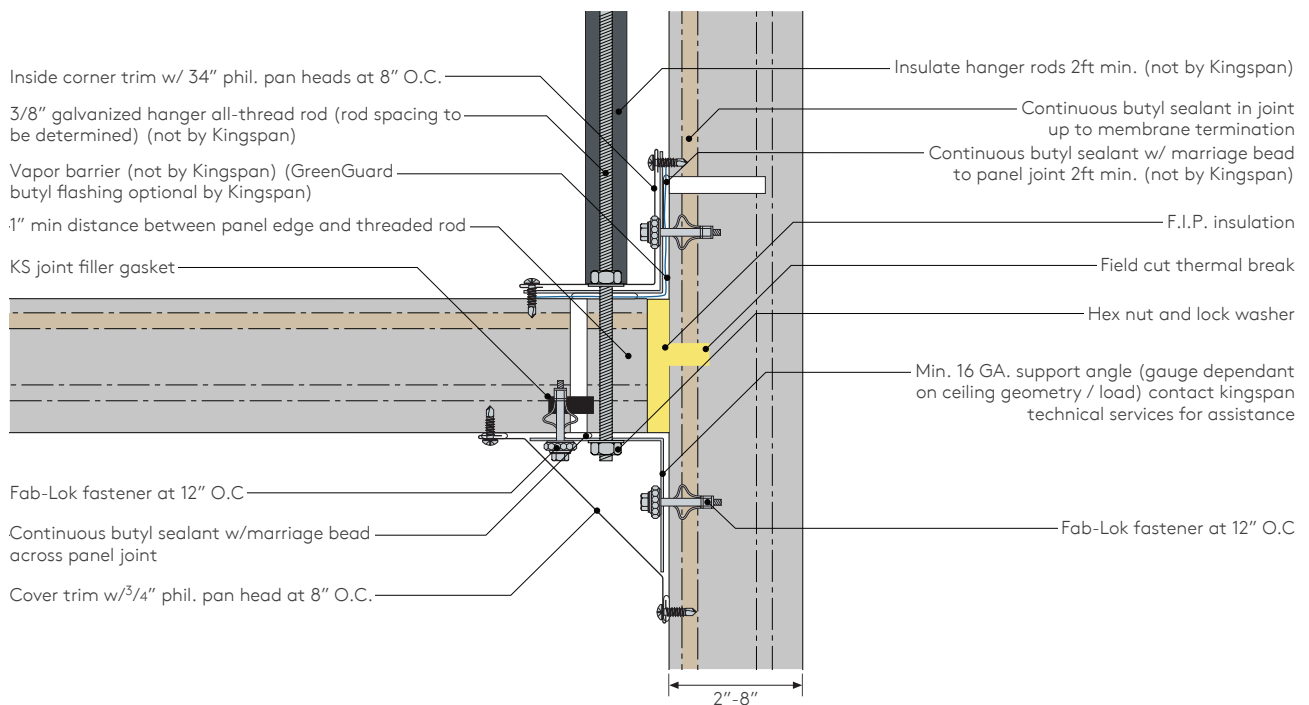


Construction Details

KS Shadowline Ceiling to Wall Transverse

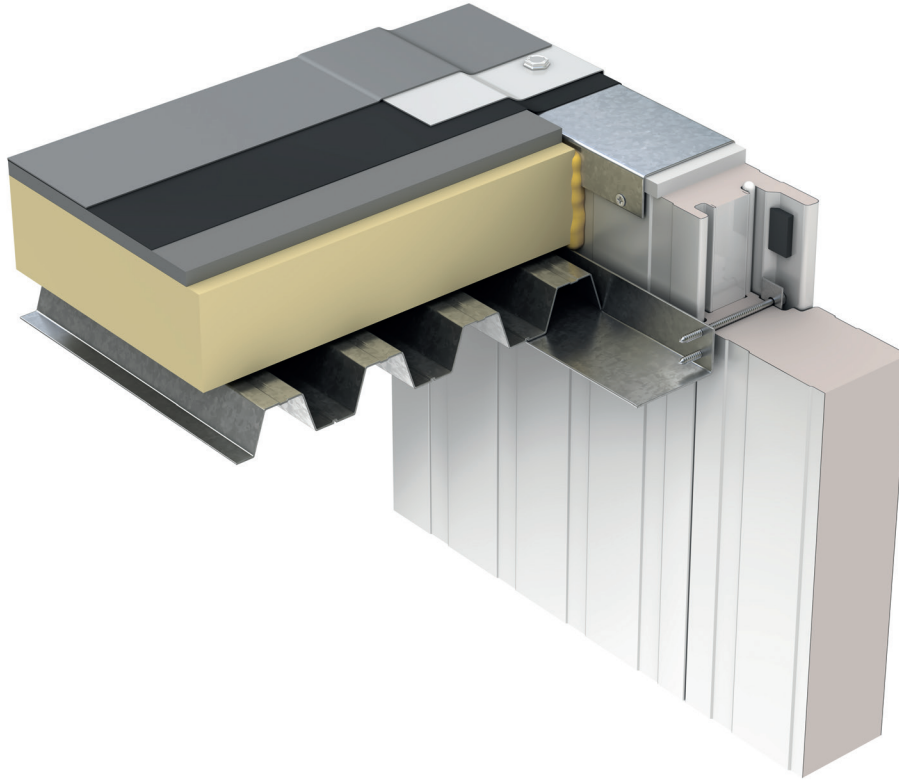


- *Support Angle (Gauge dependant on Ceiling Geometry/Load) Contact Kingspan Technical Service for assistance (not by Kingspan).
- *Ensure Thermal break cut is deep enough to cut metal at panel joint.
- *Attic above ceiling must be ventilated.

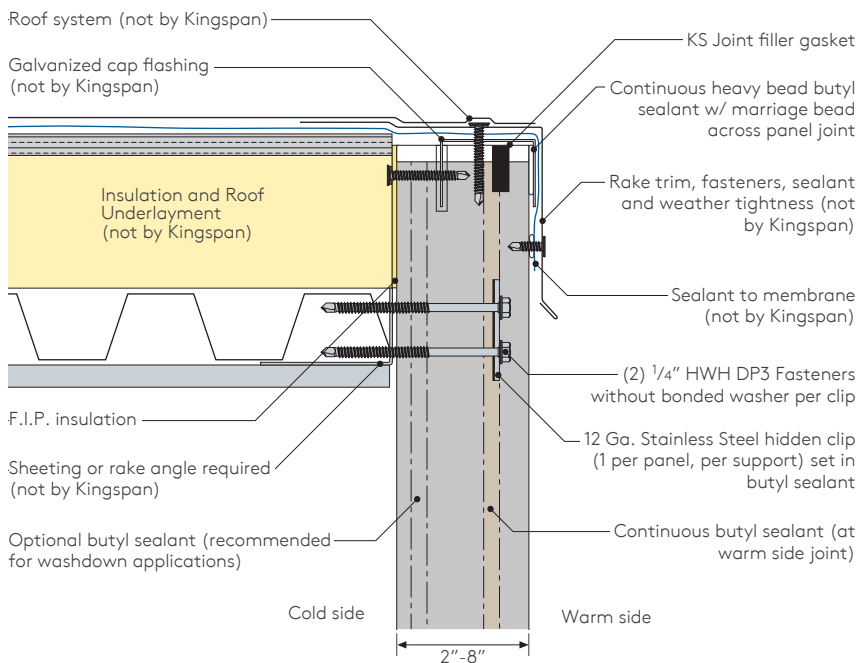


Construction Details

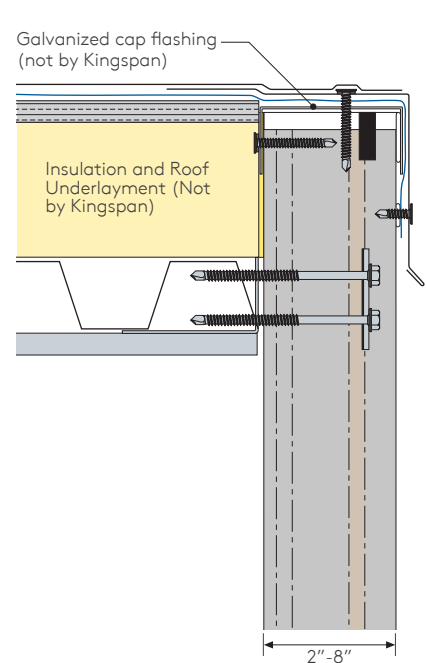
KS Shadowline - Rake with Membrane Roof



Small Cap Flashing



Large Cap Flashing



Notes

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