

BP Supplier Paint Reference

Refer to the BP Retail Visual Standards website (<https://www.bprvs.com>) for additional details.

EXTERIOR PAINT SPECIFICATIONS



- 01 BP Pearl**
- Glidden Professional, Order #A0083, Spec #38YY 72/117, "Indian Legend"
 - Sherwin Williams, SW6119, "Antique White"
 - Benjamin Moore, OC-8, "Elephant Tusk" - P28 DTM (Gallon)
 - Anchor Paint, BP Pearl - CC3065 (Acrylic), CC3112 (Oil)



- 02 BP Warm Gray**
- Glidden Professional, Order #A1860, Spec #40YY 25/074, "Grey Mountain"
 - Sherwin Williams, SW7053, "Adaptive Shade"
 - Benjamin Moore, 2137-40, "Desert Twilight" - P28 DTM (Gallon)
 - Anchor Paint, BP Warm Gray - CC3068 (Acrylic), CC3115 (Oil)



- 03 BP Yellow (Paint)**
- Glidden Professional, Order #A0775, Spec #37YY 61/867, "Omega Yellow"
 - Sherwin Williams, SW6903, "Cheerful"
 - Benjamin Moore, 2022-10, "Yellow" - P28 DTM (Gallon)
 - Anchor Paint, BP Yellow - CC3066 (Acrylic), CC3113 (Oil)
- BP Yellow (ACM) - Reynobond, "Program Yellow"**



- 04 White (Canopy Deck, Canopy Columns)**
- Glidden Professional, Order #A0128, Spec #50GY 83/010, "White Wing"
 - Sherwin Williams, SW7006, "Extra White"
 - Benjamin Moore, OC-67, "Ice Mist" - P28 DTM (Gallon)
 - Anchor Paint, BP White - 4900 (Acrylic), 900 (Oil)



- 05 BP Dark Pearl**
- Glidden Professional, Order #A0767, Spec #30YY 52/207, "Desert Valley"
 - Sherwin Williams, SW6121, "Whole Wheat"
 - Benjamin Moore, HC-24, "Pittsfield Buff" - P28 DTM (Gallon)



- 06 BP Bright Green (to go fascia paint)**
- Benjamin Moore, 2030-10, "Lizard Green"
 - Anchor Paint, BP White - CC3107 (Acrylic), CC3116 (Oil)
- BP Bright Green (to go ACM)**
- Duragloss 3000, CMR# 071013-D, 497G11281 H/G SR Green



- 09 BP Retail Green**
- Glidden Professional, Custom Color "BP Retail Green"
 - Sherwin Williams, Hydrogloss B65GW180, Custom Color
 - Benjamin Moore, BP Retail Green - PMS 348c, Custom Color
 - Anchor Paint, BP Retail Green - CC3067 (Acrylic), CC3114 (Oil)



- 10 ADA/Handicap Blue-**
- Glidden Professional, "Handicap Blue", 25524 traffic paint
 - Sherwin Williams, TM2133, "Setfast Blue", Setfast marking latex
 - Benjamin Moore, P58-30, "Handicap Blue", Safety/Zone marking latex

-Handicap Blue paint is used for pavement striping and marking on site (as required).

BP EXTERIOR SIGNAGE



BP Yellow - PMS 109



BP Super Bright Green (to go) - PMS 382



BP Extra Light Green (to go) - PMS 376



BP Light Green - PMS 368



BP Bright Green (to go) - PMS 361



BP Green - PMS 355



BP Retail Green - PMS 348



BP Dark Green (to go) - PMS 356

For all paint inquiries, contact:

Benjamin Moore
888-BEN MOOR (888-236-6667)
www.benjaminmoore.com

Sherwin Williams
847-330-6262
www.sherwin-williams.com

Glidden Professional
888-615-8169 Opt. 2
www.gliddenprofessional.com

Anchor Paint
405-831-9446
www.anchorpaint.com

BP Federal Heath Canopy Fascia Installation Guide Lines

Be sure to use API Recommended Contractor Safety Practices when installing this fascia.

Important Note: This material is designed to be installed by a professional contractor, experienced in installing canopy fascia systems.

Installation team should determine whether or not the canopy is structurally sound to receive the new system over top of the old system. When the existing canopy has multiple layers, we highly recommend that the installer should remove the top layer(s) back to a single base layer.

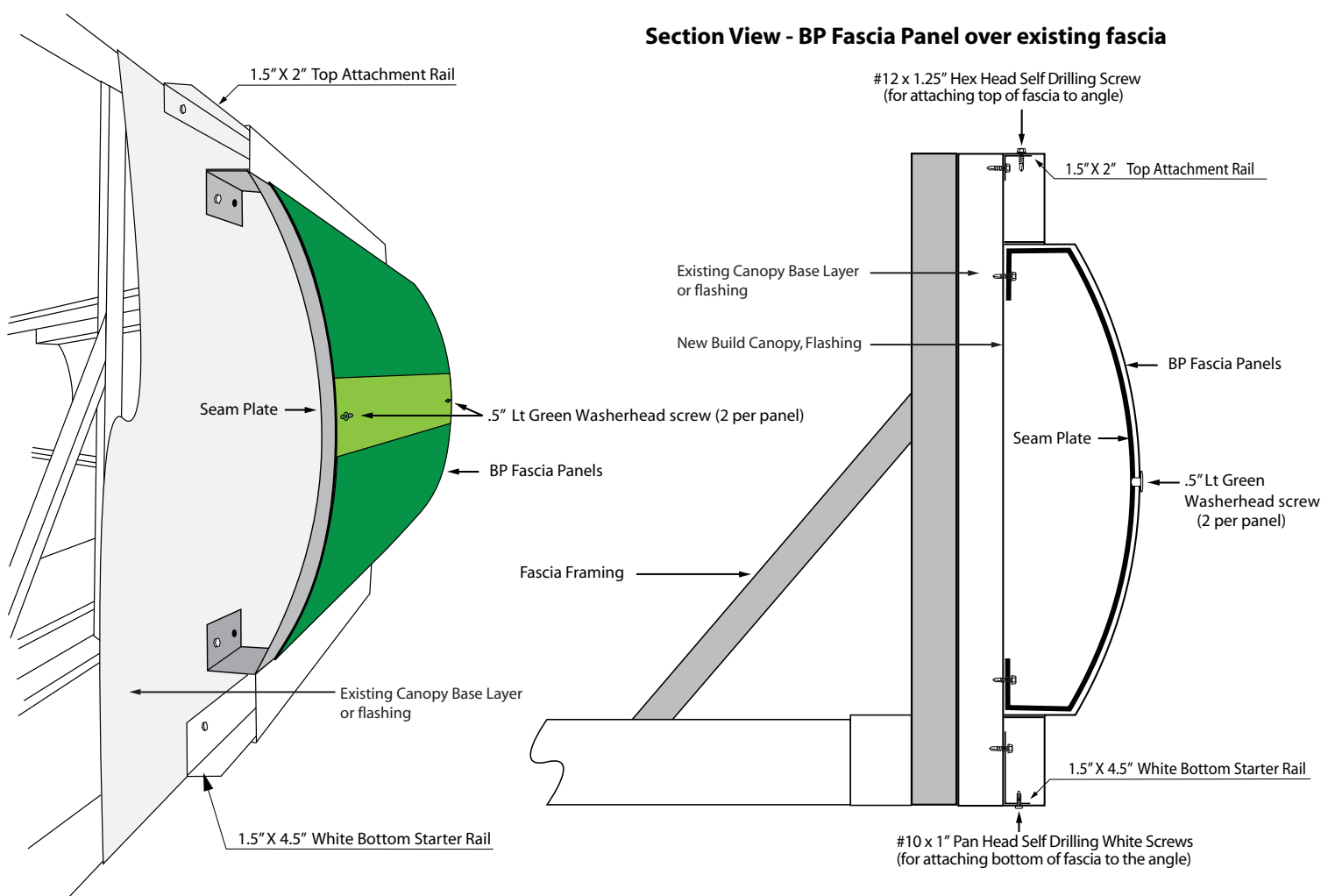
Determine if flashing is needed: Flashing is typically needed when the fascia system is open on the back of the canopy.

Typical situations where flashing is needed are:

- A new build canopy.
- The existing fascia system is 100% removed and only the existing outriggers / framing remain.

For more information about flashing, see page 2, the paragraph titled "Mounting Hardware / Flashing"

Do not allow the fascia panels to become wet if the protective mask has not been removed. The mask is extremely difficult to remove once it has been exposed to moisture.

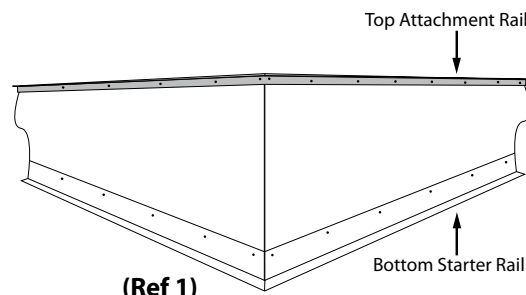


Installation Instructions:

Framing

- 1 ● Install the 1.5" x 4.5" white bottom starter rail and 1.5" x 2" top attachment rail around the perimeter of the canopy fascia. Starter and attachment rail should be installed level and parallel to each other. (Ref 1)
- Installer is responsible for supplying the fasteners used to attach the top and bottom rail to the existing base layer.

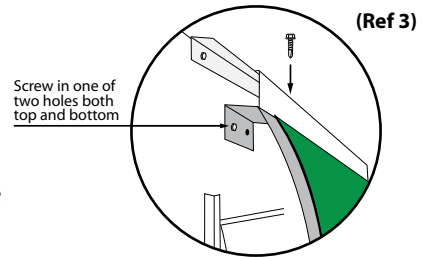
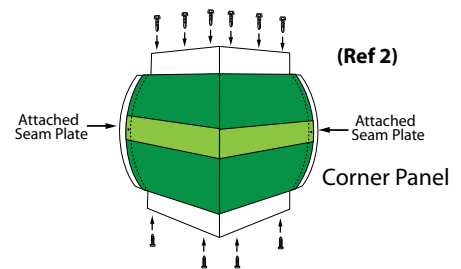
Special Note: Before hanging the new fascia panels determine the panel orientation (top vs bottom) The black shadow on the laser line should be positioned to the bottom.



(Ref 1)

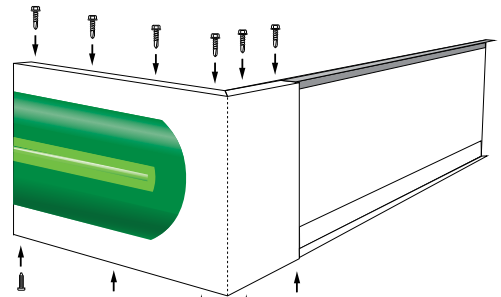
Front Corners

- 2**
- While on the ground, screw the seam plates on both ends through the slotted area of the front fascia corner panels and then through the seam plate. (Ref 2)
 - Install a seam plate on each side of the corner using the light green screws.
 - Install the front corner fascia panels first, (on the canopy) with the seam plates attached.
 - Attach the top of the canopy fascia to the top attachment rail, using self tapping hex head fasteners (furnished).
 - Attach the bottom of the canopy fascia to the bottom starter rail, using the self tapping white pan head screws (furnished).
 - Attach the seam plates to the existing fascia with screws, one at the top and one at the bottom in one of the pre-drilled holes. (Installer is responsible for supplying these fasteners.) (Ref 3)



Rear Corners

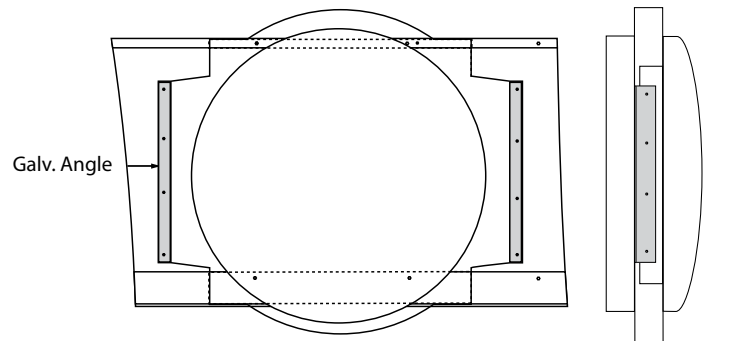
- 3**
- Install the rear corners on the canopy. **To assure that the corners are not applied upside down, remove the premask for the bullnose decal. The white highlight half-tone should be positioned towards the top of the panel and the black shadow to the bottom.** (Ref 4)
 - This will not apply if the back panels do not have decals applied to them.
 - Attach the top of the canopy fascia to the top attachment rail, using the self tapping hex head fasteners.
 - Attach the bottom of the canopy fascia to the bottom rail, using the self tapping white pan head screws.



(Ref 4) Rear Corner Panel

Helios Panels

- 4**
- Install the Helios panels in place, in accordance to the guidelines provided by BP.
 - Once the panels are in place, vertical galvanized 1.5" x 2" angle should be attached to each side of the Helios and to the face of the existing fascia panel to stabilize it. Cut to fit from the extra furnished top attachment rail. (Ref 5)
 - Attach the top of the canopy fascia to the top attachment rail, using the self tapping hex head fasteners (furnished).
 - Attach the bottom of the canopy fascia to the bottom starter rail, using the self tapping white pan head screws (furnished).



(Ref 5) Center Helios Panel

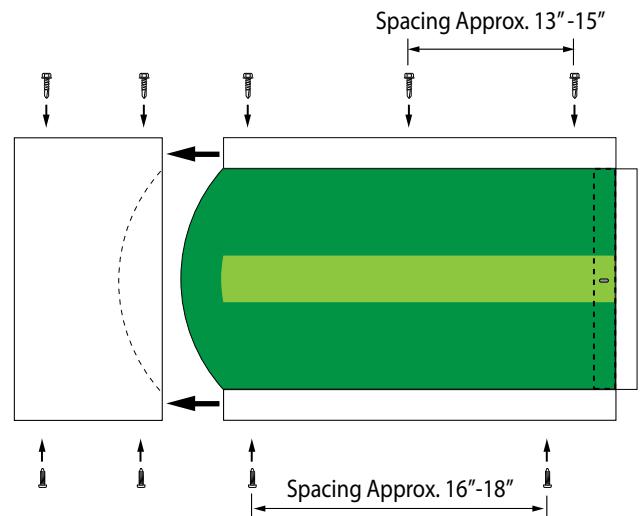
Section View

Special Note: No panel should be shorter than 36".

Determine if the Straight, Tapered, or Rounded End Cap Panels need to be cut to length. If so, see modification of a panel, Step 8.

Rounded End Cap Panels

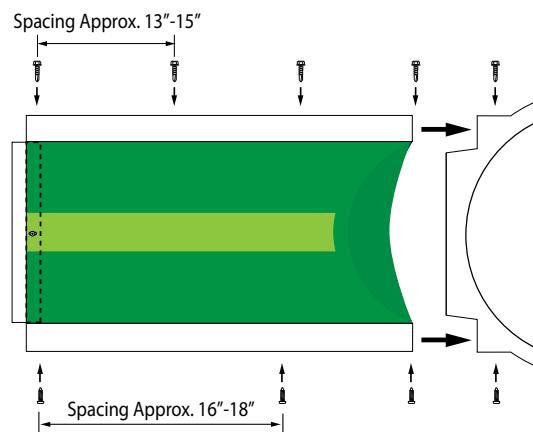
- 5**
- Before installing the Rounded End Cap Panels, attach the seam plate to the flat edge as described in step 2. (Ref 6)
 - Set the panel, with the Rounded End Cap next to a blank rear corner. The rounded end will overlap the blank white corner approximately 6".
 - Attach the top of the canopy fascia to the top attachment rail, using the self tapping hex head fasteners (furnished).
 - Attach the bottom of the canopy fascia to the bottom starter rail, using the self tapping white pan head screws (furnished).



(Ref 6) Rounded End Cap to Rear Corner Panel

Tapered End Cap Panels

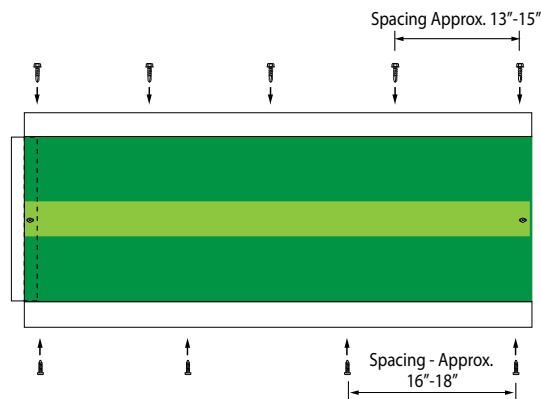
- 6** ● **Special Note:** Determine if the Tapered End Cap Panels need to be cut to length. If so, see modification of a panel, Step 8.
- Before installing the Tapered End Cap Panels, attach the seam plate to the flat edge as described in step 2. (Ref 7)
 - Install the Tapered End Cap Panel next to the Helios Panel, creating a circle around where the Helios will be located.
 - Attach the top of the canopy fascia to the top attachment rail, using the self tapping hex head fasteners (furnished).
 - Attach the bottom of the canopy fascia to the bottom starter rail, using the self tapping white pan head screws (furnished).
 - Attach the seam plates to the existing fascia with screws, one at the top and one at the bottom in one of the pre-drilled holes. (Ref 3) (Installer is responsible for supplying these fasteners.)



(Ref 7) Tapered and Straight Panels

Straight Dimensional Fascia Panels

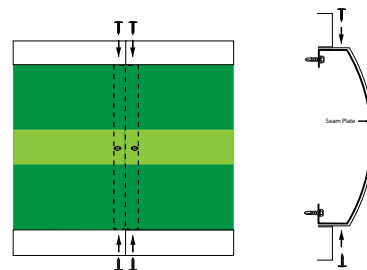
- 7** ● Before setting the Straight Panels, attach the seam plate, if required, to the flat edge as described in step 2.
- Set the Straight Panel between the Helios Panel and corners.
 - Attach the top of the canopy fascia to the top attachment rail, using the self tapping hex head fasteners (furnished). (Ref 8)
 - Attach the bottom of the canopy fascia to the bottom starter rail, using the self tapping white pan head screws (furnished).
 - Attach the seam plates to the existing fascia with screws, one at the top and one at the bottom in one of the pre-drilled holes. (Ref 3) (Installer is responsible for supplying these fasteners.)



(Ref 8) Straight Panels

Riveting and Aligning the Bottom Panel Seams

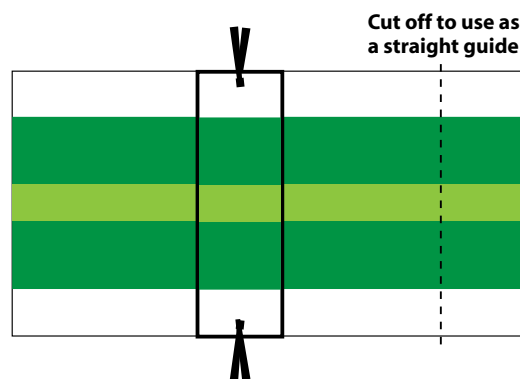
- 8** ● To ensure final alignment of the bottom seams, place two dark green washer-head screws, one on either side of the seam created by the two panels coming together. Put two at the bottom and two at the top. (Ref 9)
- Level across the seams by pushing up on the panels before inserting the screws. The screws should go through the fascia and into the seam plate behind it.
 - When completed, the seam should appear as one continuous panel across the bottom.



(Ref 9) Installing Bottom Screws

Modification of Panels

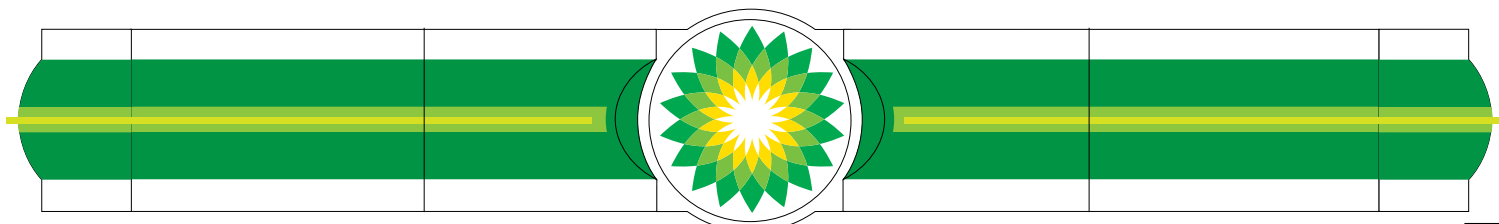
- 9** ● Cut off a short section of one of the straight panel that will be used to fit into the small section to be filled. (Ref 10)
- Clamp the straight edge to the panel and use a rotary disk saw or fine blade circular saw to make the cut.
 - **It is very important that a clean cut be made** to assure the finished quality of the canopy fascia.
 - If surface damage or scratches occur during installation of the fascia panels, use the green patching vinyl in small amounts to cover up the issue.



(Ref 10) Panel Modifications

Fascia Attachment Screw Spacing

- 10** ● Top Attachment Rail - screws should be spaced approximately 13"-15" apart. (Ref 1)
- If installing the fascia system in a hurricane zone, follow local codes for screw spacing.
 - White Bottom Starter Rail - screws should be spaced approximately 16"-18" apart. (Ref 1)



Completed Canopy with Light Bar and Helios

Furnished Materials:



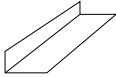
#12 x 1.25" Self Tapping Hex head screw - to attach top of new fascia to upper angle



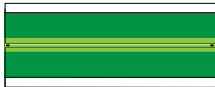
#10 x 1.25" Self Tapping White pan head screw - to attach bottom of new fascia to lower starter rail



1.5" x 2" Galv. steel upper attachment angle (If ordered)



1.5" x 4.5" White lower starter rail (If ordered)



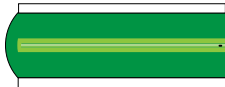
Straight Dimensional Fascia panels



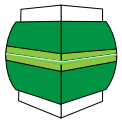
Straight Flat panels with bullnose decal applied (optional)



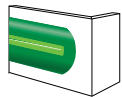
Tapered End Cap panels



Rounded End Cap panels



Front Corners



Rear Corners



Seam Plates



.75" Lt Green Washerhead screws



.75" Dark Green Washerhead screws



Green patching vinyl (2)

Materials Not Furnished:

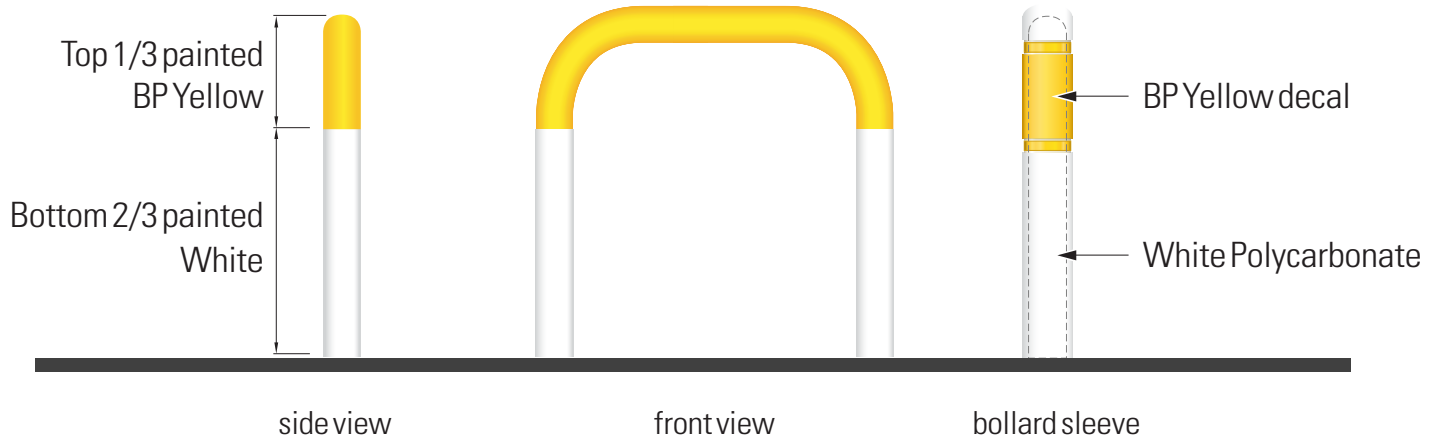


Hex head screws to attach the angle to existing fascia and to attach the seam plate to the existing fascia.



.040" or 20 gauge flashing material, caulk and fastners. To be used following a complete canopy fascia removal or a new build canopy.







Brick Specification

Part I

QUALITY ASSURANCE - Brick Tests

1. All tests shall be in accordance with ASTM C-67 latest edition

Submittals

1. Test reports shall include:
 - a) Compressive strength
 - b) 24-hour cold water absorption.
 - c) 5-hour boil absorption
 - d) Saturation Coefficient
 - e) Initial Rate of Absorption (I.R.A.)
 - f) Weather classification
2. Certificate of conformance shall state that brick meets or exceeds applicable ASTM specifications indicated herein.

Sample Panels

1. Sample panel size shall be 4'x4' showing the proposed color range, texture, bond, mortar, workmanship, cleaning, and water repellents where applicable.

Part II

Facing Bricks

1. All brick shown on contract documents shall be *color, texture* as manufactured by **General Shale, PO Box 3547, 3015 Bristol Highway, Johnson City, TN 37602-3547.**
2. ASTM C-216 latest edition, Grade SW, Type FBS or ASTM C-652 latest edition, Grade SW, Type HBS, Class H40V.
3. Dimensions $3\frac{1}{2}'' \times 2\frac{1}{4}'' \times 7\frac{5}{8}''$ (W x H x L)

Structural Bricks

1. All brick shown on contract documents shall be *color, texture* as manufactured by **General Shale, PO Box 3547, 3015 Bristol Highway, Johnson City, TN 37602-3547.**
2. ASTM C-652 latest edition, Grade SW, Type HBS, Class H40V.
3. Dimensions $5\frac{5}{8}'' \times 2\frac{3}{4}'' \times 11\frac{5}{8}''$ (W x H x L)

Shapes

1. Where special shapes are shown on architectural drawings, manufacturer shall provide shop drawings for architect's approval prior to manufacturing shapes.



Brick Specification - Continued

Mortar

Mortar shall be type consisting by proportion:

- ___ Part Portland cement (ASTM C-150 Type I or II)
- ___ Part hydrated lime (ASTM C-207)
- ___ Parts sand (ASTM C-144)

Grout

Grout shall conform to ASTM C-476 for fine grout mix. Slump shall be 10"

- a) Part Portland cement (ASTM C-150, Type I or II)
- b) 1/4 to 3 parts sand (ASTM C-404)

Part III

EXECUTION

- a) Bond - Bond shall be running bond unless otherwise shown on contract documents.
- b) Jointing - Mortar joints shall be concave and struck with a smooth steel tool.
- c) Construction - All construction strictly adheres to (ACI 530)
- d) Cleaning - Cleaning shall conform to Technical Bulletin 4: Section 4200, Brick Cleaning Recommendations and to BIA Technical Note #20-R. Contact manufacturer for recommendations.
- e) Water Repellent & Coatings - Where water repellents are specified consult Technical Bulletin 1: Section 1700, Water Repellent Coatings.

THERE'S A REVOLUTION IN PVC TRIM AND IT COMES IN PRE-FINISHED COLORS



EXTERIOR PVC

TRIM, MOULDING, SHEET, CORNER, BEAD BOARD



- Revolutionary Full Line in Pre-finished Color & Classic White PVC Trim
- Manufactured locally in the Northeast
- Custom profiles and colors available in job lots
- Patent-pending sealed edge

As the world's largest producer of free-foam PVC sheet, Jains has the manufacturing muscle to be the cost and quality leader in white PVC trim and sheet goods.

But beyond the standard plain vanilla, we offer the future of PVC trim and mouldings: over 1000 colors in a flawless exterior satin finish, available in project-specified quantities. Pre-finished Ex-Cel offers cost, durability and aesthetic advantages over field painting. Use it once, and you'll want to use it every time.

Brought to you by American Lumber, with distribution in 10 States in the Northeast and mid-Atlantic.

For more information, visit: americanlumberco.com/products/ExCel.aspx

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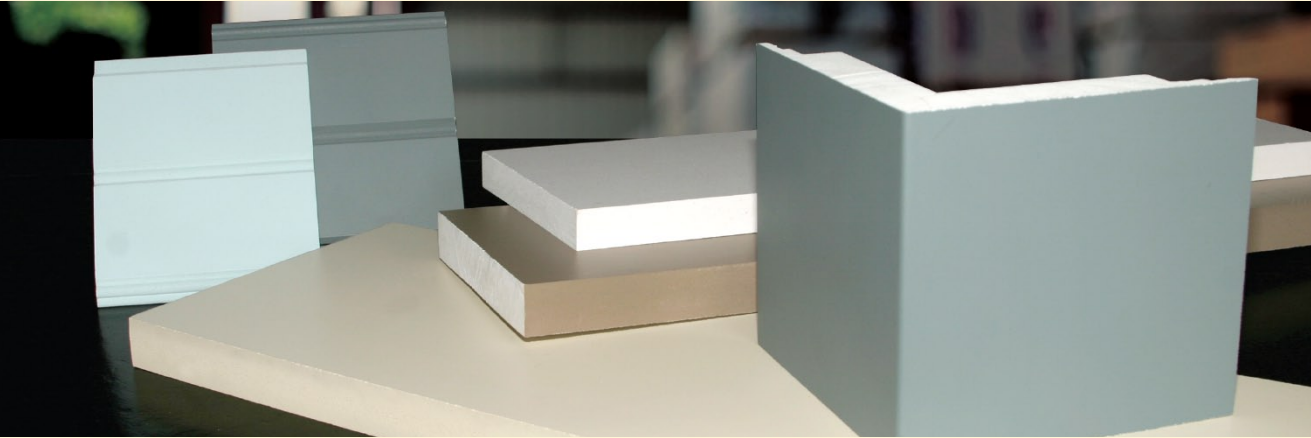
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OUR WAREHOUSE IS YOUR WAREHOUSE.™



EXTERIOR COLOR TRIM



Introducing pre-finished Ex-Cel® Exterior Trim, part of the most advanced PVC trim program available.



With Sherwin-Williams®, Ex-Cel has achieved the first-ever true satin finish for cellular PVC. From earth tones to historical hues, including the most popular fiber cement trim colors, Ex-Cel's sixteen standard colors and additional custom colors are unsurpassed in breadth and richness.

Coated or uncoated, smooth or woodgrain, standard or concealed butt joints... with a full line of trim, corners, beadboard, sheet and molding choices, Ex-Cel can meet all of your trim needs.

No other PVC trim line gives dealers the power and flexibility of Ex-Cel to seamlessly move from a bid-winning price to upselling truly value-added features.

PAINT PERFECTED

The durability of Ex-Cel color is achieved through a unique surface-bonding technology developed in conjunction with Sherwin-Williams. Solar-reflective Polane® is an extremely durable two-part polyurethane coating. It will not peel or crack and is nearly impossible to scratch. No field-applied finish can match the strength that you receive with Ex-Cel.

Ex-Cel's unique finish also protects the PVC core against UV exposure, so that it never warps or discolors in the sun. Ex-Cel is suited for all types of exterior applications including high moisture and ground level locations and carries a **lifetime warranty** on both the material and the finish.

Touch-up is easy. Ex-Cel offers touch-up paint, or just purchase matching Sherwin-Williams Duration® paint as needed.

EX-CEL = SMARTER BUTT JOINTS

In addition to classic trim profiles, the Ex-Cel Equation™ goes beyond standard concealing channels to include a Push-Lock insert, creating the hand-crafted look of a fitted butt joint.

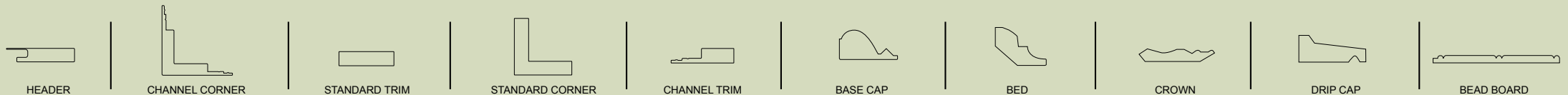
This allows Ex-Cel to be applied after the siding for faster installation and greater job efficiency, while handily concealing cuts and caulked ends.

AMERICAN LUMBER SERVICE

Our Warehouse Is Your Warehouse™...

American Lumber carries smooth trim board sizes in multiple colors as well as stocking a complete offering of traditional, uncoated white Ex-Cel.

Complete trim packages and job lots in other colors are available with a short lead time. Call for more information and pricing!



HardiePlank® Lap Siding Product Description

HardiePlank® lap siding is factory-primed fiber-cement lap siding available in a variety of styles and textures. Please see your local James Hardie® product dealer for product availability. HardiePlank lap siding comes in 3657mm (12 ft) lengths. Nominal widths from 133mm (5 ¼ in) to 305mm (12 in) create a range of exposures from 100mm (4 in) to 210mm (8 ¼ in).

HardiePlank lap siding is also available with ColorPlus® Technology as one of James Hardie's prefinished products. ColorPlus® Technology is a factory applied, oven-baked finish available on a variety of James Hardie siding and trim products. See your local dealer for details and availability of products, colors, and accessories.

The HZ5® product line is right at home in climates with freezing temperatures, seasonal temperature variations, snow and ice. HZ5® boards are the result of our generational evolution of our time-tested products. We've evolved our substrate composition to be specifically designed to perform in conditions found in these climates. To ensure that its beauty matches its durability, we've engineered the surface for higher performance, giving it superior paint adhesion and moisture resistance. In addition, we've added a drip edge to the HardiePlank® HZ5® lap siding product to provide improved water management in conditions specific to HZ5® climates.



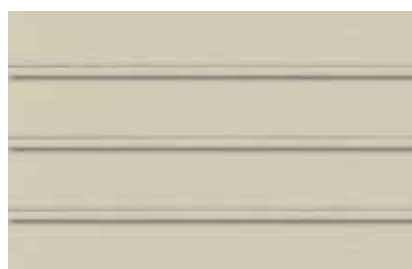
Cedarmill®



Smooth



Beaded Cedarmill®



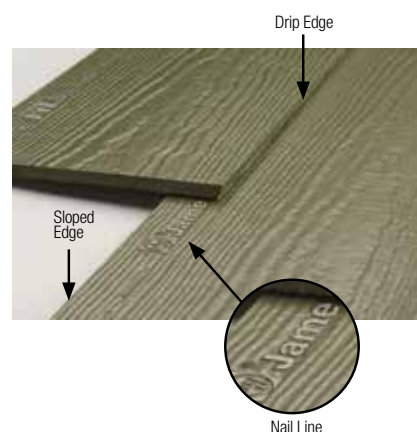
Beaded Smooth



Colonial Roughsawn



Colonial Smooth

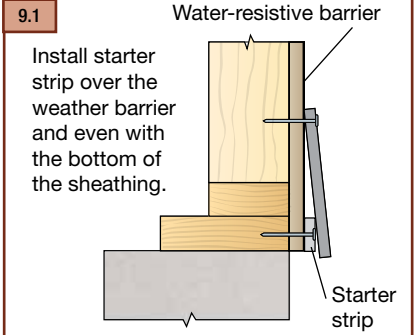


Installation of HardiePlank® Lap Siding

INSTALL A STARTER STRIP

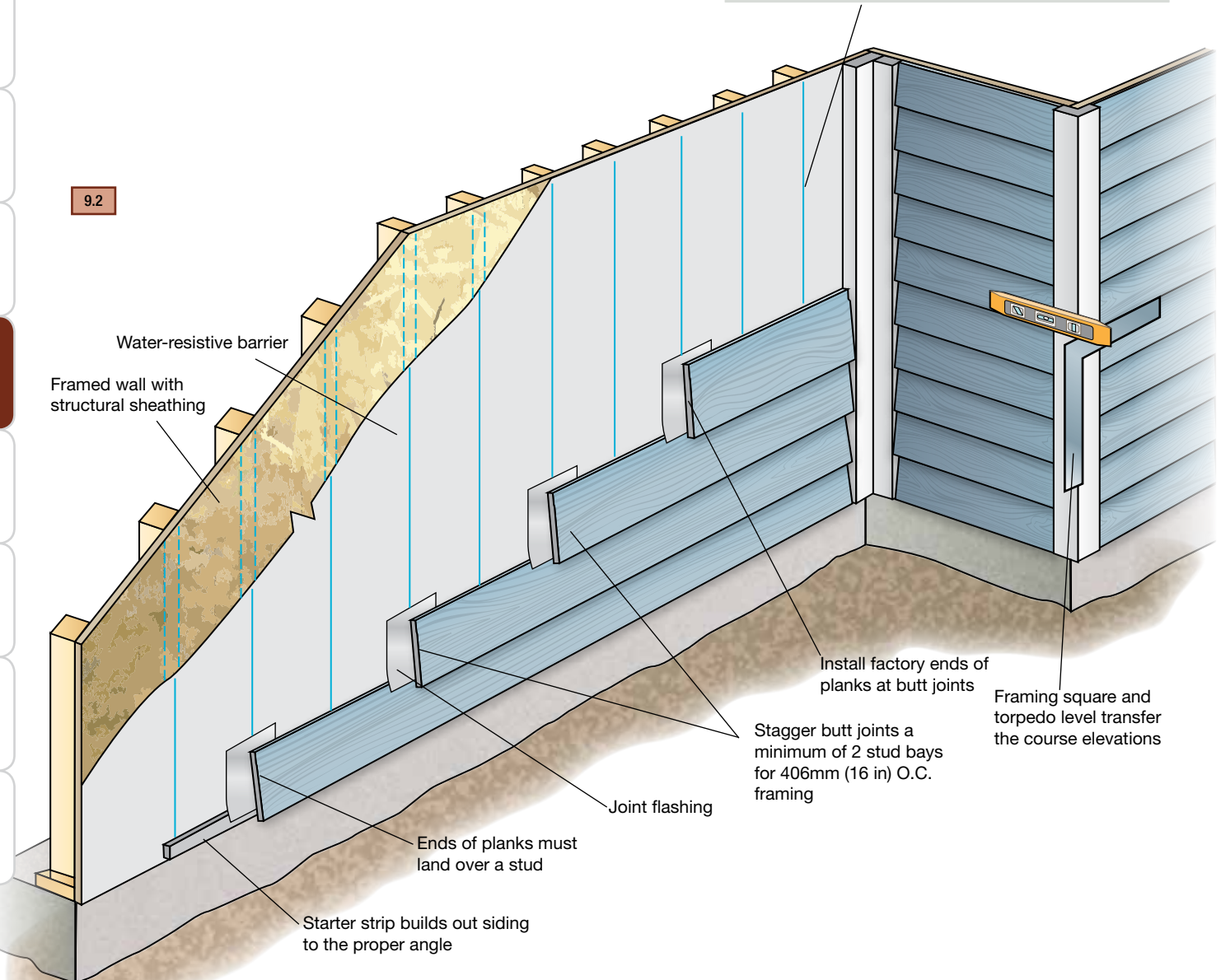
HardiePlank® lap siding requires a starter strip beneath the first course to set it on the proper angle and to create a proper drip edge at the bottom of the siding. Starter strips are easily made by ripping 32mm (1¼ in) pieces of HardiePlank siding from full or partial planks.

The bottom of the starter strip should be installed even with the bottom of the mudsill or the bottom edge of the sheathing. The strip must be installed over the water-resistive barrier, but occasional gaps should be left in the starter strip to allow any accumulated moisture behind the siding to drain away safely.



OVERVIEW OF HARDIEPLANK LAP SIDING

TIP: For accurate fastening, snap vertical chalk lines on the water-resistive barrier at the center of every stud location.

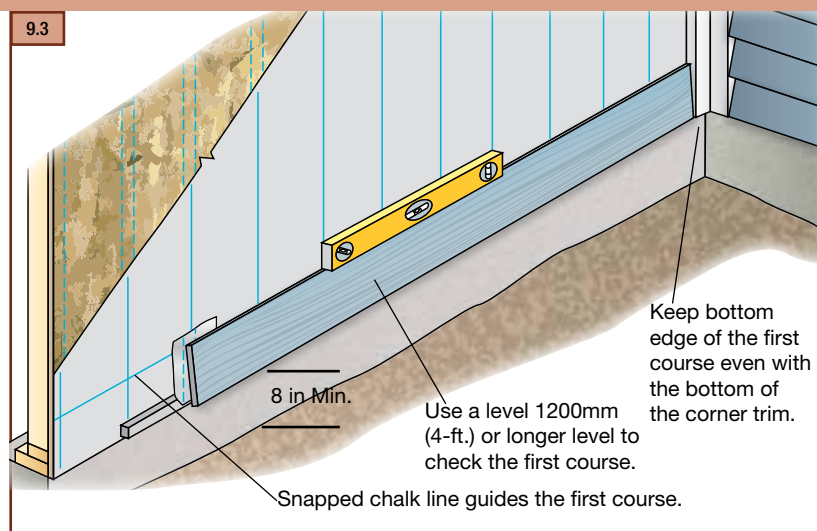


INSTALLING THE PLANKS

The first course of HardiePlank® siding is critical to the proper installation of the plank on the rest of the building. The first course should start at the lowest point of the house and within required clearances. Special attention should be made to ensure that it's straight and level. Attention should also be paid to staggering any butt joints in the planks so that the installation is attractive while making efficient use of material.

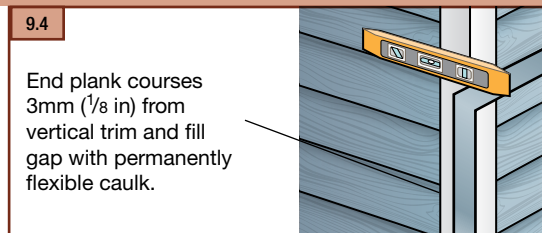
- 1) Use a level (1219 mm (4 ft) or longer) or chalked level line to be sure that the first course is level. As installation proceeds up the wall, periodically check the level and straightness of the courses. When correcting for flatness over products such as exterior insulation, use drywall shims. It is good practice to snap a chalk line every 3 to 5 courses to keep the planks straight and level.
- 2) Position the bottom edge of the first course of siding a minimum 6 mm (¼ in) below the edge of the starter strip (maintain required clearances) and secure.
- 3) Run the siding to the HardieTrim® board leaving a 3mm (⅛ in) gap between the siding and trim.

The bottom of the siding should be kept even with the bottom of the trim, or if desired, the trim may extend below the bottom of the siding. But the siding should never hang below the trim. ***When installing the first course make sure ground clearances are in accordance with James Hardie requirements and those of local codes.**



PLANK ALIGNMENT AT CORNERS

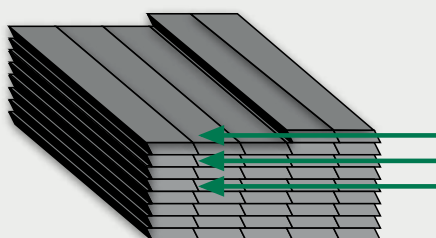
For the best looking installation, make sure that the heights of the plank courses match on both sides of a corner. Use a framing square, speed square or a level to match up the plank heights. Check every few courses to make sure proper heights are being maintained.



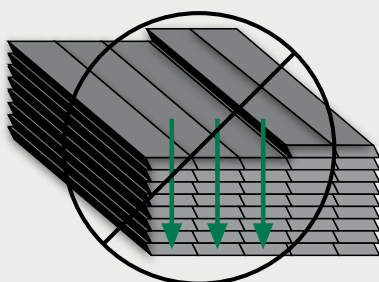
HANDLING

IMPORTANT: To prevent damage to the drip edge, extra care should be taken when removing planks from the pallet, while handling, and when installing with a lap gauge. Planks are interlocked together on the pallet, therefore they should be removed from the pallet horizontally (side to side) to allow planks to unlock themselves from one another.

Pull from across the stack



Do not go down the stack



TIP: When taking planks from the pallet installation, avoid repeating the texture pattern by working across the pallet. Two to four planks can be removed from a stack at one time. But then material should be taken from adjacent stacks, again working across the pallet. Texture repeat is typically a concern on large walls with few breaks, such as windows or doors.

Installation of HardiePlank® Lap Siding (continued)

BLIND NAILING (nailing through top of plank)


Blind nailing is recommended for installing any type of HardiePlank® lap siding including ColorPlus® siding. With blind nailing, each course covers the fasteners on the course below, which provides a better looking installation.

For blind nailing HardiePlank lap siding, James Hardie recommends driving fasteners 25 mm (1 in) from the top edge of the plank. Additionally fasteners should be placed no closer than 9.5 mm ($\frac{3}{8}$ in) from the ends of the plank.

9.5 Blind nailing measurements

Nails for blind nailing shall be between 19 mm ($\frac{3}{4}$ in) and 25 mm (1 in) from the top of the board.

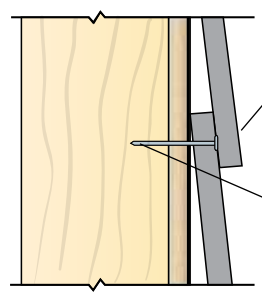
Keep nails 9.5mm ($\frac{3}{8}$ in) from ends of boards.



9.6 Blind nailing

Fasteners are hidden by the course above.

Nails are driven through the sheathing into the studs.



HardiePlank® HZ5® lap siding is manufactured with a nail line that should be used as a guide for proper nail placement when blind nailing. This nail line should not be used as a lap line.

Avoid placing fasteners near the top edge of the plank. This practice, called “high nailing”, may lead to loose planks, unwanted gaps or rattling. **Pinning of butt joints with a finish nail may be done for aesthetic purposes only. The finish nail should be nailed flush to the surface (not countersunk), must be fully corrosion resistant (e.g. galvanized or stainless) and does not provide any structural support.**

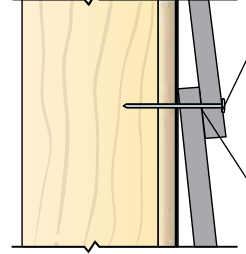
FACE NAILING (nailing through the overlap at the bottom of the plank)

Although blind nailing is recommended by James Hardie, face nailing may be required for certain installations including: installations in high wind areas, fastening into OSB or equivalent sheathing without penetrating a stud, or when dictated by specific building codes. Refer to Appendix D for related code matters.

9.7 Face nailing

Exposed fasteners are driven through the face of the boards.

Drive fasteners only where planks overlap



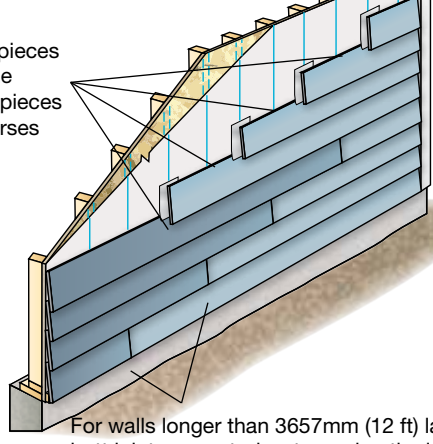
STAGGERING THE BUTT JOINTS

For walls longer than 3657mm (12 ft) it is necessary to butt joint additional lengths of HardiePlank siding. These butt joints should be staggered to avoid noticeable patterns, which is determined by the placement of the first course. Butt joints between consecutive courses should be spaced apart by at least two stud bays for 406mm (16 in), o.c. framing or one bay for 610mm (24 in) o.c. framing.

While random placement of the planks is usually the most aesthetically pleasing, a progressive stagger pattern can make the job easier and faster without the pattern becoming too noticeable. With this strategy, the cut off piece for one course becomes the starter piece for a course above, making efficient use of materials and ensuring that all butt joints land on studs. The pattern can be modified for different stud placement.

9.8

Cutoff pieces form the starter pieces for courses above.



For walls longer than 3657mm (12 ft) land butt joints over studs, staggering the joints at least 610mm (24 in) (for 610mm (24 in) o.c. framing or 813mm (32 in) (two stud bays for 406mm (16 in) o.c. framing).

JOINT FLASHING

One or more of the following joint treatment options are required by code (as referenced 2009 IRC R703.3.2)

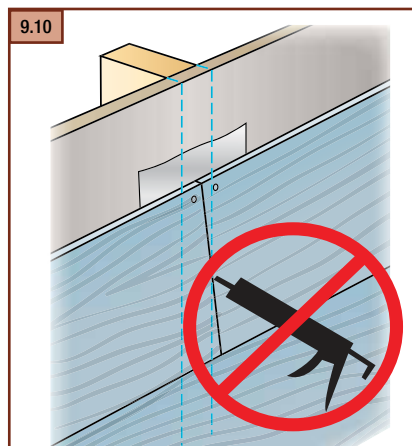
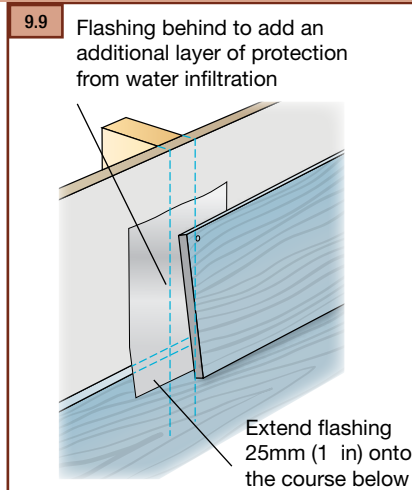
- A. Joint Flashing (James Hardie recommended)
- B. Caulking* (Caulking is not recommended for ColorPlus for aesthetic reasons as the caulking and ColorPlus will weather differently. For the same reason, do not caulk nail heads on ColorPlus products.)
- C. "H" jointer cover

Flashing behind butt joints provides an extra level of protection against the entry of water at the joint. James Hardie recommends 152mm (6 in) wide flashing that overlaps the course below by 25mm (1 in). Some local building codes may require different size flashing.

Joint-flashing material must be durable, waterproof materials that do not react with cement products. Examples of suitable material include finished coil stock and code compliant water-resistive barriers. Other products may also be suitable.

TIP: Joint flashing can be quickly and easily made by cutting a 6-in wide section off a roll of housewrap. Tape the roll tightly at the cut mark and cut the section off using a miter saw with a carbide blade. Individual sheets then can be cut to length with a utility knife.

TIP: Use light-colored joint flashing when using light-colored ColorPlus lap siding or other siding with a light-colored finish. Dark-color joint flashings should be used on siding with dark finishes.

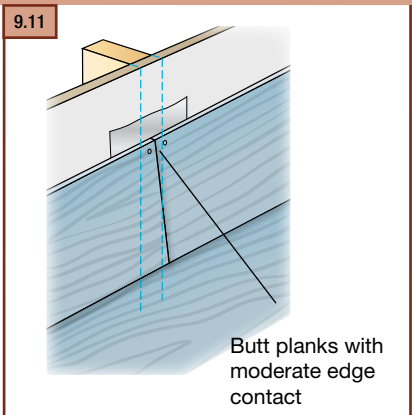


Caulking at HardiePlank lap siding butt joints is not recommended for ColorPlus for aesthetic reasons as the caulking and ColorPlus will weather differently. For the same reason, do not caulk exposed nail heads. Refer to the ColorPlus touch-up section for details

JOINT PLACEMENT AND TREATMENT

Butt joints in HardiePlank lap siding should always land on a stud. Butt joints between studs are not recommended and should be avoided. Whenever possible, factory-finished ends should be used at butt joints.

Place cut ends where the siding meets a corner, door, window trim, or other break in the wall where the joint is to be caulked. If cut ends are used in a butt joint between planks, James Hardie requires sealing cut ends for all products. For ColorPlus products, use the color-matched edge coater to seal the cut end.



COLORPLUS® TIP: When installing HardiePlank lap siding with ColorPlus Technology, position the plank in the immediate area where the plank is to be fastened. Do not place the plank on the course below and slide into position. Doing so may scuff or scratch the ColorPlus finish on the installed piece.

Installation of HardiePlank® Lap Siding (continued)

CONTINUING JOINT PLACEMENT AND TREATMENT

Once the initial course of HardiePlank® siding is fastened to the wall, continue installing successive courses with full 3657 mm (12 ft) pieces (follow the stagger pattern for longer walls), or until a window, door or other opening interrupts the course (fig 9.12). Notch planks as needed to fit around windows and doors. Again, be sure to seal all cut edges. Avoid placing butt joints directly above or below windows or above doors. Separate the joint from the opening by at least one course of siding.

Where butt joints land on a stud, make sure there is enough stud space for plank on both sides of the joint to land properly. Optimally both sides of a butt joint should land in the middle of a stud with 19mm ($\frac{3}{4}$ in) landing space for each side. The minimum stud space for a plank to land is 10mm ($\frac{3}{8}$ in).

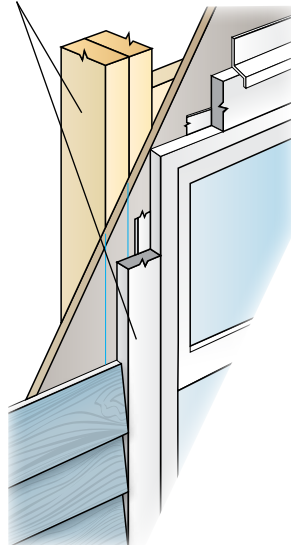
Pay special attention to windows, doors, and corners that have been trimmed before the siding goes on. Vertical trim boards may cover the king

studs beside windows or doors, or they may cover up corner studs leaving no room for nailing the siding. In these places add extra studs as needed.

If corners are trimmed with 5/4, 4/4 HardieTrim® boards, it may be necessary to measure and cut the first pieces of siding to make sure the butt joints land on studs.

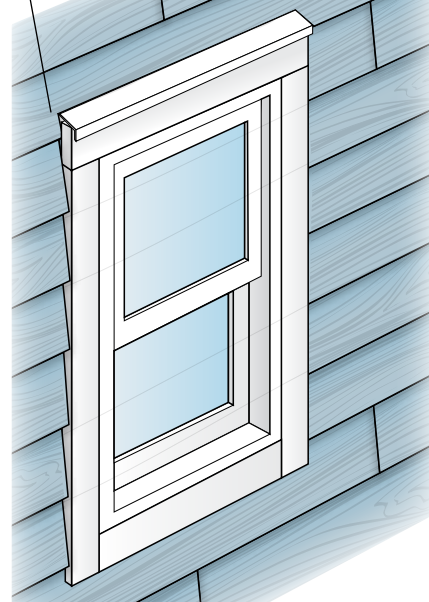
9.12 Planking around windows

Add an extra stud if necessary for nailing the ends of the planks.



Notch plank around window trim and flashing.

Keep butt joints more than one course away from top of window.



COLORPLUS TIP: HardiePlank lap siding with ColorPlus Technology is shipped with a protective laminate slip sheet, which should be left in place during cutting and fastening to reduce marring and scratching. The sheet should be removed immediately after each plank is installed.



INSTALLING HARDIEPLANK® SIDING ON GABLE WALLS

Siding gable walls can be challenging, and some of the keys to siding gable walls efficiently are determining the angle or pitch of the roof, properly staging materials, and ensuring that the plank lengths are measured accurately.

To estimate the amount of siding needed to complete a gable end, use the estimating tools located in Appendix B.

Stage enough material on the pump jacks or scaffolding to complete the gable end, but take care not to overload the staging. When possible, a cut table should be located on the pump jacks or scaffolding, which frees up crew members to work on other walls.

To cut planks for the gable:

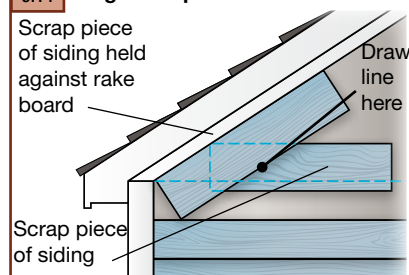
- 1) Tack up a small scrap piece of siding where the first gable course is going.
- 2) Hold a second small piece of siding against the eave or rake board.
- 3) Trace the angle onto the scrap.
- 4) Cut that line and label the scrap as the template for the gable angle. The template can then be used to transfer the angle onto the larger pieces for cutting and installation.
- 5) Periodically check the angle as you progress up the wall.

The quickest way to measure and cut consecutive courses of siding for a gable is to work off the previous piece.

- 1) Cut and fit the lowest course of siding.
- 2) Before installing, lay it flat and measure down 32 mm (1¼ in) from the top edge of the plank for the course overlap. Make a mark on both ends.
- 3) Set a piece of uncut siding on top of the first piece, aligning the bottom edge with the overlap marks. Transfer the length directly to the uncut piece.
- 4) Draw the gable angle with the template, cut the angle and then repeat the process for the next course.

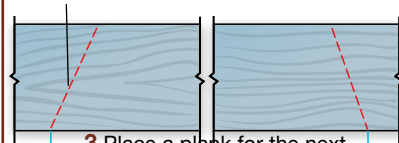
TIP: Stainless steel fasteners are recommended when installing James Hardie® products.

9.14 Angle Template



9.13 Tip for fast gable installation

- 4 Draw the angle, cut and repeat the process for the next course.



- 3 Place a plank for the next piece on the overlap lines and mark the length.
- 2 Before installing, measure down the 32mm (1¼ in) overlap at the top of the board.
- 1 Measure, cut and fit lowest gable plank using gable angle template.

HARDIEPLANK® SIDING FASTENER SPECIFICATIONS

The Fastener Specifications table shows fastener options for a variety of different nailing substrates. Please refer to the applicable to wind load tables.

Fastener Substrate		Approved Fastener		Fastener Type	
wood studs	blind nail	406mm (16 in) o.c.	3 9	2	3mm x 6.8mm 50.8mm (0.118 in x 0.267 in x 2 in) — 6d
		610mm (24 in) o.c.		3	2.3mm x 5.6mm x 50.8mm (0.089 in x 0.221 in x 2 in) siding nail
	face nail	406mm (16 in) o.c.	2 3	9	3.1mm x 9.4mm x 31.8mm ([11 GA] 0.121 x 0.371 in x 1.25 in) roofing nail
		610mm (24 in) o.c.	3	7	Ribbed Bugle-Head No. 8 8.2mm x 41.3mm (0.323 in x 1.625 in) screws
steel studs*	blind nail	406mm (16 in) o.c.	8 13	8	Ribbed Wafer-Head No. 8 9.5mm x 31.8mm (0.375 in x 1.25 in)
		610mm (24 in) o.c.		12	2.5mm x 6.4mm x 38.1mm [AKN-100] (0.100 in x 0.25 in x 1.5 in) ET&F
	face nail	406mm (16 in) o.c.	7 12	13	2.5mm x 8mm x 38.1mm [AGS-100] (0.100 in x 0.313 in x 1.5 in)
		610mm (24 in) o.c.		14	2.5mm x 8mm x 38.1mm [ASTM C-90] ASM-144-125 (P/C) masonry nail
				15	9.5mm x 41.3mm Ribbed Wafer-Head No. 8 (0.375 in x 1.625 in) screw
				16	3mm x 9.4mm x 44.5mm [11 GA] (0.121 x 0.371 in x 1.75 in) roofing nail
Direct to Masonry			14	4	2.3mm x 5.6mm x 38.1mm (0.091 in x 0.221 in x 1.5 in) siding nail
11.1mm (7/16 in) OSB or equivalent (blind nailed)			15 16		
11.1mm (7/16 in) OSB or equivalent (face nailed)			4		

*When blind fastening 241mm (9.5 in) or wider product onto steel studs, use screws.

● indicates recommended fasteners

Installation of HardiePlank® Lap Siding (continued)

RAIN SCREENS

The Optional Use of Rain Screen Systems:

James Hardie will support the use of its exterior siding products with rainscreen systems, but does not take sole responsibility for the entire wall assembly or system. James Hardie expects the designer or builder using our components as part of the rainscreen system to:

- Adhere to all the installation requirements listed in the relevant product installation instructions.
- Provide adequate details for water management.
- Make the decision about the use of rainscreen.
- Understand the interaction between system components and how each of the components in the system interacts.
- Design the building envelope to account for both interior and exterior moisture control.

Installation Over Furring:

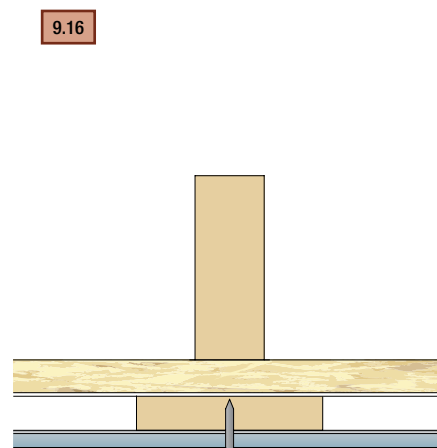
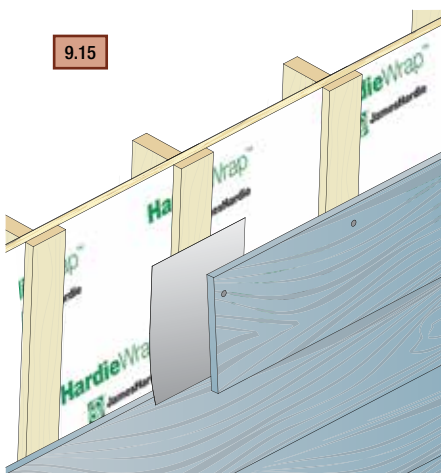
When reviewing the following details for attaching to wood furring or framing, an important consideration is that the fastener chosen must be fully encompassed by a wood substrate - the furring may count as all or part of the necessary penetration if it has been proven that the furring and/or wood substrate has the same or better holding power as a timber stud.

Design responsibility

In all cases it is the sole responsibility of the architect, envelope engineer or specifier to identify moisture related risks associated with any particular building design and to make any appropriate adjustments or modifications to the installation guidelines given by manufacturers. Wall construction and design must effectively manage moisture, considering both the interior and exterior environment of the building.

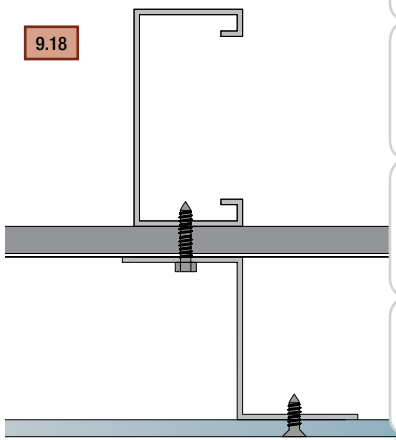
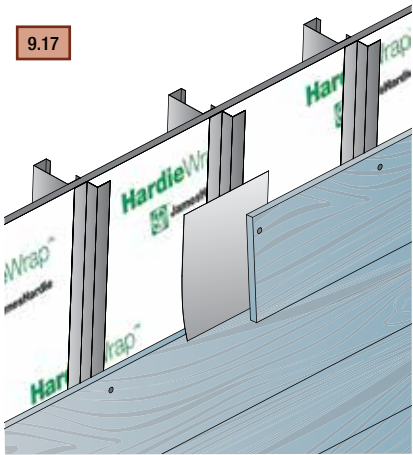
Attaching lap siding to wood furring:

When attaching lap siding products over wood furring, the typical fastener used is the 32mm (1 ¼ in) long No. 11 ga. roofing nail, blind nailed. This fastener is going to be the shortest fastener approved for fastening lap siding products, therefore the furring must be a minimum of 19mm (0.75 in) thick to achieve the same values as CCMC states for the 11 ga. 32mm (1 ¼ in) roofing nail given plank reveal, stud spacing, building height and exposure category.



Attaching lap siding to steel furring:

When attaching lap siding products to metal furring, the steel furring must be a minimum 20 gauge steel. A fastener should be chosen out of the CCMC, which is approved for attaching to steel framing. Two general rules that should be considered when choosing a fastener is that a nail (pin) must penetrate steel furring 6mm (1/4 in), and screws must penetrate steel furring 3 full threads. Therefore, if the rules for steel fastening are followed – given plank reveal, stud spacing, building height, and exposure category – the values are the same as CCMC states for the chosen fastener.



General Product Information	Working Safety	Tools for Cutting and Fastening	General Installation Requirements	General Fastener Requirements	Finishing and Maintenance	HardieTrim® Boards/Battens	HardieSoft® Panels	HardiePlank® Lap Siding	HardieShingle® Siding	HardiePanel® Vertical Siding	Appendix/ Glossary	CCMC Report
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HardiePlank® **HL5** Lap Siding

INSTALLATION REQUIREMENTS - PRIMED & COLORPLUS® PRODUCTS



James Hardie

EFFECTIVE FEBRUARY 2014



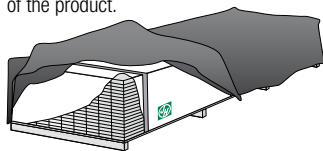
Visit www.jameshardie.com for the most recent version.

SELECT CEDARMILL® • SMOOTH • BEADED CEDARMILL®

IMPORTANT: FAILURE TO INSTALL AND FINISH THIS PRODUCT IN ACCORDANCE WITH APPLICABLE BUILDING CODES AND JAMES HARDIE WRITTEN APPLICATION INSTRUCTIONS MAY LEAD TO PERSONAL INJURY, AFFECT SYSTEM PERFORMANCE, VIOLATE LOCAL BUILDING CODES, AND VOID THE PRODUCT ONLY WARRANTY. BEFORE INSTALLATION, CONFIRM THAT YOU ARE USING THE CORRECT HARDIEZONE INSTRUCTIONS. TO DETERMINE WHICH HARDIEZONE APPLIES TO YOUR LOCATION, VISIT WWW.HARDIEZONE.COM OR CALL 1-866-942-7343 (866 9HARDIE)

STORAGE & HANDLING:

Store flat and keep dry and covered prior to installation. Installing siding wet or saturated may result in shrinkage at butt joints. Carry planks on edge. Protect edges and corners from breakage. James Hardie is not responsible for damage caused by improper storage and handling of the product.



CUTTING INSTRUCTIONS

OUTDOORS

1. Position cutting station so that wind will blow dust away from user and others in working area.
2. Use one of the following methods:
 - a. Best: i. Shears (manual, electric or pneumatic)
 - b. Better: i. Dust reducing circular saw equipped with a HardieBlade® saw blade and HEPA vacuum extraction
 - c. Good: i. Dust reducing circular saw with a HardieBlade saw blade (only use for low to moderate cutting)

INDOORS

1. Cut only using shears (manual, electric or pneumatic).
 2. Position cutting station in well-ventilated area
- NEVER use a power saw indoors
 - NEVER use a circular saw blade that does not carry the HardieBlade saw blade trademark
 - NEVER dry sweep – Use wet suppression or HEPA Vacuum

Important Note: For maximum protection (lowest respirable dust production), James Hardie recommends always using "Best"-level cutting methods where feasible.

NIOSH-approved respirators can be used in conjunction with above cutting practices to further reduce dust exposures. Additional exposure information is available at www.jameshardie.com to help you determine the most appropriate cutting method for your job requirements. If concern still exists about exposure levels or you do not comply with the above practices, you should always consult a qualified industrial hygienist or contact James Hardie for further information.

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IMPORTANT: To prevent damage to the drip edge, extra care should be taken when removing planks from the pallet, while handling, and when installing with a lap gauge. Please see additional handling requirements on page 4.

GENERAL REQUIREMENTS:

- References to the 2005 National Building Code (NBC) of Canada are made throughout this document. Local building code requirements may supersede the NBC in some locations.
- Where local building code requires a capillary break (Rainscreens, Furring, Etc.), fastener specifications per the CCMC can still be used as long as the required fastener penetration is achieved into an approved nailable substrate.
- HardiePlank® lap siding can be installed over braced wood or steel studs spaced a maximum of 610mm (24") o.c. or directly to minimum 11.1mm (7/16") thick OSB sheathing*. See general fastening requirements. Irregularities in framing and sheathing can mirror through the finished application. HardiePlank lap siding can also be installed over furring strips (in accordance with local building code requirements).
- HardiePlank lap siding can also be installed over foam insulation/sheathing up to 25mm (1") thick. When using foam insulation/sheathing, avoid over-driving nails (fasteners), which can result in dimpling of the siding due to the compressible nature of the foam insulation/sheathing. Extra caution is necessary if power-driven nails (fasteners) are used for attaching siding over foam insulation/sheathing.
- A water-resistive barrier is required in accordance with Part 9.27.3.2 of the NBC. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with Part 9.27.3 of the NBC. **James Hardie will assume no responsibility for water infiltration.**
- When installing James Hardie products all clearance details in figs. 3-14 must be followed.
- Adjacent finished grade must slope away from the building in accordance with local building codes.
- Do not use HardiePlank® lap siding in Fascia or Trim applications.
- Do not install James Hardie products, such that they may remain in contact with standing water.
- HardiePlank lap siding may be installed on flat vertical wall applications only.
- DO NOT use stain, oil/alkyd base paint, or powder coating on James Hardie® Products.
- For larger projects, including commercial and multi-family projects, where the span of the wall is significant in length, the designer and/or architect should take into consideration the coefficient of thermal expansion and moisture movement of the product in their design. These values can be found in the Technical Bulletin "Expansion Characteristics of James Hardie® Siding Products" at www.JamesHardie.com.

INSTALLATION: JOINT TREATMENT

One or more of the following joint treatment options are required by code (as referenced 2009 IRC R703.3.2)

- A. Joint Flashing (James Hardie recommended)
- B. Caulking* (Caulking is not recommended for ColorPlus for aesthetic reasons as the Caulking and ColorPlus will weather differently. For the same reason, do not caulk nail heads on ColorPlus products.)
- C. "H" jointer cover

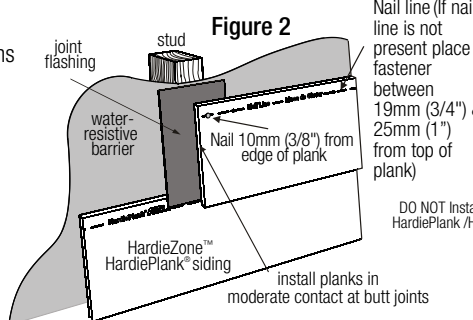
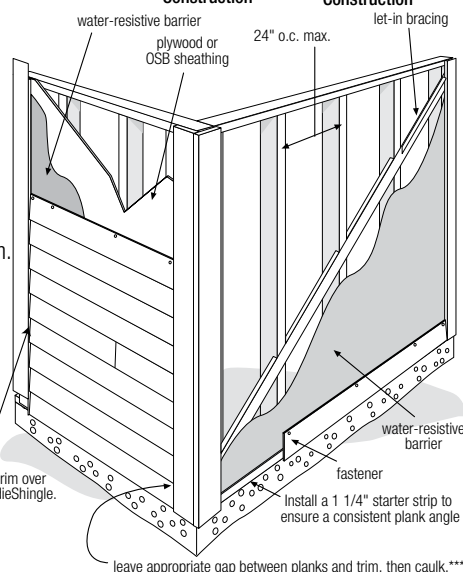


Figure 2

Figure 1 Double Wall Construction Single Wall Construction



Note: Field painting over caulking may produce a sheen difference when compared to the field painted PrimePlus. *Refer to Caulking section in these instructions.

WARNING: AVOID BREATHING SILICA DUST

James Hardie® products contain respirable crystalline silica, which is known to the State of California to cause cancer and is considered by IARC and NIOSH to be a cause of cancer from some occupational sources. Breathing excessive amounts of respirable silica dust can also cause a disabling and potentially fatal lung disease called silicosis, and has been linked with other diseases. Some studies suggest smoking may increase these risks. During installation or handling: (1) work in outdoor areas with ample ventilation; (2) use fiber cement shears for cutting or, where not feasible, use a HardieBlade® saw blade and dust-reducing circular saw attached to a HEPA vacuum; (3) warn others in the immediate area; (4) wear a properly-fitted, NIOSH-approved dust mask or respirator (e.g. N-95) in accordance with applicable government regulations and manufacturer instructions to further limit respirable silica exposures. During clean-up, use HEPA vacuums or wet cleanup methods - never dry sweep. For further information, refer to our installation instructions and Material Safety Data Sheet available at www.jameshardie.com or by calling 1-800-9HARDIE (1-800-942-7343). FAILURE TO ADHERE TO OUR WARNINGS, MSDS, AND INSTALLATION INSTRUCTIONS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.

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CLEARANCE AND FLASHING REQUIREMENTS

Figure 3
Roof to Wall

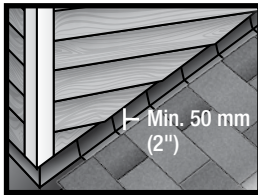


Figure 4
Horizontal Flashing

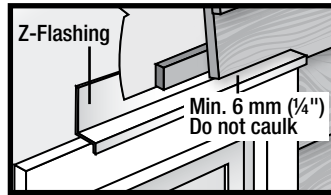


Figure 5
Kickout Flashing

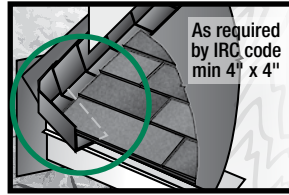


Figure 6
Slabs, Path, Steps to Siding

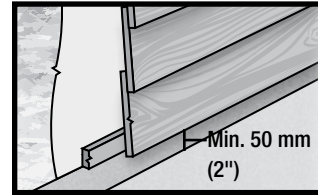


Figure 7
Deck to Wall

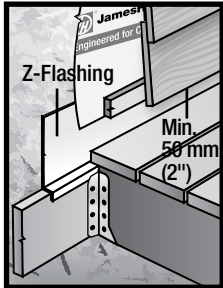


Figure 8
Ground to Siding

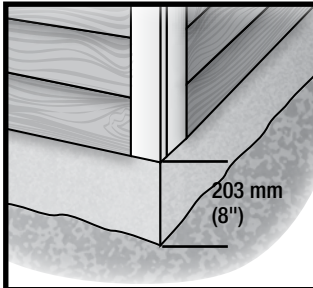


Figure 9
Gutter to Siding

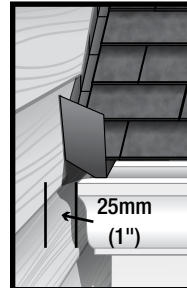


Figure 10
Sheltered Areas

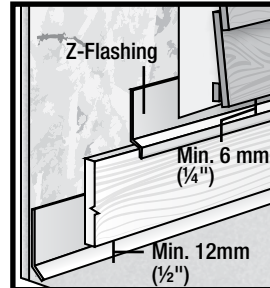


Figure 11
Mortar/Masonry

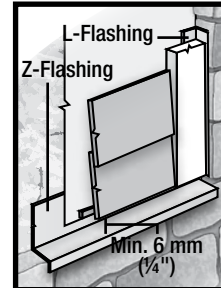


Figure 12
Drip Edge

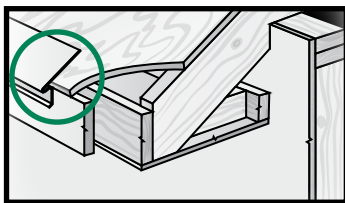


Figure 13
Block Penetration

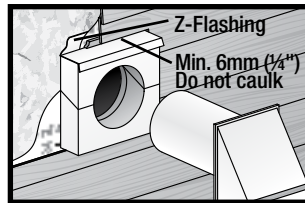
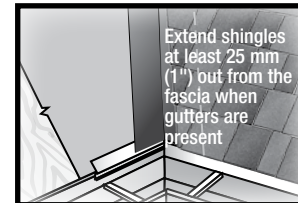


Figure 14
Valley/Shingle Extension



FASTENER REQUIREMENTS**

Blind Nailing is the preferred method of installation for HardiePlank® lap siding products. Face nailing should only be used where required by code for high wind areas and must not be used in conjunction with Blind nailing (Please see JH Tech bulletin 17 for exemption when doing a repair). **For Fastening schedule refer to Wind Load Table on page 4 of this document. Pin-backed corners may be done for aesthetic purposes only. Pin-backs shall be done w/finish nails only, and are not a substitute for blind or face nailing.**

BLIND NAILING

Corrosion Resistant Nails (galvanized or stainless steel)

- Roofing nail (3 mm shank x 9.5 mm HD x 32 mm (1 1/4") long)
- Minimum Requirement: Siding nail (2.4 mm shank x 5.6 mm HD x 50 mm (2") long)

Corrosion Resistant Screws

- Ribbed wafer-head or equivalent (No. 8 x 9.5 mm HD x 32 mm (1 1/4") long). Screws must penetrate 6 mm or 3 full threads into metal framing.

Corrosion Resistant Fasteners

ET & F Panelfast (2.5mm shank x 8mm HD x 38mm (1 1/2") long)

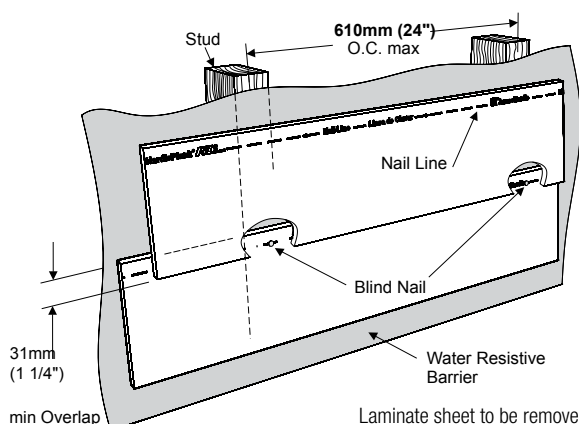
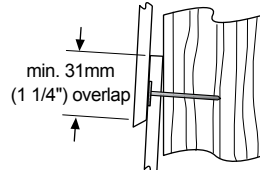


Figure 15

Minimum overlap
for Both Face
and Blind Nailing



FACE NAILING

Corrosion Resistant Nails (galvanized or stainless steel)

- 6d common nail (2.9 mm shank x 6.7 mm HD x 50 mm (2") long)
- Siding nail (2.3 mm shank x 5.6 mm HD x 50 mm (2") long)
- Siding nail (2.3 mm shank x 5.6 mm HD x 38 mm (1 1/2") long)*

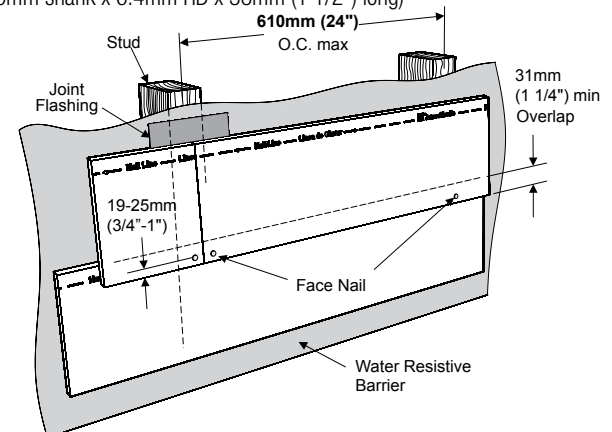
Corrosion Resistant Screws

Ribbed bugle-head or equivalent (No. 8-18 x 8.2 mm HD x 41 mm (1 5/8") long). Screws must penetrate 6 mm or 3 threads into metal framing.

Corrosion Resistant Fasteners

ET & F pin (2.5mm shank x 6.4mm HD x 38mm (1 1/2") long)

Figure 16



Laminate sheet to be removed immediately after installation of each course for ColorPlus® products.

* When face nailing to OSB, planks must be no greater than 8 1/4" wide and fasteners must be 305mm (12") o.c. or less. ** Also see General Fastening Requirements.

GENERAL FASTENING REQUIREMENTS

Fasteners must be corrosion resistant, galvanized, or stainless steel. Electro-galvanized are acceptable but may exhibit premature corrosion. James Hardie recommends the use of quality, hot-dipped galvanized nails. James Hardie is not responsible for the corrosion resistance of fasteners. Stainless steel fasteners are recommended when installing James Hardie® products near the ocean, large bodies of water, or in very humid climates.

Manufacturers of ACQ and CA preservative-treated wood recommend spacer materials or other physical barriers to prevent direct contact of ACQ or CA preservative-treated wood and aluminum products. Fasteners used to attach HardieTrim Tabs to preservative-treated wood shall be of hot dipped zinc-coated galvanized steel or stainless steel and in accordance to 2009 IRC R317.3 or 2009 IBC 2304.9.5

PNEUMATIC FASTENING

James Hardie products can be hand nailed or fastened with a pneumatic tool. Pneumatic fastening is highly recommended. Set air pressure so that the fastener is driven snug with the surface of the siding. A flush mount attachment on the pneumatic tool is recommended. This will help control the depth the nail is driven. If setting the nail depth proves difficult, choose a setting that under drives the nail. (Drive under driven nails snug with a smooth faced hammer - Does not apply for installation to steel framing).

CAULKING

For best results use an Elastomeric Joint Sealant complying with ASTM C920 Grade NS, Class 25 or higher or a Latex Joint Sealant complying with ASTM C834. Caulking/Sealant must be applied in accordance with the caulking/sealant manufacturer's written instructions. **Note: OSI Quad as well as some other caulking manufacturers do not allow tooling. DO NOT caulk nail heads when using ColorPlus products, refer to the ColorPlus touch-up section.**

COLORPLUS® TECHNOLOGY CAULKING, TOUCH-UP & LAMINATE

- Care should be taken when handling and cutting James Hardie® ColorPlus products. During installation use a wet soft cloth or soft brush to gently wipe off any residue or construction dust left on the product, then rinse with a garden hose.
- Touch up nicks, scrapes and nail heads using the ColorPlus® Technology touch-up applicator. Touch-up should be used sparingly. If large areas require touch-up, replace the damaged area with new HardiePlank® lap siding with ColorPlus Technology.
- Laminate sheet must be removed immediately after installation of each course.
- Terminate non-factory cut edges into trim where possible, and caulk. Color matched caulks are available from your ColorPlus® product dealer.
- Treat all other non-factory cut edges using the ColorPlus Technology edge coat, available from your ColorPlus product dealer.

Note: James Hardie does not warrant the usage of third party touch-up or paints used as touch-up on James Hardie ColorPlus products.

Problems with appearance or performance arising from use of third party touch-up paints or paints used as touch-up that are not James Hardie touch-up, will not be covered under the James Hardie ColorPlus Limited Finish Warranty.

PAINTING JAMES HARDIE® SIDING AND TRIM PRODUCTS WITH COLORPLUS® TECHNOLOGY

When repainting ColorPlus products, James Hardie recommends the following regarding surface preparation and topcoat application:

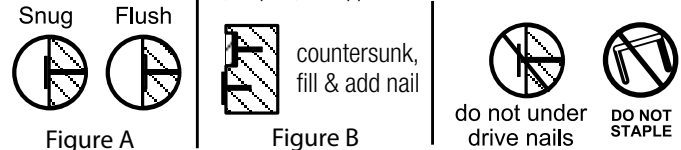
- Ensure the surface is clean, dry, and free of any dust, dirt, or mildew
- Repriming is normally not necessary
- 100% acrylic topcoats are recommended
- DO NOT use stain or oil/alkyd base paints on James Hardie® products
- Apply finish coat in accordance with paint manufacturers written instructions regarding coverage, application methods, and application temperature

- Consult applicable code compliance report for correct fasteners type and placement to achieve specified design wind loads.
- NOTE: Published wind loads may not be applicable to all areas where Local Building Codes have specific jurisdiction. Consult James Hardie Technical Services if you are unsure of applicable compliance documentation.

- Drive fasteners perpendicular to siding and framing.
- Fastener heads should fit snug against siding (no air space). (fig. A)
- Do not over-drive nail heads or drive nails at an angle.
- If nail is countersunk, fill nail hole and add a nail. (fig. B)
- For wood framing, under driven nails should be hit flush to the plank with a hammer (For steel framing, remove and replace nail).

NOTE: Whenever a structural member is present, HardiePlank should be fastened with even spacing to the structural member. The tables allowing direct to OSB or plywood should only be used when traditional framing is not available.

- Do not use aluminum fasteners, staples, or clipped head nails.



CUT EDGE TREATMENT

Caulk, paint or prime all field cut edges. James Hardie touch-up kits are required to touch-up ColorPlus products.

PAINTING

DO NOT use stain on James Hardie® products. James Hardie products must be painted within 180 days for primed product and 90 days for unprimed. 100% acrylic topcoats are recommended. Do not paint when wet. For application rates refer to paint manufacturers specifications. Back-rolling is recommended if the siding is sprayed.

COVERAGE CHART/ESTIMATING GUIDE

Number of 12' planks, does not include waste

COVERAGE AREA LESS OPENINGS		HARDIEPLANK SIDING WIDTH						
SQ (1 SQ = 100 sq.ft.)	Sq. Meters (1 SQ = 9.29)	(exposure)	5 1/4 4	6 1/4 5	7 1/4 6	7 1/2 6 1/4	8 6 3/4	8 1/4 7
1	(9.29)		25	20	17	16	15	14
2	(18.58)		50	40	33	32	30	29
3	(27.87)		75	60	50	48	44	43
4	(37.16)		100	80	67	64	59	57
5	(46.45)		125	100	83	80	74	71
6	(55.74)		150	120	100	96	89	86
7	(65.03)		175	140	117	112	104	100
8	(74.32)		200	160	133	128	119	114
9	(83.61)		225	180	150	144	133	129
10	(92.9)		250	200	167	160	148	143
11	(102.19)		275	220	183	176	163	157
12	(111.48)		300	240	200	192	178	171
13	(120.77)		325	260	217	208	193	186
14	(130.06)		350	280	233	224	207	200
15	(139.35)		375	300	250	240	222	214
16	(148.64)		400	320	267	256	237	229
17	(157.93)		425	340	283	272	252	243
18	(167.22)		450	360	300	288	267	257
19	(176.51)		475	380	317	304	281	271
20	(185.8)		500	400	333	320	296	286

This coverage chart is meant as a guide. Actual usage is subject to variables such as building design. James Hardie does not assume responsibility for over or under ordering of product.

RECOGNITION: In accordance with ICC-ES Evaluation Report ESR-2290, HardiePlank® lap siding is recognized as a suitable alternate to that specified in: the 2006, 2009, & 2012 International Residential Code for One- and Two-Family Dwellings, and the 2006, 2009, & 2012 International Building Code. HardiePlank lap siding is also recognized for application in the following: City of Los Angeles Research Report No. 24862, State of Florida listing FL#889, Dade County, Florida NOA No. 02-0729.02, U.S. Dept. of HUD Materials Release 1263c, Texas Department of Insurance Product Evaluation EC-23, City of New York MEA 223-93-M, and California DSA PA-019. These documents should also be consulted for additional information concerning the suitability of this product for specific applications.

COMPLIANCE:

HardiePlank® lap siding complies with ASTM Specification C1186 (Grade II, Type A) and ISO Standard 8336 (Category 3, Type A).

When tested in accordance with CAN/ULC-S102, the product is recognized to have the following properties: Flame Spread Rating: 0, Smoke Developed Classification: 0.

When tested in accordance with CAN/ULC-S114, the product is recognized as noncombustible.

ADDITIONAL HANDLING REQUIREMENTS

IMPORTANT: To prevent damage to the drip edge, extra care should be taken when removing planks from the pallet, while handling, and when installing with a lap gauge. Planks are interlocked together on the pallet, therefore they should be removed from the pallet horizontally (side to side) to allow planks to unlock themselves from one another.

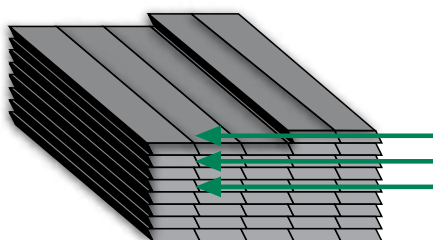
RECOGNITION:

HardiePlank lap siding is recognized as an exterior wall cladding in CCMC Evaluation Report 12678-R. This document should also be consulted for additional information concerning the suitability of this product for specific applications. For technical assistance, call 1-800-9-HARDIE.

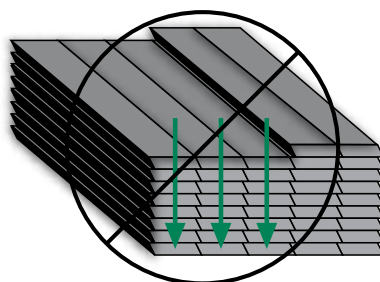
FIRE-RESISTIVE CONSTRUCTION:

HardiePlank lap siding is recognized as a component in 1-hour fire-related wall construction. Details of this assembly (Design No. JH/WA 60-04) may be found at: www.Intertek-ETLSemko.com

Pull from across the stack



Do not go down the stack



WIND LOAD TABLE

Refer to CCMC Evaluation Report 12678-R for steel stud application.

NOMINAL PRODUCT WIDTH (mm)	PRODUCT THICKNESS	FASTENER TYPE	NAILING	FRAME TYPES	MAXIMUM STUD SPACING	ULTIMATE LOAD @FAILURE	
						kPa	psf
<190 (7.5")	7.5mm (5/16")	Min. 2.4 mm shank x 5.6 mm HD x 50 mm (2") long galvanized roofing nail	Through top edge of plank	Nominal 2x4 wood 2	406mm (16")	4.39	92
203 (8") 210 (8.25")	7.5mm (5/16")	Min. 2.4 mm shank x 5.6 mm HD x 50 mm (2") long galvanized roofing nail	Through top edge of plank	Nominal 2x4 wood 2	406mm (16")	3.93	82
<241 (9.5") w/off stud/ splice	7.5mm (5/16")	No. 11 ga.x 9.5 mm HD x 32 mm (1 1/4") long galvanized roofing nail	Through top edge of plank	Nominal 2x4 wood 1	406mm (16")	6.77	141
					610mm (24")	4.41	92
<241 (9.5")	7.5mm (5/16")	2.3 mm shank x 5.6 mm HD x 50 mm (2") long galvanized siding nail	Through Overlap	Nominal 2x4 wood 2	406mm (16")	5.08	106
<241 (9.5")	7.5mm (5/16")	6d common 50 mm long (2")	Through Overlap	Nominal 2x4 wood 1	406mm (16")	9.53	199
					610mm (24")	4.50	94
305 (12")	7.5mm (5/16")	6d common 50 mm long (2")	Through Overlap	Nominal 2x4 wood 1	610mm (24")	3.60	75
<241 (9.5")	7.5mm (5/16")	38 mm (1 1/2") long with head dia. 5.7 mm and shank dia. 2.3 mm galvanized siding nails	Through Overlap	7/16" mm OSB rated sheathing	NA	3.45	72

WIND LOAD TABLE FOOT NOTES:

1. Values are for species of wood having a specific gravity of 0.42 or greater.
2. Values are for species of wood having a specific gravity of 0.36 or greater.

METRIC TO IMPERIAL CONVERSION TABLE

The following table provides a conversion of the nominal metric measurements presented in these installation instructions to nominal Imperial fraction measurement values

mm	inches	mm	inches	mm	inches	mm	inches
2.3	3/32	7.5	5/16	32	1-1/4	203	8
2.4	3/32	8.2	21/64	35	1-3/8	210	8-1/4
2.9 1/8		92	3/64	38	1-1/2	241	9-1/2
31	/8	9.5	3/8	41	1-5/8	305	12
5.6	7/32	11.1	7/16	50	2	406	16
5.7	7/32	12	15/32	91	3-5/8	610	24
61	5/64	19	3/4	150	6		
6.7	17/64	25	1	190	7-1/2		



Appendix B

VYCOM LIMITED WARRANTY

WARRANTY COVERAGE

Subject to the terms and conditions stated herein, VYCOM (hereinafter Manufacturer) warrants to the original purchaser that each VYCOM plastic sheet product (hereinafter "Product") will be free from manufacturing defects that cause the Product to rot, corrode, delaminate, or excessively swell from moisture for a period of twenty-five (25) years from the date of the original consumer purchase from an authorized VYCOM dealer. Each purchaser of a VYCOM Product is solely responsible for determining the effectiveness, suitability and safety of any particular use or application of the Product. Building code regulations vary from area to area. Each VYCOM purchaser should consult local building and safety codes for specific requirements.

LIMITATIONS – CONDITIONS NOT COVERED BY THIS WARRANTY:

Manufacturer's liability under this Warranty applies to the original purchaser only and is limited solely and exclusively to replacement of defective Product. In no event shall Manufacturer be liable for labor, installation, reinstallation, freight, taxes or any other charge related to defective Product. Manufacturer shall not be liable for any indirect, incidental, punitive, consequential, exemplary or other damages of any kind whatsoever, whether any such claim is based upon theories of contract, warranty, negligence, tort strict liability or otherwise. This warranty does not cover, and Manufacturer is not liable for, damage or failure of the VYCOM Product as a result of one or more of the following: intentional or unintentional misuse of or damage to the Product; impact of foreign objects; earthquakes, fire, flood, lightning, ice, tornado, hurricane, windstorm or any other Acts of God; improper installation of the Product or its structural supports; movement, settlement, distortion, warping or cracking of the Product's structural supports or accessories used in connection therewith; physical abuse, vandalism, riot, insurrection, improper maintenance, use or incompatible accessories or other products that cause a Product defect or failure to occur; pollution, acid rain, application of harmful chemicals or vapors applied to the Product; or ordinary and expected weathering due to exposure to the elements, which for purposes of this Warranty is defined to be fading, chalking or darkening of the surface of the Product due to exposure to ultraviolet light and extremes of atmospheric conditions that are unique to and may vary in each geographic location. This Warranty does not cover painted finishes or coatings applied to the Product by the original purchaser or any third party. Failure to adhere to Manufacturer's recommended guidelines for application of painted surfaces may void this Warranty. All claims under this Limited Warranty must be made within 90 days from the time that the defect is discovered and while the Product is in place. Manufacturer shall be given a reasonable opportunity to inspect and test the Product, its installation, and the environment in which it was used prior to removal by the original purchaser. Failure to comply with these notice and inspection provisions shall void this Limited Warranty.

This Limited Warranty may not be altered or amended except in a written instrument signed by the Manufacturer and purchaser. No dealer or other person or entity is authorized by the Manufacturer to make statements or representations regarding the performance of VYCOM Products except as contained in this Warranty, and the Manufacturer shall not be bound by any such statements other than those contained herein.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER APPLICABLE WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Some states do not permit limitations on the duration of implied warranties or exclusions or limitations of incidental or consequential damages. This warranty gives you specific legal rights. You may have other rights that vary from state to state.

HOW TO FILE A WARRANTY CLAIM: To file a claim under this Warranty, original purchaser must send proof of purchase, a picture of the defective Product and a written description to:

VYCOM
801 Corey Street
Scranton, PA 18505.
(570) 348-0997

Manufacturer reserves the right to investigate any claim hereunder. Upon verification of a claim, Manufacturer shall, at its option, either arrange for the delivery of replacement Product or issue a refund equal to the original cost of the Product only.

Installation Guidelines

These guidelines cover the general installation recommendations for cellular PVC Trim/Sheet.

- Cellular PVC trim and sheet should be installed using the same good building principles used to install wood or composite trim and mouldings and in accordance with the local building codes and the installation guidelines included below. **Vycom** accepts no liability or responsibility for the improper installation of this product.
- Cellular PVC trim and sheet may not be suitable for every application and it is the sole responsibility of the installer to be sure that the products are fit for the intended use. Since all installations are unique, it is also the installer's responsibility to determine specific requirements in regards to each trim application.
- It is recommended that all applications be reviewed by a licensed architect, engineer or local building official before installation.

STORAGE & HANDLING

- Store trim and sheet products on a flat and level surface.
- Since cellular PVC trim products are more flexible than wood, they may conform to uneven surfaces. Ensure that storage areas, as well as all framing and substructures, are flat and level to minimize uneven surfaces.
- Cellular PVC trim products have a density comparable to pine and should be handled in a fashion as pine would be handled to avoid damage.
- Units of the products are shipped from the manufacturer in a protective covering. If covering has been removed, take care to keep product free of dirt and debris at jobsite. If product gets dirty, clean after installation.

CUTTING

- Products can be cut using the same tools used to cut lumber.
- Carbide tipped blades designed to cut wood work well. Avoid using fine tooth metal cutting blades.
- Rough edges from cutting may be caused by excessive friction, poor board support, or worn or improper tooling.

DRILLING

- Cellular PVC products can be drilled using the same tools used to drill lumber.
- Drilling cellular PVC products is similar to drilling a hardwood. Care should be taken to avoid frictional heat build-up.
- Periodic removal of shavings from the drill hole may be necessary.

ROUTING

- Products can be routed using standard router bits and the same tools used to rout lumber.
- Carbide tipped router bits are recommended.
- Routing products provides a crisp, clean edge.

FASTENING

- For best results, use fasteners designed for wood trim and wood siding. These fasteners have a thinner shank, blunt point, and full round head.
- A #8 trim screw may be used and works well with cellular PVC trim products.
- Use a highly durable fastener such as stainless steel or hot dipped galvanized.
- Staples, small brads, and wire nails must not be used.
- The fasteners should be long enough to penetrate the solid wood substrate a minimum of 1 1/4".
- Standard nail guns work well with cellular PVC products. If using pneumatic tools, the air pressure should be regulated so fasteners slightly penetrate the surface.
- Like wood, use 2 fasteners per every framing member for trimboard applications. Trimboards 12" or wider, as well as sheets,

Installation Guidelines

will require additional fasteners, not to exceed 8" on center. See illustration below.

- Fasteners must be installed within 2" of the end of each board. See illustration below.
- There must be 2 fasteners on each side of a board joint (scarf, miter, etc.).
- All fasteners must hit a solid framing member.
- Cellular PVC products should be fastened into a flat, solid substrate. Fastening the material into hollow or uneven areas must be avoided.
- Pre-drilling is typically not required unless a large fastener is used or product is installed in low temperatures.
- 3/8" and 1/2" sheet product is not intended to be ripped into trim pieces. These profiles must be glued to a substrate and mechanically fastened.

BEADBOARD FASTENING CONSIDERATIONS

(Use one of the following):

- #7 trim screw
- 16 gauge T-nail
- 15 gauge round head (for 1/2" Beadboard only)
- Fasteners should be a minimum of 1 1/2" in length

GLUING

- For best results, glue all joints such as window surrounds, long fascia runs, etc., with a cellular PVC cement to prevent joint separation.
- The glue joint should be secured with a fastener and/or fastened on each side of the joint to allow adequate bonding time.
- Cellular PVC cement typically has a working time of 10 minutes and will be fully cured in 24 hours.
- If standard PVC cements are used, these products typically cure quickly which will result in limited working time and may reduce adhesive strength.
- For best results, surfaces to be glued should be smooth, clean and in complete contact with each other.
- For best results, whenever possible, always use scarf joints instead of butt joints.
- To bond cellular PVC material to other substrates, various adhesive may be used. Consult adhesive manufacturer to determine suitability.
- Must have 2 fasteners on each side of a board joint (scarf, miter, etc...).

PAINTING

- Cellular PVC trim does not require paint for protection, but accepts and holds paint very well.
- If you choose to paint, use a 100% acrylic latex paint with colors having a Light Reflective Value (LRV) of 55 or higher.
- For darker colors (LRV of 54 or lower), use paints specifically formulated for use on vinyl/PVC products such as, but not limited to, Sherwin-Williams Vinyl Safe® coatings. These paints/coatings are designed to reduce excessive heat gain.
- WARNING: It is recommended that you only use standard VinylSafe® paint colors and do not request a custom blend from the paint manufacturer.
- Follow the paint manufacturer's recommendations for use and compatibility
- Surfaces must be clean, dry, and void of any foreign material such as dirt, oil, grease or other contaminants that may come from normal handling, storage and/or installation prior to painting.
- Moisture cycling is a main reason for paint failure on wood. Since cellular PVC material absorbs no moisture, paints last longer on the products than it does on wood.
- Since cellular PVC products have almost no moisture absorption, paints may take longer to cure on the material than on wood. Generally paints on cellular PVC will be dry to the touch quickly, but may take up to 30 days to fully cure depending on the humidity and temperature.

EXPANSION & CONTRACTION

- Cellular PVC products expand and contract with changes in temperature.
- Properly fastening material along its entire length will minimize expansion and contraction.
- When properly fastened, allow 1/8" per 18 feet of product for expansion and contraction. Joints between pieces of material

Installation Guidelines

should be glued to eliminate joint separation. See "Gluing".

- When gaps are glued on a long run of cellular PVC material, allow expansion and contraction space at ends of the run.
- Cellular PVC trim should be glued to a substrate and mechanically fastened to help minimize expansion and contraction.
- WARNING: Dark colors may increase movement and expansion and contraction of PVC Trim.

SPANNING

- Cellular PVC products must not be used in load bearing applications, but may be used in spanned applications such as fascias, soffits and ceilings. Material should be installed over a solid backing.
- For soffit installations :
 - For spans greater than 16" OC, see below.
 - When using beadboard, see considerations below.
- For ceiling installations :
 - For spans greater than 16" OC, see below.
 - If temperature at time of installation is 40°F or below, spans need to be decreased to 12".
 - When using beadboard, see consideration below.
- BEADBOARD SPANNING CONSIDERATION:
 - For both 1/2" and 5/8" beadboard, run boards perpendicular to structure when possible to create the shortest possible run of material.
 - When using 1/2" beadboard, use 12" OC framing as well as use a high quality construction grade polyurethane adhesive on joists.
 - For spans greater than 12" OC, use 5/8" beadboard or use a minimum 1/2" backer such as plywood or OSB with construction grade adhesive and mechanical fastening a minimum of every 8". Fasteners should hit joist or framing when possible.
 - When using 5/8" beadboard, use 16" OC framing as well as use a high quality construction grade polyurethane adhesive on joists. For spans greater than 16" OC, see below.
- For spans greater than 16" OC, use a minimum 1/2" backer such as plywood or OSB with construction grade adhesive and mechanical fastening a minimum of every 16". Fasteners should hit joist or framing when possible.
- Never span cellular PVC products more than 16" without utilizing instructions above. Proper fastening will help reduce the possibility of excessive movement from expansion and contraction.
- With all beadboard or trim ceiling and soffit installations, follow good building practices and ensure adequate ventilation is provided.

MATERIAL SAFETY DATA SHEET
VYCOM SHEET

1. PRODUCT IDENTIFICATION

MANUFACTURING SITE: Vycom Corporation
ADDRESS: 801 Corey Street, Moosic, PA 18507
TRADE NAME: Polyvinyl Chloride (PVC, Vintec I, Vintec II, Celtec) sheet and trim.
SYNONYMS: Vinyl Polymers
CAS NUMBER(S): 9002-86-2
TELEPHONE NO.: (570) 346-8254

2. COMPONENTS AND HAZARD CLASSIFICATION

PVC Polymer:	70 - 95%	
Inert Fillers:	0 - 30%	CaCO ₃ , TiO ₂
Heat Stabilizer:	0 - 2%	Organotin Compounds
Lubricants:	0 - 4%	Calcium Stearate; Parafin, Polyethylene, Polyamide compounds, or Esters
Process Aids:	0 - 2%	Acrylic compounds
Impact Modifiers:	0 - 10%	CPE, ABS, MBS or Acrylic Compounds
Colorants:	0 - 2%	Organic and Inorganic
Chemical Blowing Agents:	0 - 1%	Azo Compounds or Sodium Bicarbonate

This product is an article as defined in 29 CFR 1910.1200. It will not result in exposure to hazardous chemicals under normal conditions of use. This product is not subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

3. PHYSICAL DATA

BOILING POINT (°F):	Solid
SPECIFIC GRAVITY (H ₂ O=1):	0.45 - 1.4
VAPOR PRESSURE (mm Hg.):	Solid
MELTING POINT:	Decomposes before melting
SOLUBILITY IN WATER:	Solid
VAPOR DENSITY:	Solid
APPEARANCE AND ODOR:	Finished Sheet

4. FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD):	Not applicable
AUTOIGNITION TEMPERATURE:	Not applicable

FLAMMABLE LIMITS IN AIR. % BY VOL.

LOWER:

Not applicable

UPPER:

Not applicable

EXTINGUISHING MEDIA:

Water spray(fog), foam, dry chemical, or CO₂

SPECIAL FIRE FIGHTING PROCEDURES:

Cool exposed equipment with water spray. Use self-contained breathing apparatus if fighting fire in confined spaces.

UNUSUAL FIRE AND EXPLOSION
HAZARD:

PVC evolves hydrogen chloride, carbon monoxide, and other toxic gases when burned. Exposure to combustion products may be fatal and should be avoided.

5. HEALTH HAZARD INFORMATION

Pertains to dust or chips as a by-product of fabricating finished sheet

FIRST AID

EYES: Immediately flush with plenty of water. Call a physician if irritation persists.

SKIN: Flush skin with plenty of water. Remove contaminated clothing. Call a physician if irritation persists. Wash clothing before reuse.

INHALATION: Remove to fresh air.

INGESTION: Seek medical aid.

NATURE OF HAZARD

EYES: If exposed to high concentrations of dust, physical irritation of the eyes.

SKIN: This material is not expected to present a hazard to the intact skin. Molten sheet will produce thermal burns.

INHALATION: Under normal conditions and with normal use, no inhalation hazard is presented. Please refer to Section IV, Fire and Explosion Data.

INGESTION: No significant health hazard can be reasonably anticipated.

EXPOSURE LIMITS

None established. ACGIH TLV of 10 mg/m³ total dust as an 8-hour TWA is recommended.

TOXICITY DATA

SKIN CONTACT: A review of the pertinent literature did not reveal specific information for PVC.

EYE CONTACT: A review of the pertinent literature did not reveal specific information for PVC.

INHALATION: Rodents exposed by the dietary or inhalation route for 6 to 24 months have shown no significant toxicological effects.

INGESTION: See above.

SPECIAL PRECAUTIONS

AVOID INHALATION OF COMBUSTION PRODUCTS.

6. REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY: Not applicable

INCOMPATIBILITY: Not applicable

HAZARDOUS DECOMPOSITION PRODUCTS:	Hydrogen chloride and other toxic fumes generated with combustion.
CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION:	Not applicable

7. SPILL OR LEAK PROCEDURES

When producing chips or dust from fabricating PVC sheet, sweep, scoop, or vacuum and remove. Dispose of only in accordance with local, state, and federal regulations.

8. SPECIAL PROTECTION INFORMATION

Pertains to dust or chips as a by-product of fabricating finished sheet

VENTILATION RECOMMENDATIONS: General ventilation when fabricating and nuisance dust control.

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT RESPIRATORY PROTECTION: If dust is produced during handling, an approved particulate filter respirator should be used.

EYES: Safety glasses or goggles.

GLOVES: Necessary when handling hot or molten sheet.

OTHER CLOTHING AND EQUIPMENT: As necessary when handling hot or molten sheet.

9. SHIPPING, TRANSFER AND STORAGE

SHIPPING INFORMATION: Non-hazardous for transportation purposes.

TRANSPORTATION AND STORAGE USUAL SHIPPING CONTAINERS: Palletized sheets

STORAGE TRANSPORT: Sustained Temperatures above 150°F may cause slow degradation.

ELECTROSTATIC ACCUMULATION HAZARD: Yes

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ACRYLITE® cell cast sheet (GP)

Physical Properties

ACRYLITE® cell cast acrylic sheet is made to exacting standards. It offers excellent optical characteristics, thickness tolerances, light stability, and low internal stress levels for consistent performance.

Colorless ACRYLITE® cell cast carries an exclusive 30-year limited warranty on light transmission, your assurance of a quality product.

Characteristics

ACRYLITE® sheet is a lightweight, rigid thermoplastic material that has many times the breakage resistance of standard glass and is highly resistant to weather conditions. ACRYLITE® cell cast can be easily sawed, machined, thermoformed, and cemented and is ultraviolet light absorbing up to approximately 360 nanometers.

Because of its unique properties, ACRYLITE® cell cast is ideal for a wide range of applications, such as:

- Retail store displays
- Security glazing
- Industrial and residential glazing
- Luminaries
- Aquariums
- Decorative paneling
- Spectator shielding
- Skylights
- Signs

Availability

ACRYLITE® cell cast is available in clear, colors and a wide range of standard sizes and thicknesses from .118" (3mm) to 1.0" (24mm). ACRYLITE® cell cast is also available as ACRYLITE® Satinice with a velvet frost surface on one or both sides. It is available in a plethora of colors with varying degrees of transmitted and reflected light. ACRYLITE® Satinice retains the same physical properties of standard cell cast acrylic.

Safety

ACRYLITE® sheet is more impact-resistant than glass. If subjected to impact beyond the limit of its resistance, it does not shatter into small slivers but breaks into comparatively large pieces. ACRYLITE® sheet meets the requirements of ANSI Z 97.1 for use as a Safety Glazing material in Buildings (for thicknesses 0.080" [2.0 mm] to 0.500" [12.7mm]).

Weather Resistance

Acrylic offers better weather resistance than other types of transparent plastics. ACRYLITE® cell cast will withstand exposure to blazing sun, extreme cold, sudden temperature changes, salt water spray and other harsh conditions. It will not deteriorate after many years of service because of the inherent stability of acrylic. ACRYLITE® sheet has been widely accepted for use in skylights, school buildings, industrial plants, aircraft glazing and outdoor signs.

Dimensional Stability

Although ACRYLITE® sheet will expand and contract due to changes in temperature and humidity; it will not shrink with age. Some shrinkage occurs when ACRYLITE® cell cast is heated to forming temperature.

Light Weight

ACRYLITE® sheet is half the weight of glass, and 43% the weight of aluminum. One square foot of 1/8" (3.0 mm) thick ACRYLITE® sheet weighs less than 3/4 pound (1/3 kilogram).

Rigidity

ACRYLITE® sheet is not as rigid as glass or metals. However, it is more rigid than many other plastics such as acetates, polycarbonates, or vinyls. Under wind load, a sheet will bow and foreshorten as a result of deflection. For glazing installations, the maximum wind load and the size of the window must be considered when the thickness of the panel and the depth and width of the glazing channels are to be determined.

If ACRYLITE® sheet is formed into corrugated or domed shapes, rigidity is increased and deflection minimized.

Cold Flow

Large, flat ACRYLITE® sheet may deform due to continuous loads such as snow, or even from its own weight if not sufficiently supported. Increased rigidity obtained by forming will minimize cold flow.

Strength and Stresses

Although the tensile strength of ACRYLITE® cell cast is 10,000 psi (69 M Pa) at room temperature (ASTM D638), stress crazing can be caused by continuous loads below this value. For most applications, continuously imposed design loads should not exceed 1,500 psi (10.4 M Pa). Localized, concentrated stresses must be avoided. For this reason, and because of thermal expansion and contraction, large sheets should never be fastened with bolts, but should always be installed in frames.

All thermoplastic materials—including ACRYLITE® cell cast—will gradually lose tensile strength as the temperature approaches the maximum recommended for continuous service. For ACRYLITE® cell cast, the maximum is 180°F (82°C).

Expansion and Contraction

Like most other plastics, ACRYLITE® sheet will expand 3 times as much as metals, and 8 times as much as glass. The designer should be aware of this rather large coefficient of expansion. A 48" panel will expand and contract approximately .002" for each degree fahrenheit change in temperature. In outdoor use, where summer and winter temperatures differ as much as 100°F, a 48" sheet will expand and contract approximately 3/16". Glazing channels must be of sufficient depth to allow for expansion as well as for contraction.

ACRYLITE® sheet also absorbs water when exposed to high relative humidities, resulting in expansion of the sheet. At relative humidities of 100%, 80%, and 60%, the dimensional changes are 0.6%, 0.4% and 0.2%, respectively.

Heat Resistance

ACRYLITE® cell cast can be used at temperatures from -40°F (-40°C) up to +200°F (93°C), depending on the application. It is recommended that temperatures not exceed 180°F for continuous service, or 200°F for short, intermittent use. Components made of ACRYLITE® cell cast should not be exposed to high heat sources such as high wattage incandescent lamps, unless the finished product is ventilated to permit the dissipation of heat.

Light Transmission

Colorless ACRYLITE® cell cast has a light transmittance of 92%. It is warranted not to lose more than 3% of its light-transmitting ability in a 30-year period. Contact Evonik Cyro for the complete warranty.

Chemical Resistance

ACRYLITE® cell cast has excellent resistance to many chemicals including:

- solutions of inorganic alkalies such as ammonia
- dilute acids such as sulfuric acid up to a concentration of 30%
- aliphatic hydrocarbons such as hexane

ACRYLITE® sheet is not attacked by most foods, and foods are not affected by it. It is attacked, in varying degrees, by:

- aromatic solvents such as benzene and toluene
- chlorinated hydrocarbons such as methylene chloride and carbon tetrachloride
- ethyl and methyl alcohols
- some organic acids such as acetic acid
- lacquer thinners, esters, ketones and ethers

For a listing of the resistance of ACRYLITE® sheet to more than 70 chemicals, refer to the table on page 6.

Formability

ACRYLITE® sheet will soften gradually as the temperature is increased above 210°F (99°C). At temperatures from 340°F to 380°F (171°C to 193°C), it becomes soft and pliable and can be formed into almost any shape using inexpensive molds. The optimum forming temperature within this range depends on thickness and desired depth of draw. ACRYLITE® sheet will typically shrink 1.5% when heated without a frame. As the sheet cools, it will harden and retain the formed shape.

Because ACRYLITE® cell cast is a thermoplastic material; heating a formed part to temperatures above 210°F (99°C) may cause it to revert to its original flat condition.

Cutting and Machining

ACRYLITE® sheet can be sawed with circular saws or band saws. It can be drilled, routed, filed and machined much like wood or brass with a slight

modification of tools. Cooling of the cutting tool is recommended to keep the machined edge of the sheet as cool and stress free as possible. Heat buildup should be avoided because it could lead to stress crazing. Tool sharpness and “trueness” are also essential to prevent gumming, heat buildup and stresses in the part.

Laser Cutting

Laser technology is ideal for quick and accurate cutting, welding, drilling, scribing, and engraving of plastics. CO₂ lasers focus a large amount of light energy on a very small area which is extremely effective for cutting complex shapes in acrylic sheet. The laser beam produces a narrow kerf in the plastic allowing for close nesting of parts and minimal waste. CO₂ lasers vaporize the acrylic as they advance resulting in a clean polished edge but with high stress levels; annealing acrylic sheet after laser cutting is recommended to minimize the chance of crazing during the service life of the part.

Cementing

ACRYLITE® sheet can be cemented using common solvent or polymerizable cements, such as ACRIFIX®. The most critical factor is the edge of the part to be cemented. The edge must have been properly machined so as to have a square flat surface and no stresses. Annealing of the part prior to cementing is recommended. Cement and cement fumes should not contact formed or polished surfaces.

Annealing

To eliminate stresses caused by machining and/or polishing, annealing is recommended. ACRYLITE® cell cast may be annealed at 180°F (82°C) with the heating and cooling times determined by the sheet thickness. An approximate guideline is: annealing time in hours equals the sheet thickness in millimeters and the cool-down period is a minimum of 2 hours ending when sheet temperature falls below 140°F. For example, 1/8” (3 mm) ACRYLITE® cell cast would be heated for 3 hours at 180°F (82°C) and slowly cooled for at least 2 hours.

Flammability

ACRYLITE® cell cast is a combustible thermoplastic. Precautions should be taken to protect the material from flames and high heat sources. ACRYLITE® usually burns rapidly to completion if not extinguished. The products of combustion, if sufficient air is present, are carbon dioxide and water. However, in many fires sufficient air will not be available and toxic carbon monoxide will be formed, as it is from other combustible materials. We urge good judgment in the use of this versatile material and recommend that building codes be followed carefully to ensure it is used properly.

Other properties related to flammability:

- Burning rate is 1.2 inches per minute (for 3 mm thickness) according to ASTM D 635.
- Smoke density: Measured by ASTM D 2843 is 11.4%.
- Self-ignition temperature is 910°F (488°C) when measured in accordance with ASTM D 1929.

While these test data are based on small scale laboratory tests frequently referenced in various building codes, they do not duplicate actual fire conditions.

ACRYLITE® cell cast meets the requirements of the following building codes for use as a Light Transmitting Plastic:

- NES (See National Evaluation Services, Inc., Report # NER-582)
- ICBO (See ICBO Evaluation Services, Inc., Evaluation Report #3715-CC2 Classification)
- BOCA and SBCCI (Accept National Evaluation Services, Inc., Report # NER-582)

Thermal Conductivity

The thermal conductivity of a material—its ability to conduct heat—is called the k-Factor. The k-Factor is an inherent property of the material and is

independent of its thickness and of the surroundings to which it is exposed.

The k-Factor of ACRYLITE® sheet is:

1.3 B.T.U. / (hour) (sq. ft.) (°F /inch) or 0.19 W/m.K

Whereas the k-Factor is a physical property of the material, the U-Factor—or overall coefficient of heat transfer—is the value used to calculate the total heat loss or gain through a window.

The U-Factor is the amount of heat, per unit time and area, which will pass through a specific thickness and configuration of material per degree of temperature difference between each of the two sides.

This value takes into account the thickness of the sheet, whether the sheet is in a horizontal or vertical position, as well as the wind velocity.

U-Factors are based on specific conditions (e.g., single-glazed or double-glazed installations) and are different for summer and winter. Listed below are U-Factors for several thicknesses of ACRYLITE® sheet for single-glazed, vertical installations, based on the standard ASHRAE* summer and winter design conditions.

U-Factors—BTU/hour sq. ft. F° (w/m² x K)

ACRYLITE® Cell Cast Thickness		Summer Conditions	Winter Conditions
mm	inches		
3.0	.118	0.98 (5.56)	1.06 (6.02)
4.5	.177	0.94 (5.34)	1.02 (5.79)
6.0	.236	0.90 (5.11)	0.97 (5.51)
9.0	.354	0.83 (4.71)	0.89 (5.05)
31.5	1.25	0.56 (3.18)	0.58 (3.29)

*American Society of Heating, Refrigerating and Air-Conditioning Engineers

The total heat loss or gain through a window (due to temperature difference only) can be calculated by multiplying the area of the window, times the difference between indoor and outdoor temperatures, times the appropriate U-Factor (from Table above). Heat intake through solar radiation must be added to arrive at the total heat gain.

ACRYLITE® sheet is a better insulator than glass. Its U-Factor or heat transfer value is approximately 10% lower than that of glass of the same thickness. Conversely, its RT-Factor is about 10% greater.

Thermal Shock and Stresses

ACRYLITE® cell cast is more resistant than glass to thermal shock and to stresses caused by substantial temperature differences between a sunlit and a shaded area of a window, or by temperature differences between opposite surfaces of a window.

Chemical Resistance

The table on the next page gives an indication of the chemical resistance of clear ACRYLITE® sheet. The code used to describe chemical resistance is as follows:

R = Resistant

ACRYLITE® cell cast withstands this substance for long periods and at temperatures up to 120°F (49°C).

LR = Limited Resistance Fabrication

ACRYLITE® cell cast only resists the action of this substance for short periods at room temperatures. The resistance for a particular application must be determined.

N= Not Resistant Application of Chemicals

ACRYLITE® cell cast is not resistant to this substance. It is swelled, attacked, dissolved or damaged in some manner.

Chemical Resistance of Clear ACRYLITE®

Chemical	Code	Chemical	Code	Chemical	Code
Acetic-Acid (5%)	R	Ethyl Acetate	N	Mineral Oil	R
Acetic Acid (Glacial)	N	Ethyl Alcohol (30%)	LR	Naphtha (VM&P)	R
Acetone	N	Ethyl Alcohol (95%)	N	Nitric Acid (up to 20%)	R
Ammonium Chloride (Saturated)	R	Ethylene Dichloride	N	Nitric Acid (20%-70%)	LR
Ammonium Hydroxide (10%)	R	Ethylene Glycol	R	Nitric Acid (over 70%)	N
Ammonium Hydroxide (Conc.)	R	Formaldehyde	R	Oleic Acid	R
Aniline	N	Gasoline (Regular, Leaded)	LR	Olive Oil	R
Battery Acid	R	Glycerine	R	Phenols	N
Benzene	N	Heptane	R	Soap Solution (Ivory)	R
Butyl Acetate	N	Hexane (Commercial Grade)	R	Sodium Carbonate	R
Calcium Chloride (Sat.)	R	Hydrochloric Acid	R	Sodium Chloride	R
Calcium Hypochlorite	R	Hydrofluoric Acid (40%)	N	Sodium Hydroxide	R
Carbon Tetrachloride	N	Hydrogen Peroxide (up to 40%)	R	Sodium Hypochlorite	R
Chloroform	N	Hydrogen Peroxide (over 40%)	N	Sulfuric Acid (up to 30%)	R
Chromic Acid	LR	Isopropyl Alcohol (up to 50%)	LR	Sulfuric Acid (Conc.)	LR
Citric Acid (20%)	R	Kerosene	R	Toulene	N
Detergent Solution (Heavy Duty)	R	Lacquer Thinner	N	Trichloroethylene	N
Diesel Oil	R	Methyl Alcohol (up to 15%)	LR	Turpentine	LR
Dimethyl Formamide	N	Methyl Alcohol (100%)	N	Water (Distilled)	R
Diethyl Phthalate	N	Methyl Ethyl Ketone (MEK)	N	Xylene	N
Ether	N	Methylene Chloride	N		

Plastic materials can be attacked by chemicals in several ways. The methods of fabrication and/or conditions of exposure of ACRYLITE® sheet, as well as the manner, in which the chemicals are applied, can influence the final results even for “R” coded chemicals. Some of these factors are listed below.

Fabrication—Stress generated by sawing, sanding, machining, drilling, polishing, and/or forming.

Exposure—Length of exposure, stresses induced during the life of the product due to various loads, changes in temperatures, etc.

Application of Chemicals— by contacts, rubbing wiping, spraying, etc.

The table therefore should be used only as a general guide and, in case of doubt, supplemented by tests made under actual working conditions.

Physical Properties of ACRYLITE®

		ASTM Method	Typical Value (.236" Thickness) ^(b)
Property^(a) Mechanical	Specific Gravity	D 792	1.19
	Tensile Strength	D 638	10,000 psi (69 M Pa)
	Elongation, Rupture		4.2%
	Modulus of Elasticity		400,000 psi (2800 M Pa)
	Flexural Strength (Rupture)	D 790	16,500 psi (114 M Pa)
	Modulus of Elasticity		475,000 psi (3300 M Pa)
	Compressive Strength (Yield)	D 695	18,000 psi (124 M Pa)
	Modulus of Elasticity		430,000 psi (2960 M Pa)
	Shear Strength	D 732	9,000 psi (62 M Pa)
	Impact Strength	D 256	0.4 ft. lbs/in. of notch (21.6 J/m of notch)
	Izod Milled Notch		
	Rockwell Hardness	D 785	M-94
Optical (Clear Material)	Barcol Hardness	D 2583	49
	Residual Shrinkage ^(c) (Internal Strain)	D 702	2%
	Refractive Index	D 542	1.49
	Light Transmission, Total UV Transmission Haze	D 1003	92%, 0 at 320 nanometers, less than 1%
Thermal	Forming Temperature	–	340–380 °F (170–190°C)
	Deflection Temperature under load, 264 psi	D 648	210 °F (99°C)
	Vicat Softening Point	D 1525	239 °F (115°C)
	Maximum Recommended Continuous Service Temperature	–	180 °F ^(d) (82°C)
	Coefficient of Linear Thermal Expansion	D 696	0.000040 in/in-°F (0.000072 m/m-°C)
	Coefficient of Thermal Conductivity (k-Factor)	Ceno-Fitch	1.3 BTU/(Hr) (Sq. Ft.) (°F/in.) (0.19 w/m.K)
	Flammability (Burning Rate 3 mm thickness)	D 635	1.2 in/min. (30.5 mm/min.)
	Self-Ignition Temperature	D 1929	910 °F (490 °C)
	Specific heat @ 77 F	–	0.35 BTU/(lb.) (°F) (1470 J/Kg.k)
	Smoke Density Rating (3 mm thickness)	D 2843	11.4%
Electrical	Dielectric Strength Short Time (0.125"-thickness)	D 149	430 volts/mil (17 KV/mm)
	Dielectric Constant 60 Hertz 1,000 Hertz, 1,000,000 Hertz	D 150	3.5, 3.2, 2.7
	Dissipation Factor 60 Hertz 1,000 Hertz, 1,000,000 Hertz	D 150	0.06, 0.04, 0.02
	Volume Resistivity	D 257	1.6 x 10 ¹⁶ ohm-cm
	Surface Resistivity	D 257	1.9 X 10 ¹⁵ ohms
Water Absorption	24 hrs @ 73 F	D 570	0.2%
	Weight Gain during Immersion		0.2%
	Soulable Matter Lost		0.0%
	Water Absorbed		0.2%
	Dimensional Change during Immersion		0.2%
Long Term Water Absorption	Weight Gain during Immersion	D 570	
	7 Days		.05%
	14 Days		.06%
	21 Days		.08%
	35 Days		1.0%
	48 Days		1.1%
Odor		–	None
Taste		–	None

Notes:

(a) Typical values: should not be used for specification purposes.

(b) Values shown are for 6mm thickness unless noted otherwise. Some values will change with thickness.

(c) Difference in length and width, as measured at room temperature, before and after heating above 300°F.

(d) It is recommended that temperatures not exceed 180°F for continuous service, or 200°F for short, intermittent use.

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