PowerWool™ Cavityboard™ Insulation Attachment Guide

Technical attachment guide for PowerWool™ Cavityboard™ for installation on exterior wall assemblies

Prepared for:
PowerWool Insulation USA Inc.

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Prepared by:
Stantec Consulting Ltd.

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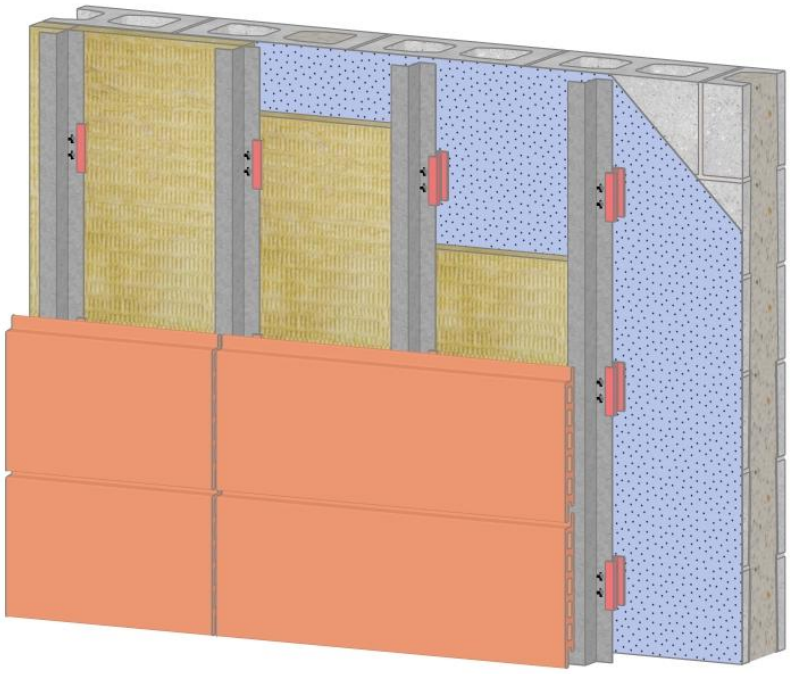

Stantec Consulting Ltd.

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1 General Product Description

PowerWool™ Cavityboard™ is a continuous, non-structural, and non-combustible semi-rigid mineral wool insulation sheathing board designed for exterior use. It enhances the thermal efficiency of cavity walls and rainscreen applications. Available in two versions, the standard Cavityboard™ has a density of 4.5 lbs/ft³ (72 kg/m³), while the more robust Cavityboard™ HD boasts a density of 6 lbs/ft³ (100 kg/m³). Both versions feature consistent density throughout, allowing for flexible installation without a specific direction. The panels are available in sizes of 16” x 48” or 24” x 48”, with thicknesses ranging from 1½ ” to 6” in ½” increments.

Benefits of continuous exterior insulation

Reduces thermal bridging and increases overall R-value. Thermal bridging is a type of heat loss that occurs when heat flows continuously through the building envelope, such as through timber structural members or, more commonly, highly conductive steel framing members. This phenomenon directly affects the R-value, which measures the thermal efficiency of a building envelope assembly. For example, a steel stud wall assembly with batt insulation may lose up to 50% of its R-value due to thermal bridging. Therefore, adding exterior insulation, along with appropriate thermally broken attachment systems, enhances the overall R-value by providing a thermal break and reducing heat flow through conductive elements.

Creates barrier continuity. Air and water barriers are typically materials installed adjacent to wall sheathing to create a continuous and homogeneous barrier. Air and vapor-permeable continuous mineral wool insulation allows for the passage of air and vapor, enabling condensation, moisture, or water within the wall cavity to dry outwards.

Reduces moisture concerns. Continuous mineral wool insulation is designed to repel and drain moisture from driving rain, condensation, and other sources within the wall system. This type of insulation reduces the risk of condensation within the wall by preventing warm, moist air from reaching the dew point temperature. The primary barrier is also further protected and placed away from points of moisture ingress.

Fire and smoke protection. Continuous mineral wool insulation is designed to resist burning and prevent the release of hot gasses or harmful smoke during a fire, making it an excellent choice for multistory construction. The use of mineral wool in cavity walls and open-joint facade systems can help reduce fire spread across the exterior surface of a building.

Sound Attenuation. Mineral wool products enhance indoor environmental quality by providing sound attenuation. They absorb and block sound between partition walls, floors, and ceilings, improving the acoustic comfort for building occupants.

The attachment systems for continuous semi-rigid insulation can have a significant influence on the thermal performance of a wall assembly. This Attachment Guide provides recommendations for attaching PowerWool™ Cavityboard™ in common applications when integrated as part of a cladding attachment system over various substrates. This guide is intended to assist design professionals in designing attachment systems for Cavityboard™ semi-rigid mineral wool insulation. These recommendations are for information purposes only and may vary based on the project specific design and exposure considerations.

2 Related Products

PowerWool™ offers a range of commercially available insulation products for use in exterior wall assemblies and curtain wall systems. These products are versatile and can be tailored to meet various project demands.

RigiBoard™ 80

PowerWool™ RigiBoard™ 80 is a continuous, non-structural, and non-combustible rigid mineral wool insulation sheathing board designed to enhance the thermal efficiency of exterior wall assemblies with lightweight cladding, structures, and assemblies with combustible components. RigiBoard™ 80 has a density of 8 lbs/ft^3 (128 kg/m^3), and the panels are available in thicknesses ranging 1½" to 6".

RigiBoard Pro MAX™

PowerWool™ RigiBoard™ PRO MAX is a continuous, non-structural and non-combustible rigid mineral wool insulation sheathing board designed to improve the thermal efficiency of exterior wall assemblies with heavy duty claddings and structures. RigiBoard™ Pro MAX has a density of 11 lbs/ft^3 (176 kg/m^3); the panels are available in different thickness from 1½" to 8".

CurtainBoard™

PowerWool™ CurtainBoard™ is a semi-rigid exterior mineral wool insulation engineered for increased fire protection in curtain wall systems. CurtainBoard™ has a density of 3.5 lbs/ft^3 (56 kg/m^3) and is available from 1" to 8" in thickness in ½" increments.

CurtainBoard™ 40

PowerWool™ CurtainBoard™ 40 is a semi-rigid exterior mineral wool insulation engineered for increased fire protection in curtain wall systems. CurtainBoard™ 40 has a density of 4 lbs/ft^3 (64 kg/m^3) and is available from 1" to 8" in thickness, in ½" increments.

CurtainBoard™ 80

PowerWool™ CurtainBoard™ 80 is a rigid exterior mineral wool insulation designed to increase fire protection in curtain wall systems. CurtainBoard™ 80 has a density of 8 lbs/ft^3 (128 kg/m^3) and is available from 1½" to 6" in thickness in ½" increments.

3 Basic Wall Assembly Diagram

PowerWool™ Cavityboard™ is intended for use as an exterior insulation in rainscreen wall assemblies. A typical assembly consists of the following components:

1. Interior sheathing
2. Air/vapor control layer (if required)[1,2]
3. Wall framing (metal stud, wood stud, concrete, concrete masonry units)
4. Cavity insulation[1]
5. Exterior sheathing (stud wall assemblies)
6. Sheathing membrane[2]
7. PowerWool™ Cavityboard™ mineral wool exterior insulation supported with selected fasteners
8. Exterior cladding and cladding attachment system[3]

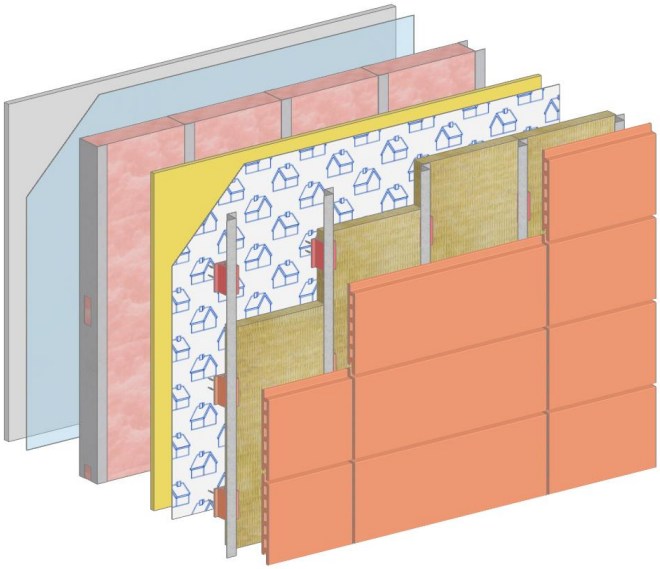

Figure 1 – Wall Assembly Diagram

[1] Stud assemblies only, vary per project requirements.
[2] Assembly details and vapor permeability will change, along with location of actual layers, based on climate zone. Refer to a qualified design professional for guidance and modeling, if required.
[3] Cladding panel sub-frame rails and attachment clips not shown for clarity.

4 Use Guidelines

4.1 Job Safety

Refer to the Occupational Health and Safety (OHS) Regulation or the Construction Safety Association of Canada for safety precautions at a jobsite. Personal Protective Equipment (PPE) is required at all times when installing PowerWool™ Cavityboard™.

There are some health risks associated with the use of PowerWool™ Cavityboard™ and its recommended components. For more information, refer to the Safe Use Instruction Sheet.

Recommended Safety Equipment

Skin Protection Loose-fit long-sleeved shirt and long-legged pants
Hand Protection Gloves
Eye Protection Safety glasses with side shields
Respiratory Protection NIOSH/MSHA-approved respiratory protection (N95 efficiency rating or higher)

4.2 Handling Requirements

To minimize potential health risks associated with mineral wool insulation, handle PowerWool™. Cavityboard™ with care. The use of PPE is required at all times when handling this product. Ensure use in well-ventilated areas and avoid generating dust when cutting or handling.

Ensure storage areas are cool, dry, and well-ventilated, and keep the product away from incompatible materials. The packaging is not designed for long-term exposure to the elements. Elevate the product above the ground and/or standing water and protect it with a waterproof tarp or membrane.

4.3 General Installation Requirements

PowerWool™ Cavityboard™ insulation panels should be securely fastened to the base substrate to ensure effective thermal performance in a continuously insulated exterior wall assembly. The attachment method should keep the panels flush with the substrate and stable throughout the insulation and assembly's service life. Additionally, panels must be installed tightly together without gaps or voids to maintain continuity. The select attachment system should support this alignment. Any openings created for the installation of clips, girts, wall penetrations, or other installation purposes must be properly filled with insulation to preserve thermal integrity.

5 Recommended Fasteners for the Cavityboard™ Panels

PowerWool™ Cavityboard™ panels are compatible with various substrates for use in exterior cavity wall and rainscreen applications. Typically, they are installed over the air and water barrier, with fasteners securing them to the base substrate. Depending on the wall assembly design, the continuous insulation may be independently supported or integrated with the cladding attachment system. The choice of fasteners should be based on the base substrate, insulation thickness, exterior cladding system specifications, and local code requirements.

The table below provides general recommendations for the use and application of various insulation fastener types. These guidelines are for reference only. All final attachment systems must be reviewed and approved by a qualified design professional, considering project-specific performance requirements, thermal cycling, design loads (including static, wind, and seismic forces), and fastener manufacturer recommendations.

Table 1. Fastener Comparison

	Permanent Support	Temporary Support	Insulation Support	Cladding Attachment	Notes
Metal Fasteners	•			•	For metal frame construction and strapping applications
Wood Screws or Nails	•			•	For wood frame construction and strapping applications
Concrete and Masonry Screws or Nails	•			•	For concrete or masonry construction and strapping applications
Z-girts	•			•	Continuous framing members
Proprietary Clips	•			•	Typically combined with continuous girts to exterior of insulation or partially embedded in insulation
Impaling Pins	•		•		Mechanically attached or bonded to base structure
Insulation Fasteners	•		•		For fastening to variety of substrates
Fasteners with Washers	•		•		For fastening to variety of substrates. Recommend minimum 1” diameter washers
Plastic Cap Nails		•	•		Typically for temporary support to wood substrates
Adhesives		•	•		Temporary support only. Adhesive installation must comply with manufacturer’s guidelines and project specifications

6 Plain Insulation Board

While PowerWool™ Cavityboard™ is designed exclusively for exterior use and typically covered or supported by a cladding attachment assembly, there situations where the insulation will need to be self-supported without relying on the cladding attachment assembly, or in atypical situations where it remains exposed. If semi-rigid insulation panels are not secured by a structural frame or cladding system, they lack the necessary stability to remain in place. To ensure long-term performance, the insulation must be self-supported to prevent displacement, sagging, or potential damage. Any gaps or voids that develop within the insulated assembly over time can reduce thermal efficiency and compromise the system's ability to resist moisture penetration. Additionally, fire resistance may be affected if the insulation is not properly secured. PowerWool™ Cavityboard™ is designed exclusively for exterior use, limiting its application as plain insulation. The following sections suggest common attachment methods for plain insulation, for cases where the cladding attachment system does not provide the required support.

Plain Insulation Fasteners

The recommended attachment method for self-supported PowerWool™ Cavityboard™ semi-rigid insulation include mechanical fasteners as a permanent system or construction-grade adhesive used as a temporary solution to secure the insulation before permanent fasteners are installed. Permanent mechanical fasteners include impaling pins, adhesive-backed impaling pins, and appropriate fasteners with washers, which are specific to the substrate and insulation type. Temporary attachment options include plastic cap nails and construction-grade adhesive compatible with the PowerWool™ Cavityboard™ insulation and the intended substrate. It is important that the adhesive does not damage the substrate or compromise its performance.

Plain Insulation Attachment

PowerWool™ Cavityboard™ should be mechanically fastened outboard of the base substrate and air and water barrier. Fasteners should typically penetrate the base substrate by a maximum of 1¼" from stud edge, although specific requirements should be confirmed with the manufacturer. Fasteners should not overly compress the insulation and should be installed to sufficiently hold the insulation in place without causing it to sag, pillow, or become damaged. Each panel should be installed tightly against the adjacent board to ensure continuity in the system.

It is recommended to use a minimum of five fasteners per board, allowing for a 3" space between the fastener and the edge of the panel. Mechanical fasteners should not be spaced more than 24" apart, although tighter spacing may be required depending on the substrate and project requirements. The dimensions of the insulation boards dictate the minimum number of attachments required and their fastening pattern. Design professionals are responsible for determining the adequate number of fasteners to meet the building conditions and comply with the fastener manufacturer's recommendations.

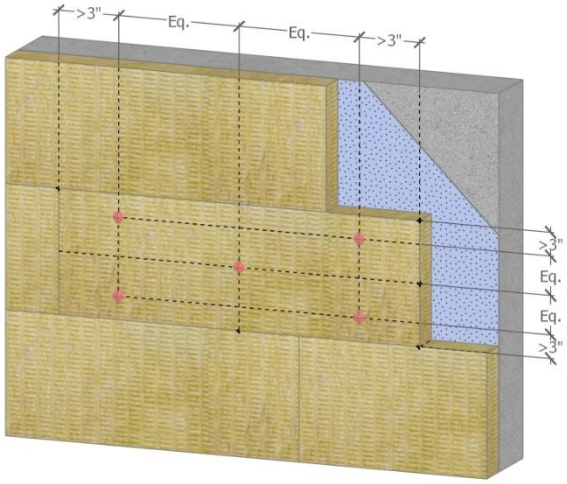

Figure 2 – 16 in x 48 in Panel

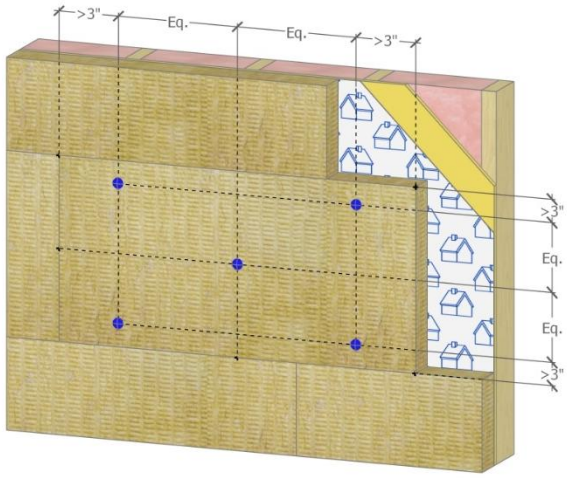

Figure 3 – 24 in x 48 in Panel

7 Insulation Board within Cladding Attachment System

When PowerWool™ Cavityboard™ insulation is installed as part of the cladding attachment system, it can rely on the cladding system for support. Depending on the substrate type and cladding application, the insulation boards are secured using various cladding attachment components. Typical systems include:

- **Continuous insulation with strapping** Pressure treated plywood or metal rails fastened with long screws through the insulation and into the backup wall (typically used with PowerWool™ Rigiboard™, not Cavityboard™).
- **Continuous insulation with intermittent clips/brackets** Insulation pressure-fitted between vertical or horizontal supporting rails.
- **Continuous insulation with continuous rails** vertical or horizontal rails secured direct to the substrate (typically Z-girts), with the insulation pressure-fitted between the rails.
- **Continuous insulation with masonry anchors and ties** PowerWool™ Cavityboard™ insulation conforming around the ties and the backup wall.

In these applications, the weight of the PowerWool™ Cavityboard™ insulation is partially or fully supported by the cladding attachment system. Components such as clips, girts, rails, or long screws are installed tightly against the insulation, providing permanent support.

When insulation boards are supported by the cladding attachment system, the structural design should consider the load imposed by the insulation. The load is determined by factors such as insulation thickness, density, and size. The exact design of the cladding attachment system should be tailored to project-specific requirements, in consultation with the cladding attachment system manufacturer and a qualified design professional.

In some cases, additional insulation fasteners or impaling pins may be recommended in conjunction with the cladding attachment system, depending on project needs. However, the number of fasteners required will be optimized compared to the quantity needed for self-supported insulation.

7.1 Wood and Metal Strapping

The use of wood and metal strapping to the exterior of the insulation typically requires the use of PowerWool™ Rigiboard™ to provide sufficient support and alignment for the strapping. The use of Cavityboard™ may provide insufficient rigidity for the assembly. The wood or metal strapping can run horizontally or vertically and is supported by long cantilevered fasteners that penetrate through the insulation and into the base substrate. The cladding materials are subsequently attached to the strapping. This approach provides minimal penetrations through the insulation, thereby ensuring good overall continuity of the insulation layer. Key considerations of this form of attachment are as follows:

1. It is recommended to use PowerWool™ Rigiboard™ to provide sufficient compressive resistance for the strapping. The alignment of the strapping, and consequently the exterior cladding surface, is highly dependent on the amount of compression applied to the insulation boards.

2. Fasteners are installed from the exterior side of the insulation or strapping, which increases the risk of missing attachment to the interior wood or metal studs. It is imperative that strapping layouts are tightly coordinated to align with the interior studs and that fastener alignment is controlled to securely attach to the base studs and maintain appropriate edge distance requirements.

3. The use of horizontal strapping may impede drainage. Therefore, it is recommended that horizontal applications use only perforated metal strapping, or that strapping be layered with an initial layer of vertical strapping followed by horizontal strapping. Another option is to run furring strips or non-perforated metal strapping at a diagonal to prevent water from pooling on strips. Refer to cladding manufacturer for proper spacing between cladding fasteners.

4. This type of attachment is typically limited to a maximum of 4 to 6” thick insulation due to the difficulty of aligning fasteners to studs for thicker assemblies and increased vertical deflection for longer fasteners. While it can be used for thicker insulation assemblies, the more restrictive installation tolerances should be considered along with increased deflection of the cladding assembly. Refer to an engineer for fastener spacing.

5. This type of attachment is generally suitable for lighter weight cladding products, which weigh less than 5 lbs/ft², such as fiber cement, metal, and composite claddings. The design is typically constrained by the limitations in dead load deflection of the entire assembly, ensuring that vertical deflection does not exceed 1/8" (3 mm) or as otherwise dictated by the cladding manufacturer and project requirements.

6. Furring and fastener spacing are typically determined by the type of wall assembly and should follow the recommendations of a qualified professional engineer. Generally, furring spacing ranges from 16” to 24”. For lightweight cladding with an insulation thickness of less than 4”, the vertical spacing can range from 10” to 24” (250 mm to 610 mm), with a screw diameter of #10 to #12.

7. Wood and metal strapping can fully support the insulation, allowing the insulation to be temporarily supported by other means (e.g., adhesives, impaling pins) before the strapping is installed. It is recommended that any temporary supports be left in place to prevent damage to the air and water barrier and insulation during their removal.

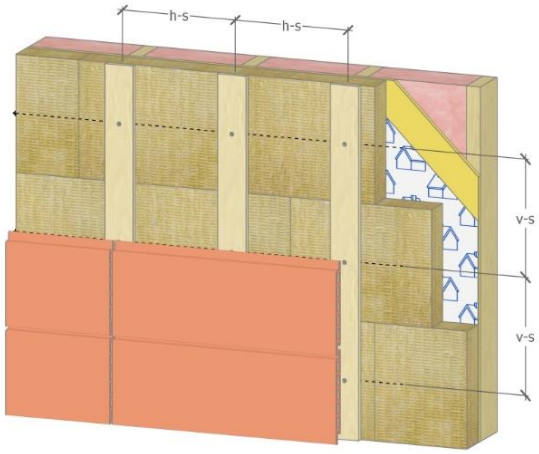

Figure 4 – Wood Strapping

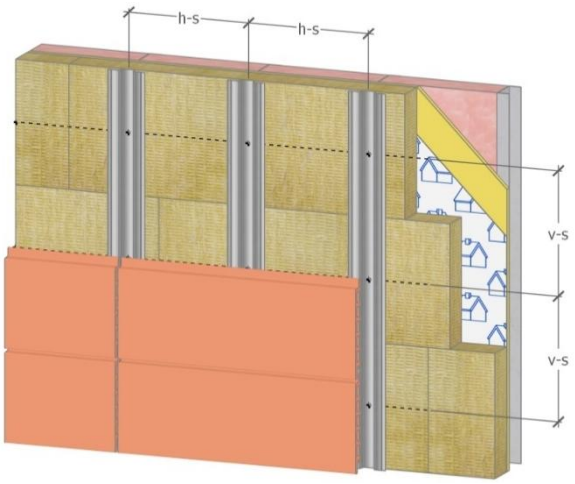

Figure 5 – Vertical Metal Strapping

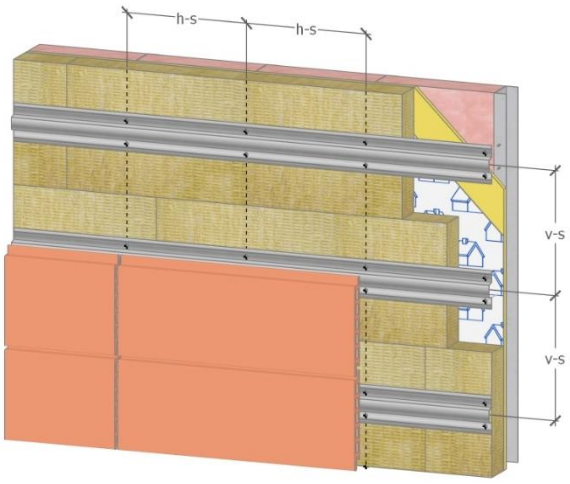

Figure 6 – Horizontal (Perforated) Metal Strapping

7.2 Clip and Rail Systems

A variety of proprietary systems are available in the market for cladding attachment using intermittent clips with continuous girts or rails to the exterior side of the insulation. Depending on the attachment system, the girts or rails may be located fully to the exterior of the insulation or may partially penetrate it. Any penetration of the girts or rails into the insulation may reduce the overall effective R-value of the assembly. These systems are available in a range of materials and types and can include the following:

- Galvanized steel clips and rails
- Aluminum clips and rails
- Stainless steel clips and rails
- Thermally and non-thermally broken clips
- Fiberglass clips
- Horizontal or vertical rails or a combination thereof.

Because these systems vary be manufacturer, they should be reviewed closely to understand if they can provide support to the insulation boards. Typically, the insulation may be installed tight to the clips and may be in contact with the exterior rails, but these may not offer sufficient compression and support to securely support the insulation. Since these engineered systems may have increased structural capacity compared to strapping, the spacing may exceed the minimum fastener requirements for the insulation panels. Therefore, it is recommended that the insulation should be self-supported following the guidelines provided for plain insulation board attachment.

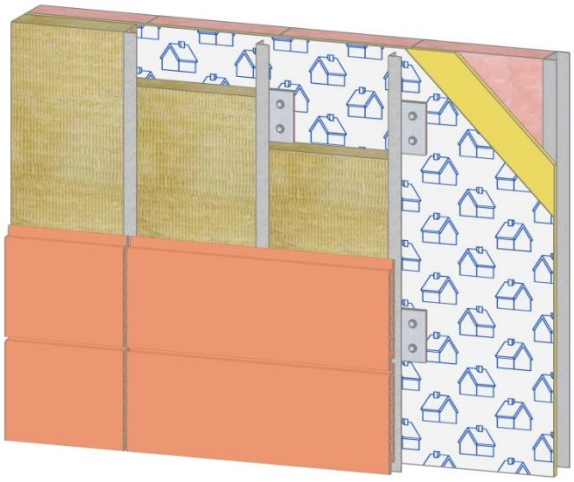

Figure 7 – Galvanized Steel Clips

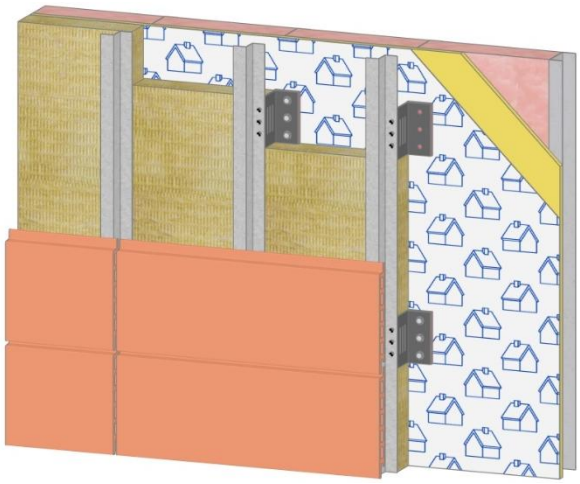

Figure 8 – Stainless Steel Clips

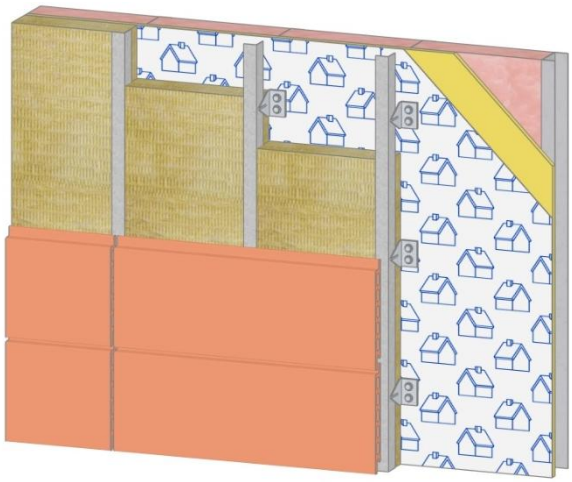

Figure 9 – Thermally Isolated Galvanized Steel Clips

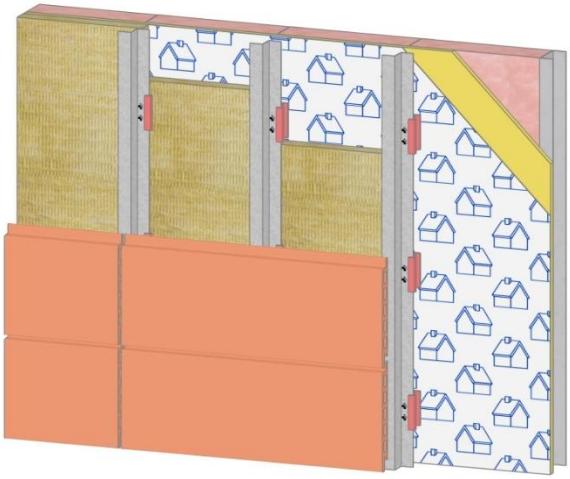

Figure 10 – Fiber Glass Clips

7.3 Continuous Z-Girt

With increasing thermal performance requirements in building codes, the use of continuous Z-girt or similar attachment systems has become less common due to the increased thermal bridging, especially with traditional metal Z-girts. Thermally broken options, such as continuous fiberglass girts, are available in the market and can mitigate these concerns. Continuous girts can be installed vertically, horizontally, or in a combination of both orientations.

As with horizontal strapping, it is important to ensure continuity of drainage through the rainscreen assembly. The spacing of the girts should consider both the spacing of the base substrate framing members and the sizes of the insulation panels for optimal efficiency. While the insulation panels will be partially supported by a tight fit to the Z-girts, it is recommended that the insulation be self-supported, following the guidelines provided for plain insulation board attachment.

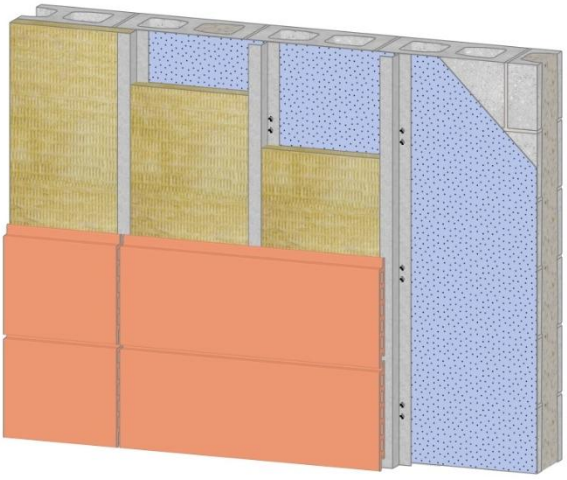

Figure 11 – Vertical Z-Girts

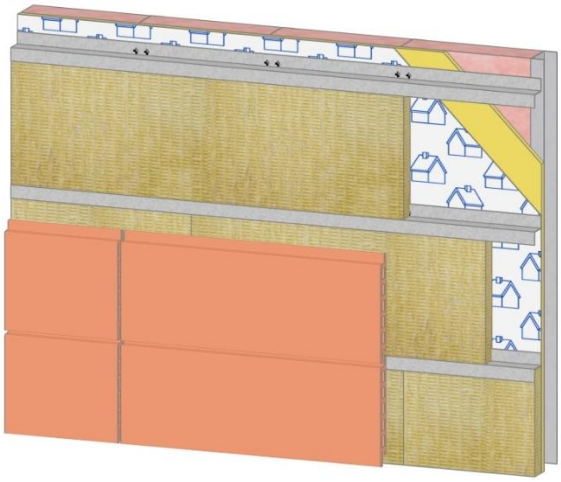

Figure 12 – Horizontal Z-Girts

7.4 Masonry Anchors and Ties

A variety of proprietary masonry attachment systems are available, and these should be reviewed for their ability to support insulation boards. Several systems include retention clips that can be installed with the masonry tie to provide support for the insulation. When installing these systems, the masonry ties are typically installed before the insulation, with the insulation either fitted around the ties or holes made in the insulation to fit over the ties. It is important to ensure that this does not result in any voids or gaps within the insulation and that the insulation is installed tightly against the masonry ties. If the masonry tie includes a retention system, this can then be added. Alternatively, the insulation may be supported following the guidelines provided for plain insulation board attachment. A 1” air space should be continuous between the brick veneer and PowerWool™ Cavityboard™.

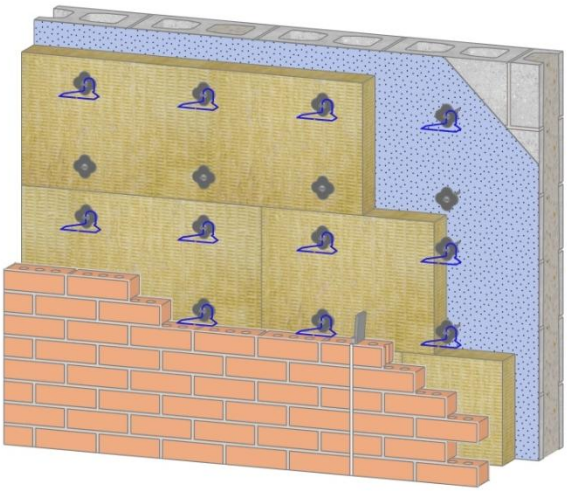

Figure 13 – Masonry Anchor Ties

8 Blindside Installation

There are situations on project sites where insulation must be installed in a blindside condition. This typically occurs on zero lot lines, where the wall is constructed adjacent to an existing building, or in below-grade construction where insulation is installed on the exterior side of the wall.

In zero lot line conditions, it is not feasible to attach the insulation to the adjacent existing structure. Instead, the insulation must be attached to the newly constructed structure. Additionally, a gap is usually required between structures to accommodate building movements due to wind and seismic events. Although mineral wool insulation is considered compressible and non-structural, a clear gap may still be necessary due to local regulatory requirements.

The method of attaching the insulation will vary depending on the base wall substrate. Currently, there are no readily available proprietary products for attaching insulation in such conditions, but other products can be adapted for use. For concrete masonry unit (CMU) walls, this may include using projecting brick ties with added pins or wires bent vertically to secure the insulation, intermittent angles, or other custom solutions that provide dead load support while holding the insulation in contact with the CMU wall assembly. In the case of a CMU wall assembly, the air barrier would need to be applied to the interior side of the CMU.

While blindside insulation on a CMU wall can be installed in layers as various courses of masonry are built, this method cannot be used for a stud wall assembly. In such cases, it is typically recommended to prefabricate sections of the wall with the sheathing, weather barrier, and insulation pre-installed, and then lift the completed assembly into place. These sections can be fabricated on each floor level and tilted into place or hoisted in from above if there is sufficient space. Panel joints would need to be sealed from the interior to ensure continuity of the air barrier.

Figure 14 – Intermittent Steel Angle

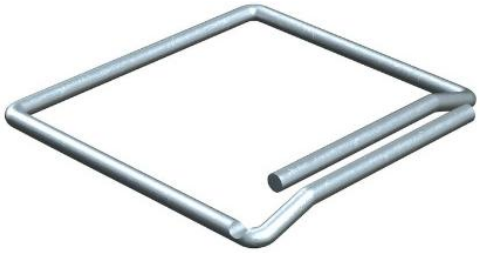

Figure 15 – Bent Wire

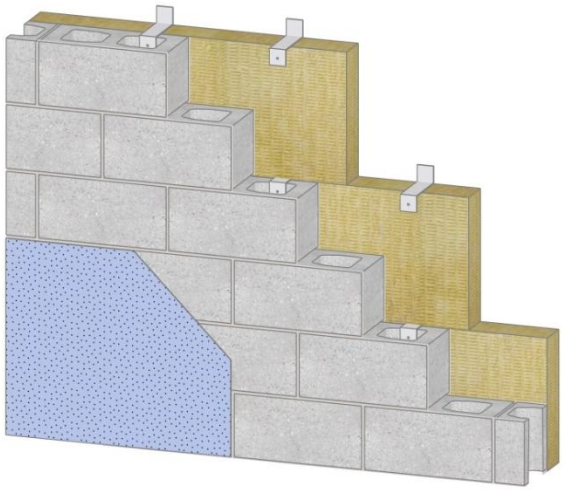

Figure 16 – Intermittent Steel Angle on CMU Wall

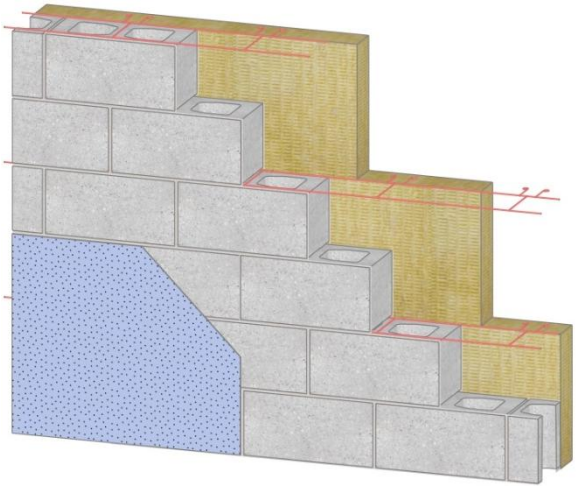

Figure 17 – Projected Brick Ties with Bent Wire on CMU Wall

9 Disclaimers

Fastener selection and attachment should typically be reviewed by a design professional and should succeed any guideline recommendations. PowerWool Insulation USA Inc. will not bear any responsibility for any fastening failures with PowerWool™ Cavityboard™. It is the end user responsibility to determine the proper fastening design for its associated load.

Stantec

Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

Stantec Consulting Ltd.
500-4515 Central Boulevard
Burnaby BC V5H 0C6
stantec.com