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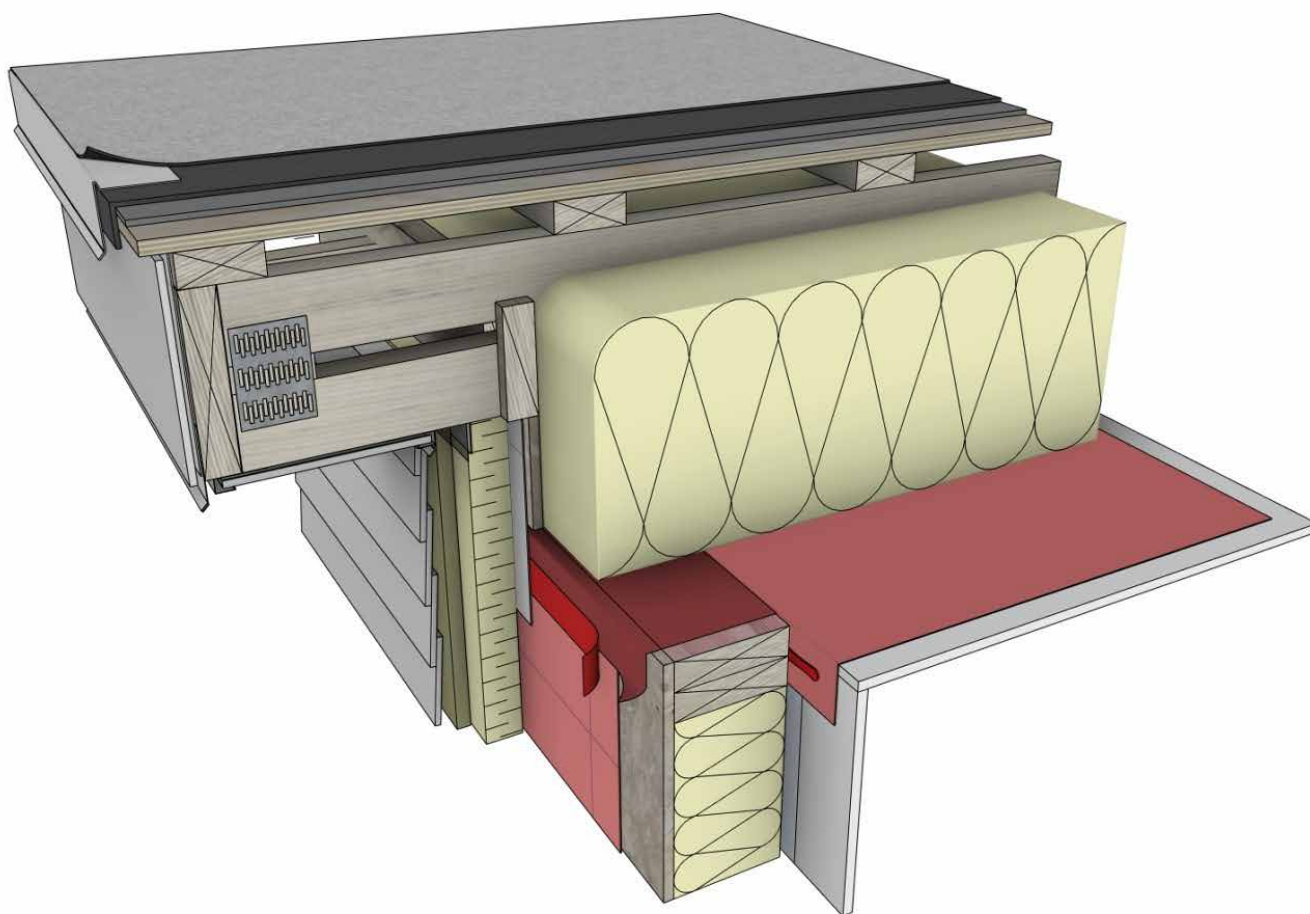
LEEP

LOCAL ENERGY
EFFICIENCY
PARTNERSHIPS

NET ZERO
ENERGY

Roof Guide #4

Vented Flat Roof Assembly



Developed by Natural Resources Canada's
Local Energy Efficiency Partnerships (LEEP) team

CanmetENERGY

Canada

**LEEP Net Zero Energy Roof Guide #4
Vented Flat Roof Assembly**

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Acknowledgments

The Local Energy Efficiency Partnerships (LEEP) team at CanmetENERGY would like to express appreciation to the many Canadian builders, designers, and industry partners who participate in LEEP programs across the country. Builders are invited through their regional Home Builders Associations to take part in technical forums, workshops, and training. Their input has consistently identified the need for practical, building science based resources, including this updated guide series focused on foundation and roof assemblies for high-performance homes.

We would like to acknowledge RDH Building Science for leading the development and illustration of these guides, for coordinating the technical analysis, and for integrating the broad range of industry feedback received during the review process. We also thank our technical reviewers whose comments and technical insights strengthened the clarity and accuracy of this material.

We would like to acknowledge the valuable support of the many regional partners who help deliver and support LEEP initiatives and make this work possible. We also recognize the provincial and local Home Builders Associations whose participation has been essential, along with ongoing leadership and support from CHBA National.

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Disclaimer

This document does not provide assurances or information related to structural systems, seismic performance, or fire safety. It is intended only as a guide on building enclosure science and foundation and roof assembly selection, detailing, materials and performance. The aim of this publication is to provide builders and designers with a framework for making decisions on the type of foundation and roof assemblies to use for individual homes and for new communities.

Natural Resources Canada assumes no liability for injury, property damage, or loss resulting from the use of information contained in this publication. This guide is intended to provide information only and does not express views of the Government of Canada nor does it constitute an endorsement of any commercial product, manufacturer or any individual.

Building science, related products, and construction practices change and improve over time. It is advisable to regularly consult up-to-date technical publications on building science, products, and practices rather than relying solely on this publication. Seek specific information on the use of products, the requirements of good design and construction practices and the requirements of the applicable building codes before undertaking a construction project. Consult the manufacturer's instructions for construction products and also speak with and retain professional consultants who hold a valid license and have appropriate engineering or architectural qualifications. Work with your municipality or local authority having jurisdiction to ensure compliance with issues of design, zoning and construction practices, including life and fire safety.

The effective R-value ranges and assemblies illustrated in this guide represent potential strategies to reach high-performance targets including the upper tiers of the National Building Code of Canada. As with any performance-based energy target, energy modeling must be used to determine appropriate designs for each individual project. Compliance strategies may be influenced by design choices such as building form, window placement, orientation, mechanical systems, and equipment efficiency.

The information included in this guide is generic in nature and is not tied to any specific voluntary labeling program. Builders and renovators looking to qualify their homes under the Canadian Home Builders' Association Net Zero Home Labeling Program must ensure their homes meet all the Technical Requirements of that Program.

LEEP Context

The LEEP Team at CanmetENERGY works with groups of builders, through their Home Builders Associations (HBAs). LEEP programs offer opportunities to identify barriers and gaps in technology and to discuss and evaluate Net Zero Energy (NZE) and high-performance home building strategies. Builders use forums and workshops to identify key technology challenges and invite experts and manufacturers to respond by proposing solutions, innovations and direction on how to integrate these ideas into construction practices. Through their HBAs, builders use LEEP to define and solve technology challenges, and to connect with design professionals who can help them deliver the homes of tomorrow. The goal is builder-driven enhancement to local building practices.

The Need

There is a need for fundamental change in roof design and construction. Canadian builders are moving beyond typical wood-framing practices to roof assemblies that reach higher levels of performance. LEEP technical forums have been delivered in many locations across Canada. Regional LEEP builder groups have consistently identified high-performance roofs as a key technological challenge. They have requested information on:

- › Increased effective R-values; continuous insulation and reduced thermal bridging
- › Continuous air barrier systems and airtight building enclosures; improved thermal performance, reduced heating and cooling loads, reduced risk of condensation within cavities
- › Water-protection systems; reduced risk of water intrusion from rain and snow using reliable water control details
- › Effective vapour control; reduced risk of trapping moisture within the assembly

There is great diversity in Canadian light wood construction. Roof details and assembly types vary by region and climate zone. Local construction practices can also vary, along with access to reliable technical information and training. Coordination with trades and consultants is critical when introducing new technology and this should not be overlooked. It is our hope that by providing these guidelines for roof assemblies with construction details, we will help builders select, plan and construct robust roof assemblies with success. Project-specific details should always be developed to account for the unique conditions of each project.

We see the LEEP guides for Net Zero Energy Construction not as the end goal, but as an essential tool for the next generation of high-performance buildings.

Documents in This Series

The following is a list of the documents in the LEEP Net Zero Energy Foundation and Roof Technical Guide series:

- › **Foundation Guide #1:** Basement Below-Grade Assemblies
- › **Foundation Guide #2:** Crawl Space and At-Grade Assemblies
- › **Foundation Guide #3:** Exposed Floor Assemblies
- › **Roof Guide #1:** Vented Attic Roof Assembly
- › **Roof Guide #2:** Vented Vaulted Roof Assembly
- › **Roof Guide #3:** Exterior-Insulated Sloped Roof Assembly
- › **Roof Guide #4:** Vented Flat Roof Assembly
- › **Roof Guide #5:** Conventional Flat Roof Assembly

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Vented Flat Roof Assembly Overview

A vented flat roof is a joist-insulated assembly with a slope of less than 2:12. It relies on a fully waterproof roofing membrane, consistent air barrier continuity, and adequate ventilation to function effectively. In this configuration, the roof joist space is insulated, while a ventilated air gap is maintained between the insulation and the roof sheathing.

Clearance between the insulation and the sheathing can be achieved with purlins (often referred to as cross-strapping), along with any remaining gap in the joist cavity. Purlins perpendicular to the joists provide cross-ventilation pathways across the top of the insulation. Complex flat roof shapes without large, interconnected spaces may make adequate venting challenging. The flat roof arrangement also limits venting airflow because there is minimal vertical height available to develop air movement, reducing the driving forces that promote consistent ventilation across the assembly.

Waterproof Membrane (Roof Finish)

The waterproof roofing membrane serves as both the water-shedding surface (WSS) and the primary water control layer. A fully adhered multi-ply bitumen-based roof membrane system is recommended in most cases. Refer to [Risk Management for Flat Roofs on page 14](#) for further guidance. Water drains across the membrane to roof drains and/or perimeter scuppers. Additional roof layers such as pavers or decorative finishes can be used to protect the membrane, but the membrane performs all water-control functions.

Effective roof drainage is key to long-term assembly durability. A consistent positive roof slope, well-placed and adequately sized drains, and robust perimeter overflow scupper details help prevent ponding and direct water off the roof effectively. Uninterrupted roof drainage is the key to reducing the potential for roof leaks and maintaining roof performance. Flashings, perimeter control layer tie-ins, and penetration detailing are also critical for controlling water on flat roofs.

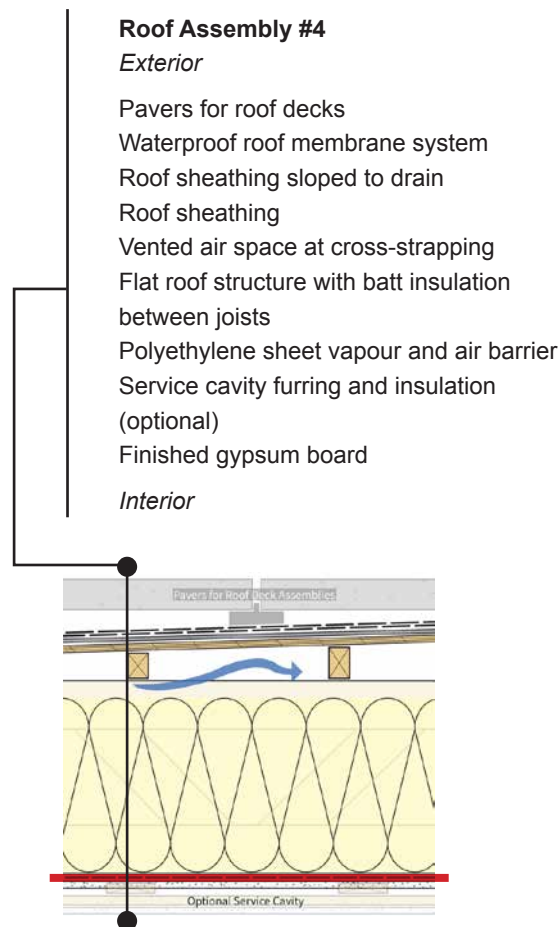


Figure 1 Typical assembly layers of the insulated vented flat roof assembly.

Airtightness is essential for high-performance NZE roof assemblies. NZE homes target very low air leakage, verified through testing at completion. Strong airtightness improves energy performance and reduces condensation risk in roof cavities. Continuity at transitions and penetrations is critical.

Air Control Layer (Air Barrier System)

This assembly relies on an interior air barrier system such as sealed polyethylene to reduce air movement into the roof space. Sheathing board with taped joints can also be used. Robust detailing at all wall top plates and penetrations is important for maintaining the air barrier's continuity and effectiveness. A service cavity beneath the air barrier above the ceiling finish can help limit penetrations from electrical services. See [Air Barrier Best Practices on page 11](#) for more information.

Thermal Control Layer (Insulation)

The insulation thickness is limited by the depth of the roof joists, while leaving space for ventilation. Achieving higher effective R-values typically requires deeper framing members (e.g., engineered trusses or I-joists). Vented flat roof assemblies can use a variety of batt insulation types, including stone wool, fiberglass, or wood-fibre. The following table provides approximate effective R-values for typical vented flat roof assembly arrangements.

Table 1: Approximate Effective R-values of Interior-Insulated Vented Vaulted Roofs [ft °F•hr/Btu]*							
2x Framing				I-Joist/Wood Truss			
Framing Depth	Nominal Insulation	16" o.c.	24" o.c.	Framing Depth	Nominal Insulation	16" o.c.	24" o.c.
2x8	R-24 batt	R-20	R-21	9.5"	R-32 batt	R-27	R-30
2x10	R-32 batt	R-26	R-27	11.8"	R-40 batt	R-34	R-37
2x12	R-40 batt	R-32	R-34	14"	R-48 batt	R-40	R-44
				16"	R-56 batt	R-42	R-52
				20"	R-72 batt	R-53	R-65
*Components above the vented air space are not accounted for. Add R-1.0 to the effective R-value for assemblies with a 1.5" interior service cavity.							

Vapour Control Layer (Vapour Barrier)

A sealed polyethylene sheet (poly) is typically used as the primary vapour barrier. If another type of ceiling air barrier is used in place of poly, a separate vapour barrier must be added to control moisture diffusion toward cold exterior surfaces. Vapour-barrier paint is a common option for this purpose. Membrane material with variable vapour permeance (i.e., "smart vapour retarder") can also be used to control outward vapour and permit inward flow if needed. A ceiling smart vapour retarder limits moisture diffusion into the roof assembly during cold conditions while allowing inward drying when conditions reverse. This adaptive behaviour can reduce the risk of condensation and moisture accumulation within the roof assembly compared to fixed low permeability vapour barriers.

Venting and Insulation

The vented flat roof assembly relies on a dedicated ventilation air space above the insulation to help reduce the risk of moisture buildup in the roof cavity and keep the roof sheathing cooler. Roof venting is important as a moisture management strategy in case of minor leaks or condensation, to help reduce humidity if there is vapour flow or air leakage from the interior, and to keep the roof sheathing cooler in the summer and reduce heat stress on the roofing products. Note that ceiling airtightness remains essential since venting cannot fully compensate for heat loss or warm interior air entering the roof assembly.

Roof vents must be uniformly distributed on opposite sides of the building and provide a total vent area of at least 1/150 of the insulated ceiling area. At least 25% of the openings must be located near the bottom of the roof space eave and 25% near the top of the space. Common methods of achieving venting include soffit vents, doghouse vents, and parapet vents. A 2.5" clear air space is required between the insulation and roof sheathing. Clearance between the insulation and the sheathing can be created by using at least 1.5" thick cross-strapping installed perpendicular to the joists. Note that the cross-strapping is typically also arranged to create the roof slope.

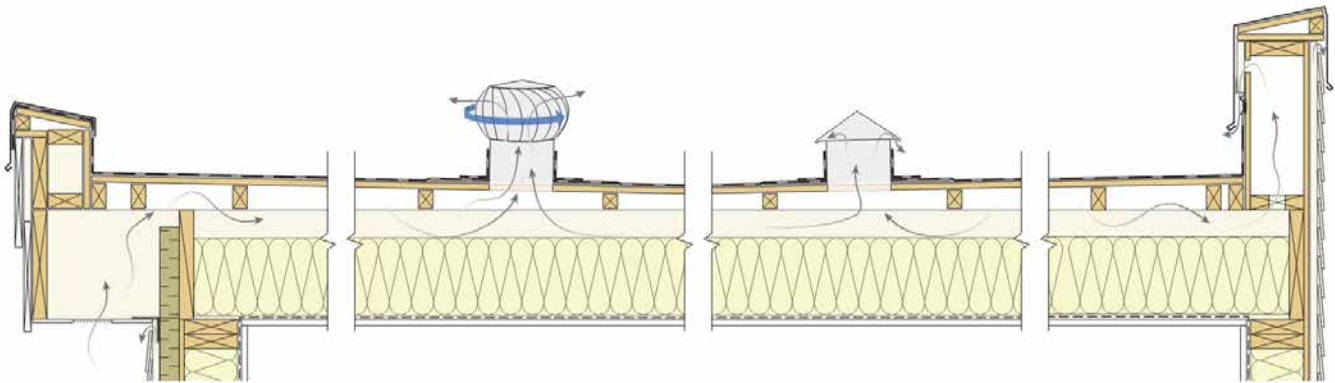


Figure 2 Examples of venting options from left to right: soffit vent, turbine roof vent, doghouse roof vent, parapet vent

Considerations for High-Humidity Environments

In mild coastal climates such as the Pacific Northwest, high outdoor humidity during fall and winter can increase the risk of microbial growth on the underside of roof sheathing in the roof space. This occurs when humid coastal air enters the roof space and raises the wood moisture content enough to support microbial growth. Increasing roof ventilation does not reduce this risk. Studies have shown that in flat roofs with limited ventilation effectiveness there can be a risk of severe seasonal discolouration, surface microbial growth and even decay.

Surface treatments on the underside of the sheathing can be used to limit the risk of microbial growth. Research has shown that wood surface treatments like fungicidal coatings, borate-based wood preservatives, and water-repellent wood coatings can be effective. These treatments are not part of the roof assembly water control system but serve as a protective measure against microbial growth.

Research has also shown that condensation and microbial growth risk can be further reduced if there is sufficient thermal insulation or thermal mass on the top side of the flat roof sheathing. This works by slowing down radiant heat loss to the night sky (i.e., night sky cooling) that leads to prolonged cold surface temperatures and condensation within the roof space. Even as little as R-5 insulation on the top side of the sheathing can help moderate temperature changes. This layer is not part of the thermal control layer but helps reduce the long term risk of damage from condensation in the assembly.

Air Barrier Best Practices

Continuity of the roof air control layer is one of the most important aspects of a properly performing assembly. The air barrier system is critical regardless of its location or material type. Ceiling polyethylene air barriers are a common weak point in buildings seeking to reach high levels of airtightness, so careful planning is needed. The details shown in the [Construction Details on page 16](#) highlight the air barrier components used to provide continuity across all the interfaces shown.

Top Plates and Roof-to-Wall Interface

Establishing exterior air barrier continuity across top plates and at the roof-to-wall transition involves applying continuous high-performance tape or self-adhered membrane over all top plates before the roof framing is installed. At exterior wall top plates, the membrane also extends over the wall sheathing. This approach is more reliable than polyethylene strips sandwiched between the top plates. The interior ceiling air barrier is then sealed to the sides of all top plates so that the air barrier transfers through the top plate membrane, including at the perimeter roof-to-wall interface. The wall air barrier membrane is then sealed to the top plate tape on the exterior side. The following figure shows the key installation steps for this roof-to-wall interface.

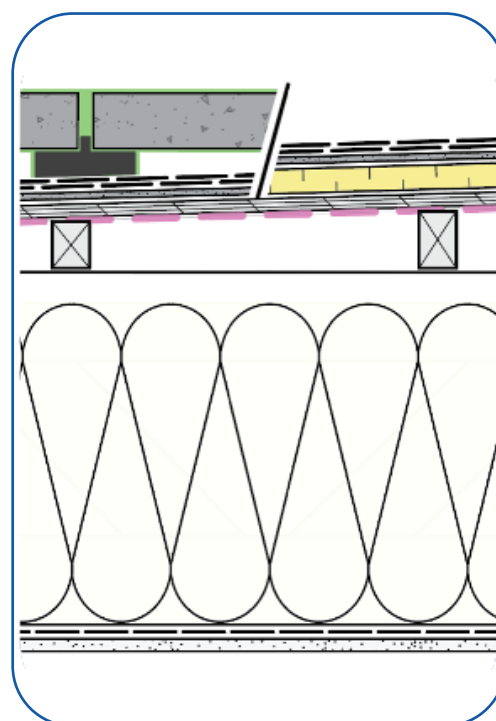


Figure 3 Assembly considerations for vented flat roofs in mild coastal climates: Roof sheathing surface treatments (pink), pavers (green), and buffer insulation (yellow).

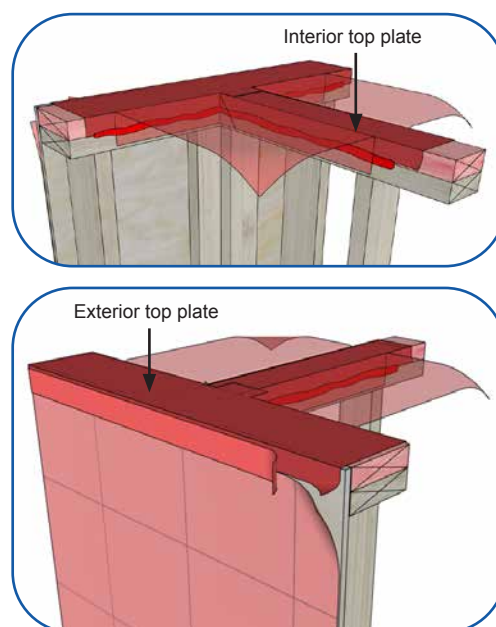


Figure 4 High-performance tape over all top plates to create a continuous air seal at the roof-to-wall transition.

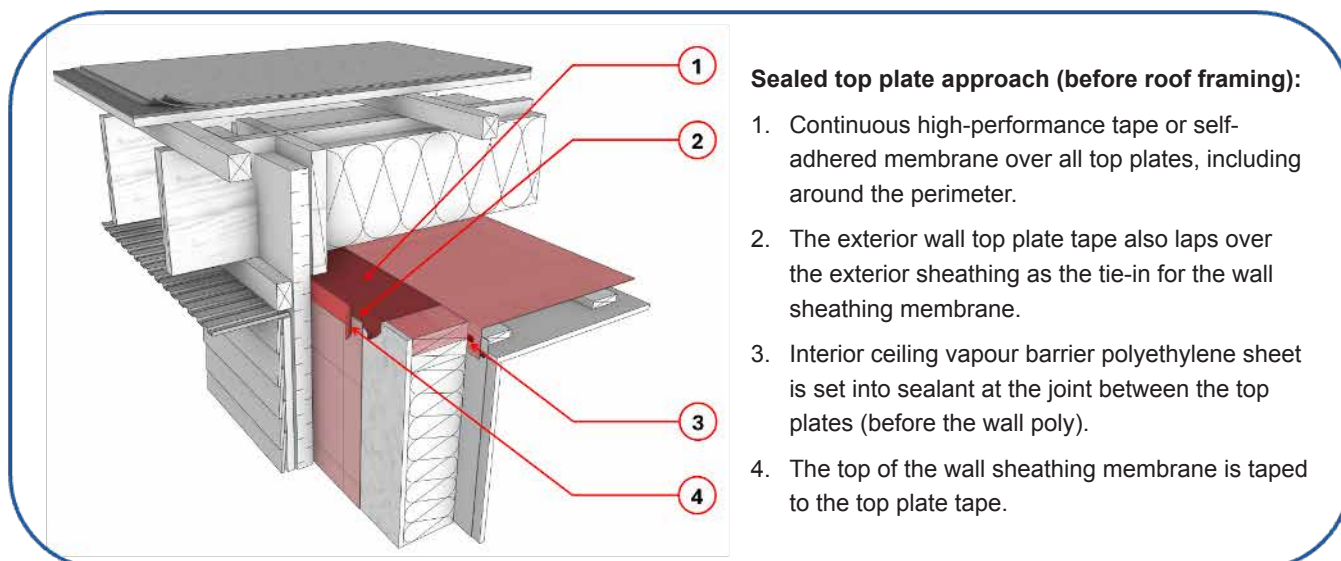


Figure 5 Overview of the key steps to achieving a continuous air barrier connection between the exterior sheathing membrane and the interior ceiling poly using the taped top plate approach.

Top Plate Penetrations

Penetrations through the top plates need clear and inspectable air barrier detailing to maintain continuity at the roof-to-wall transition. The recommended approach is to apply continuous high-performance non-permeable tape along the top and both edges of the top plate before the roof framing is installed. Then, during rough-in, install pre-formed EPDM gaskets or equivalent sealing collars around each penetration so the gasket sits flat on the taped top plates. Once the component is in place, tape the perimeter of the gasket to the top plate tape or set it into a continuous bead of sealant. This provides a durable and visible air seal. High-performance tape, sealant, or utility putty works as well. By making the top plate itself airtight with a non-permeable membrane, there is no need for polyethylene strips between the top plates.

Top of Party Wall

Top plate air sealing at party walls is critical for maintaining continuity of the ceiling air barrier in joist insulated and vented flat roof assemblies. Party walls can create concealed air leakage paths if the top plates are not fully sealed. Unsealed or discontinuous detailing at this interface allows warm interior air to bypass the ceiling air barrier. A continuous, durable air seal across the full width of the party wall top plates ensures that the

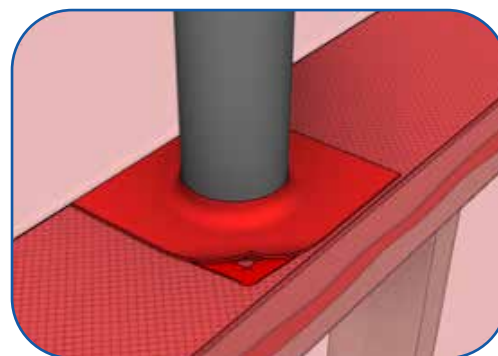


Figure 6 Air seal at a top plate penetration created with a pre-installed gasket sealed to the top plate tape for a continuous air barrier around the pipe.

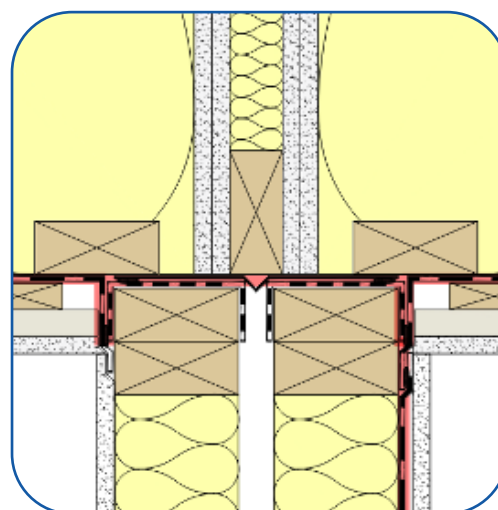


Figure 7 Air seal across the top plates of a double-stud party wall using metal flashing set into sealant.

ceiling air barrier remains uninterrupted and performs as intended. The air seal is typically provided by the required continuous sheet metal fire blocking. The air seal also needs to connect with the party wall suite air barrier. As with other ceiling airtightness details, effective performance depends on clear, inspectable sealing at all joints, transitions, and interfaces between framing elements and adjacent assemblies.

Ceiling Penetrations

Common ceiling penetrations such as recessed pot lights and other electrical fixtures present a unique challenge to ceiling airtightness when an interior air barrier is used. A typical home may have dozens of such penetrations. This section outlines three detailing approaches that can be used to achieve high-performance ceiling airtightness.

Airtight Electrical Box

Airtight electrical boxes can act as the primary air barrier instead of separate polyethylene pans or metal junction boxes. However, two additional steps are needed to make this approach reliably airtight. The factory foam flap at the wire entry is thin and flexible, so electrical putty is added around the wire penetration to create a more durable seal. At the box perimeter, the compression gasket does not always sit flush against the ceiling polyethylene, so a small bead of sealant is applied between the gasket and the air barrier.

Sealed Plywood Housing for Recessed Fixtures

Penetrations for deep fixtures like recessed pot lights, exhaust fans, and speakers can be challenging to make airtight using conventional pre-formed polyethylene pans. These pans are typically too flexible to provide a solid substrate for durable airtight detailing. Instead, sealed plywood boxes can be used at each fixture to provide a stiff airtight housing. The plywood provides a substrate for the rough-in components to be fastened inside the box and the wire penetration permanently sealed. This prevents the air seal from being disturbed during fixture installation. It is important to provide sufficient insulation above the service box, usually heat-resistant foam board insulation such as polyisocyanurate.

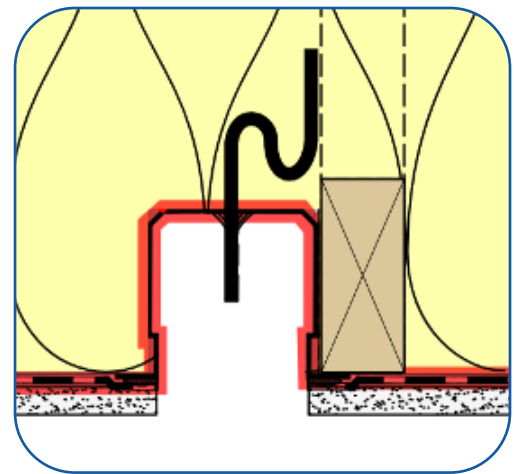


Figure 8 Airtight electrical box detail with utility putty at the wire penetration and sealant at the perimeter gasket.

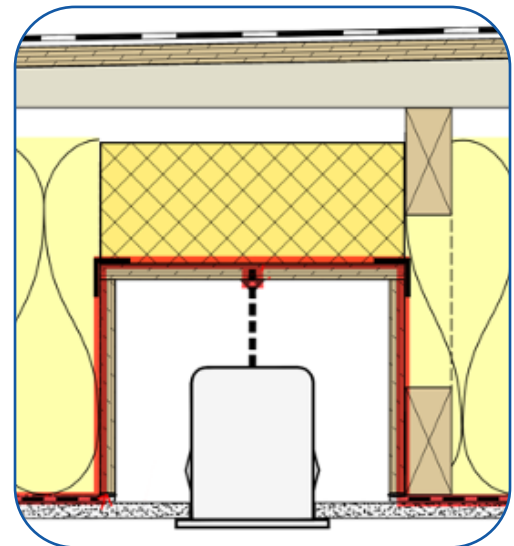


Figure 9 Sealed plywood housing with taped seams, utility putty at the wire penetration, sealant at the perimeter edge, and rigid insulation above the box.

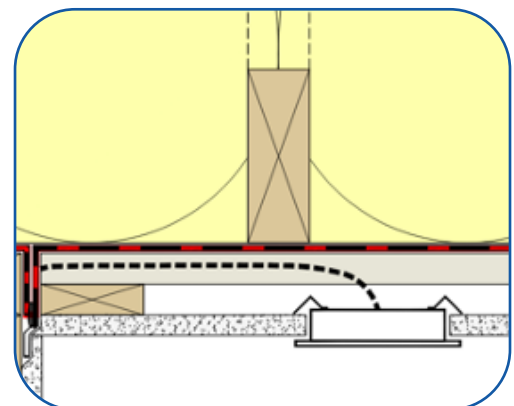


Figure 10 Fixture within a ceiling service cavity.

Dedicated Service Cavity

A service cavity provides a way to significantly reduce the number of penetrations in the ceiling air barrier. Typical service cavities use at least 1.5" deep framing and cross-strapping to allow free routing of services. This approach requires modified sequencing compared to conventional practice as follows:

- › The ceiling air barrier and strapping are installed before the electrical rough-in components are fastened in place.
- › Shallow electrical boxes and fixtures are needed to fit within the cavity.
- › Top plate penetrations route through the side of the plates into the service cavity, rather than up into the ceiling space above the air barrier.
- › Openings must be carefully cut into the ceiling finish to avoid damaging the air barrier above.
- › Insulation or tightly spaced strapping is needed to support the air barrier, unless airtight sheathing is used.

Risk Management for Flat Roofs

Wood-frame joist-insulated roof assemblies are especially sensitive to moisture, so a robust, fully adhered roofing system is needed. A fully adhered multi-ply bitumen-based roof membrane system like 2-ply SBS is recommended in most cases, for flat roofs. This system provides durability and redundancy because it includes multiple layers. Thorough detailing at interfaces and penetrations also plays a crucial role in the long-term performance of flat roof assemblies. **Flat roofing systems are installed by qualified roofing professionals in accordance with the manufacturer's written installation instructions for each layer.** Refer to the [Construction Details on page 16](#) for further guidance.

Penetrations and Drains

Roof decks include drains, scuppers, guard posts, and service penetrations that interrupt the waterproofing layer and present an increased risk of leakage. These locations require robust detailing using compatible roofing grade materials. Penetrations through the roof membrane are detailed using prefabricated boots, liquid-applied transition membranes, or other components intended for roofing applications. Transition materials must be compatible with the primary roofing membrane and installed in accordance with the manufacturer's recommendations. Drain bodies with an integrated clamping ring and strainer help provide long-term durability and reduce the risk of clogged drains.

Roof Decks

Providing as much vertical separation as practical between the door sill and the roof deck surface reduces the potential for water ingress from ponding water, splashback, or snow melt. Accessibility requirements must also be considered when establishing sill heights and transitions. Achieving a raised door sill may require the roof deck framing to be set lower than the adjacent interior floor framing so the structure allows adequate sill height and positive slope away from the door.

Any portion of the curb or framing located within 8 inches of the finished horizontal roof deck surface, including the top surface of the pavers or tiles, is made waterproof with roofing grade materials. This is typically done by extending the roofing membrane from the deck surface up into the door sill, using liquid-applied membrane around complex interfaces including onto a back dam behind the door threshold. Roof deck membranes are protected from traffic and mechanical damage using flashings, pavers, tiles, and other protective surfacing.

Overflow Scuppers

Overflow scuppers provide a secondary drainage path if primary roof drains become blocked by debris. Setting the overflow scupper lower than the lowest door sill limits the maximum ponding depth and reduces the risk of water reaching the threshold or entering the building. Locating the overflow with a visible discharge (i.e., parapet scupper) allows occupants to recognize that water levels are rising and that the primary drainage system requires attention. This simple measure is a key aspect of risk management for flat roofs.

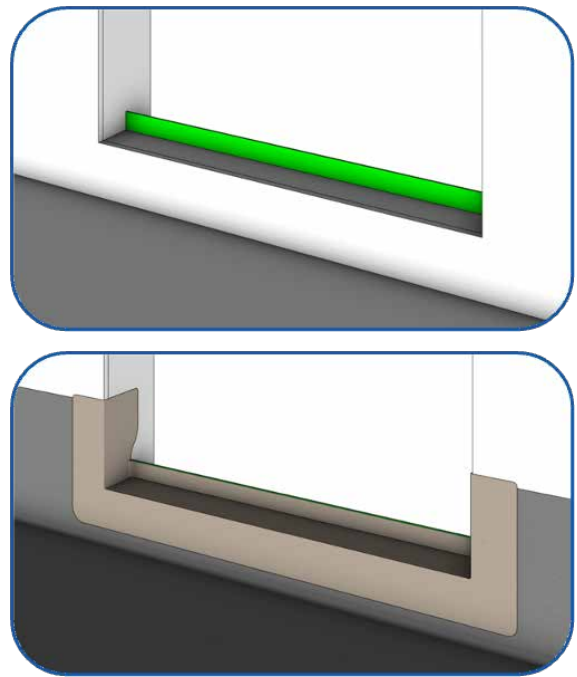


Figure 11 Roof deck door sill rough opening detailing sequence showing the back dam (green) positioned behind where the threshold will be, and the roofing membrane and liquid-applied membrane onto the back dam.

Construction Details

The example details in the following pages establish a common level of detailing for Vented Flat Roof Assembly Guide #4. Each guide in this series provides a similar set of details for its respective assembly. Builders may replicate or adapt these details to meet Net Zero Energy or other high-performance targets, provided the core principles of air barrier continuity, water-resistive barrier continuity, and insulation continuity are maintained.

The assemblies shown were selected through LEEP initiatives where builder groups requested a focus on practical, regionally appropriate high-performance solutions. Building-science experts reviewed these assemblies based on climate, local construction practices, and code requirements. The details highlight key transition strategies, with red “AB” and “AB/WRB” icons identifying air barrier and water-resistive-barrier components.

These illustrations represent best practices. Project-specific work may require additional details, cladding-specific adjustments, and coordination with structural, mechanical, electrical, and life-safety systems. Any modifications should be prepared or reviewed by qualified professionals, as provincial requirements vary.

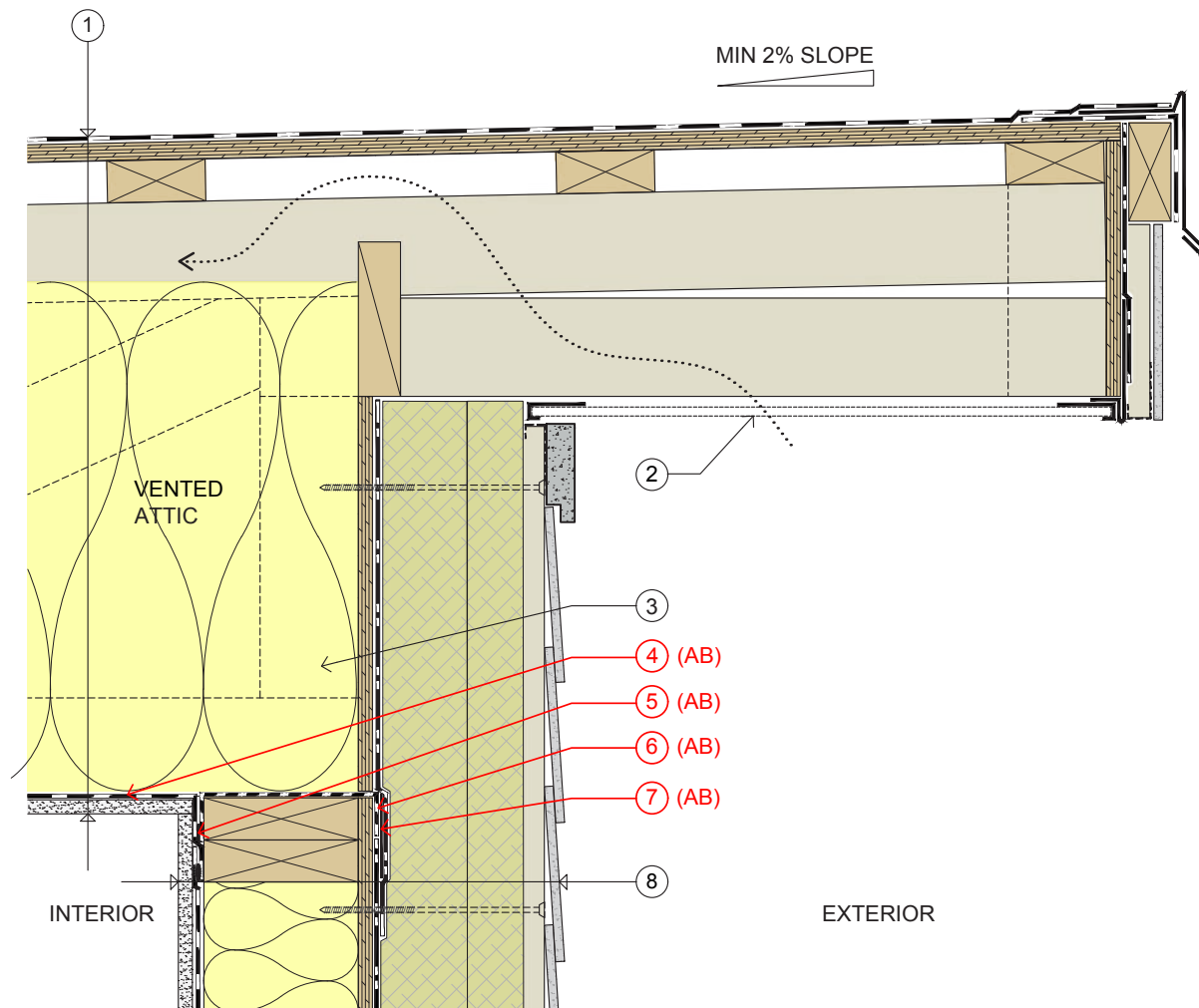
To reduce the risk of water penetration, mould, or other deficiencies, builders are encouraged to review details with a building-science engineer or architect, and to practice installation techniques using full-scale mockups for training and quality control.

Each unique project will require the development of specific details and construction documents to address the varied conditions found in each building and the capacity of local construction trades. In addition, each builder must provide quality control and assume liability for the work they complete. Reliable technical information and training are critical to your success. We recommend that builders take advantage of technical guides and training opportunities offered by credible sources and share this training with everyone on your crew. Work with your local Home Builders Association to find more information and to build local capacity.

For more guidance and example detailing for net zero energy roof assemblies, refer to the following additional resources:

- › Illustrated Guide — Insulated Wood-Frame Vaulted and Flat Roofs for Residential Construction in BC, BC Housing
- › Building Envelope Guide for Houses, BC Housing
- › Canadian Home Builders' Association of BC Building Science for New Homes, CHBA BC
- › BC Energy Step Code Builder Guide, BC Housing
- › Building Enclosure Design Guide, BC Housing

Detail 4.01 Above-Grade Wall at Overhanging Flat Roof

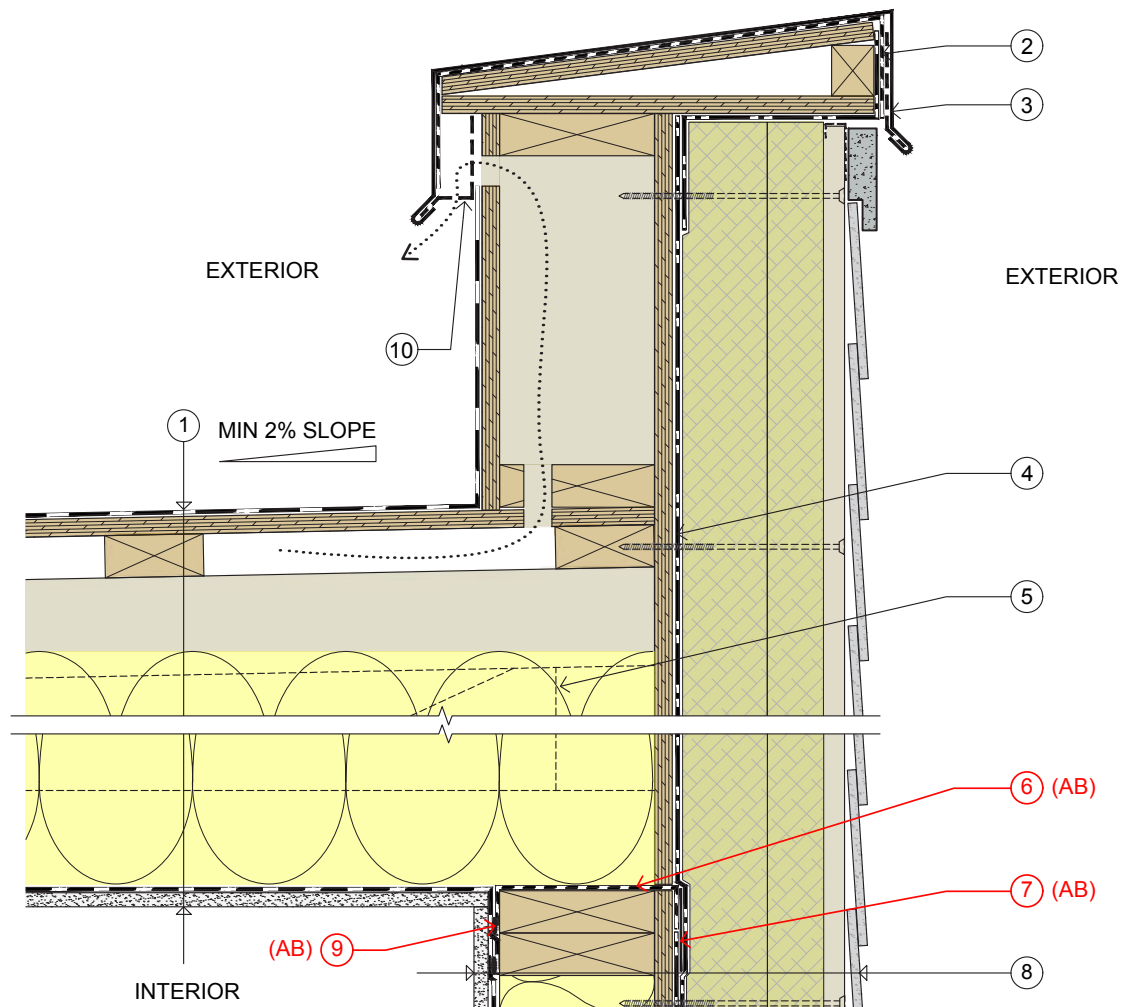


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| <p>① Vented flat roof assembly</p> <ul style="list-style-type: none"> • Waterproof roofing membrane including perimeter edge detailing • Roof sheathing • Flat roof framing with vented cavity • Batt insulation • Ceiling vapour barrier poly (AB) • Ceiling gypsum board <p>② Flat roof venting through soffit</p> <p>③ Batt insulation</p> <p>④ Ceiling poly (AB)</p> | <p>⑤ Continuous sealant at ceiling poly (AB)</p> <p>⑥ Continuous self-adhesive membrane over all top plates (AB)</p> <p>⑦ Continuous tape seal (AB)</p> <p>⑧ Above-grade wall assembly with exterior air barrier system (AB)</p> |
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ABOVE-GRADE WALL AT OVERHANGING FLAT ROOF | D4.01
ROOF #4 - VENTED FLAT ROOF

Detail 4.02 Above-Grade Wall at Roof Parapet Wall

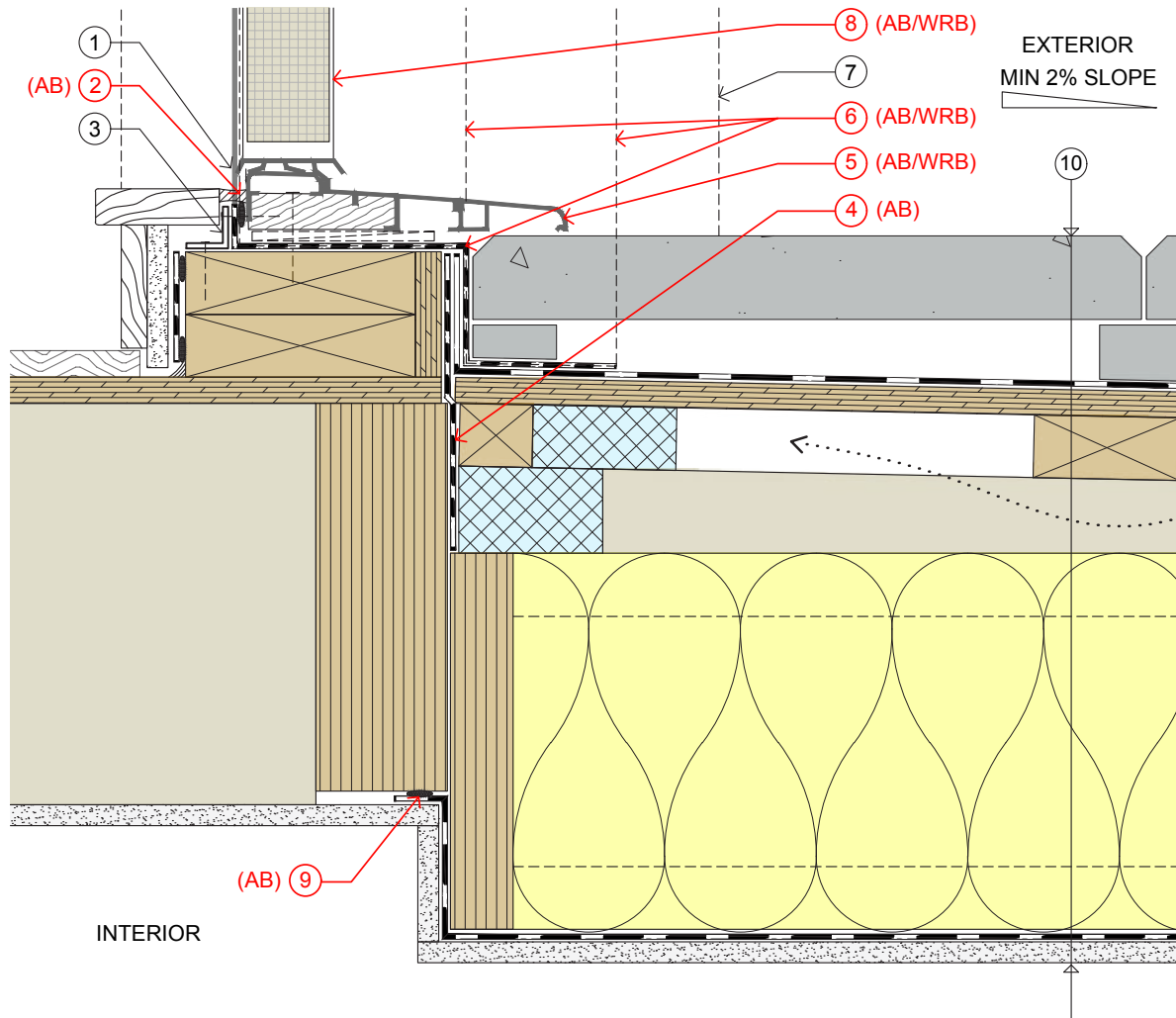


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| <p>① Vented flat roof assembly</p> <ul style="list-style-type: none"> • Waterproof roofing membrane including perimeter edge detailing • Roof sheathing • Flat roof framing with vented cavity • Batt insulation • Ceiling vapour barrier poly (AB) • Ceiling gypsum board <p>② Self-adhesive parapet membrane</p> <p>③ Parapet cap flashing c/w fastening cleat</p> <p>④ VP sheathing membrane (AB/WRB)</p> | <p>⑤ Vented cavity with batt insulation</p> <p>⑥ Continuous self-adhesive membrane over all top plates (AB)</p> <p>⑦ Continuous tape seal</p> <p>⑧ Above-grade wall assembly with exterior air barrier system (AB)</p> <p>⑨ Continuous sealant at ceiling poly (AB)</p> <p>⑩ Continuous perforated metal flashing closure for roof venting (min 300mm above roof for snowy climates)</p> |
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ABOVE-GRADE WALL AT ROOF PARAPET WALL | D4.02
ROOF #4 - VENTED FLAT ROOF

Detail 4.03 Roof Deck at Access Door Sill

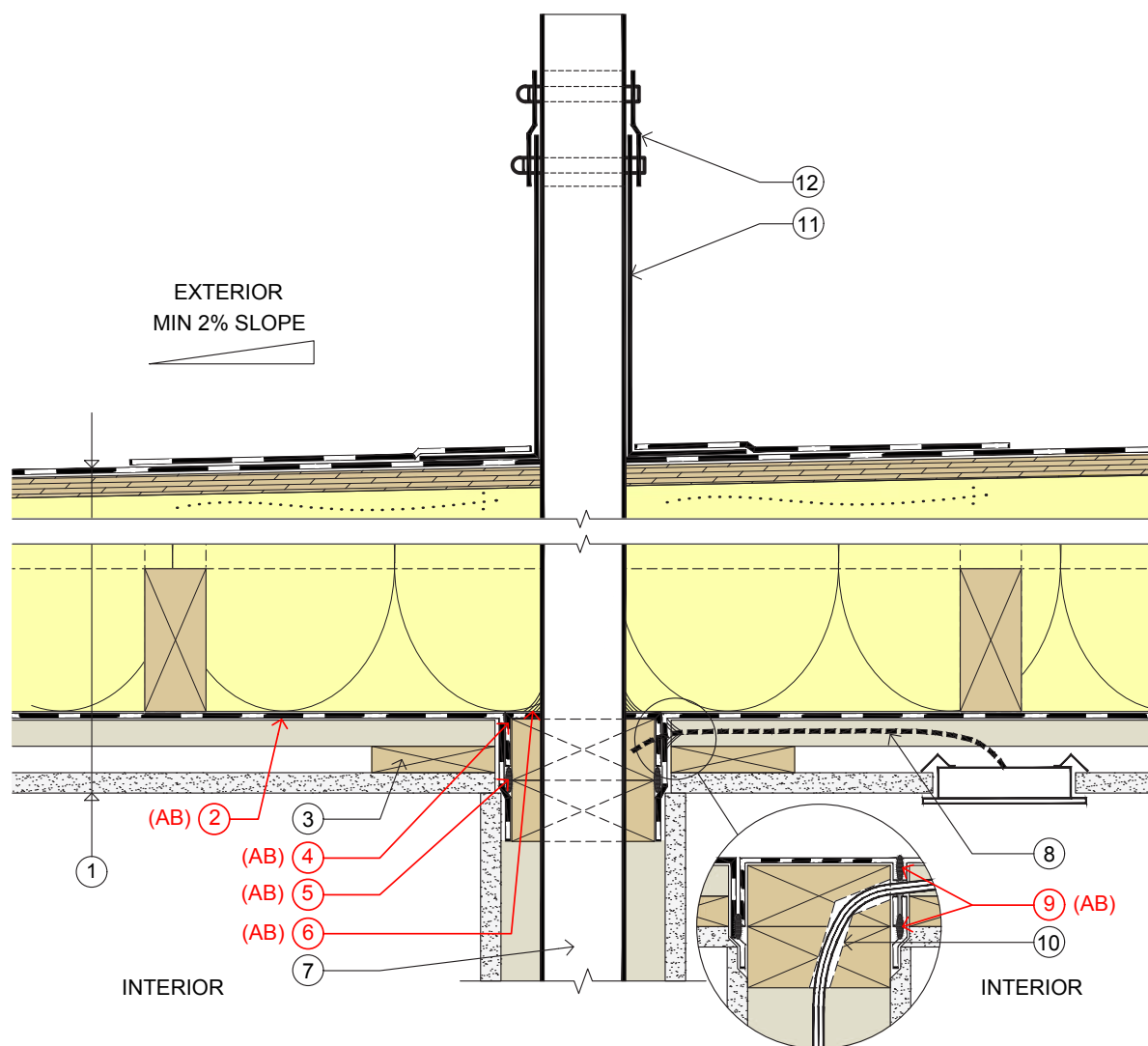


LEGEND

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| ① Continuous aluminum sill angle | ⑦ Line of adjacent wall beyond |
| ② Door threshold set into continuous sealant bead at sill angle and fastened through framing interior (AB) | ⑧ NAFS-rated entry door (AB/WRB) |
| ③ Sealant cap bead | ⑨ Continuous sealant between ceiling vapour barrier poly and rim joist / beam (AB) |
| ④ Self-adhesive membrane prestrip over rim joist/beam up to door opening (AB) | ⑩ Vented flat roof assembly |
| ⑤ Door threshold with 2" sill extender set on shims (AB/WRB) | <ul style="list-style-type: none"> • Concrete pavers • Waterproof roofing membrane including perimeter edge detailing • Roof sheathing • Flat roof framing with vented cavity • Batt insulation • Ceiling vapour barrier poly (AB) • Ceiling gypsum board |
| ⑥ Liquid-applied reinforced roofing membrane over sill angle and minimum 8" up jambs and onto adjacent starter curbs (AB/WRB) | |

ROOF DECK AT ACCESS DOOR SILL | D4.03
ROOF #4 - VENTED FLAT ROOF

Detail 4.04 Service Penetration Through Top Plates at Roof

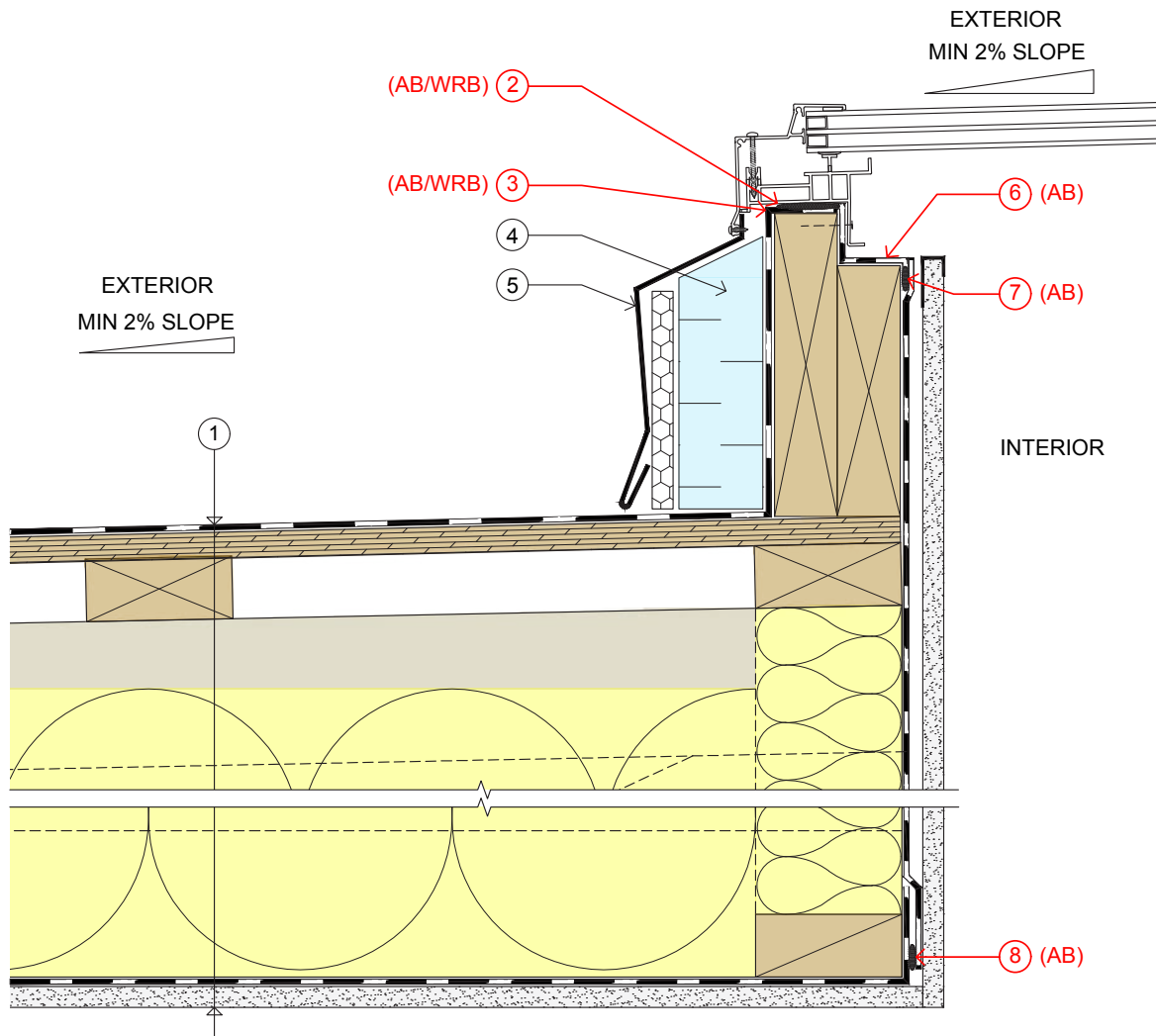


LEGEND

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| ① Vented flat roof assembly with ceiling vapour barrier poly air barrier system (AB) | ⑦ Top plate service penetration into ceiling joist space (vent stack shown) |
| ② Ceiling vapour barrier poly returned down face of top plates (AB) | ⑧ Wire penetration into ceiling service space (beyond) |
| ③ Cross-strapping for ceiling service space | ⑨ Ceiling poly top plate sealant around wire penetration (AB) |
| ④ Continuous self-adhesive membrane over all top plates (AB) | ⑩ Wire penetration through side of top plate aligned with service cavity |
| ⑤ Continuous ceiling poly top plate sealant (AB) | ⑪ Spun aluminum roof jack |
| ⑥ Continuous sealant around top plate penetration (AB) | ⑫ Flexible pipe coupling with stainless steel clamps |

SERVICE PENETRATION THROUGH TOP PLATES AT ROOF | D4.04 ROOF #4 - VENTED FLAT ROOF

Detail 4.05 Skylight on Roof Curb

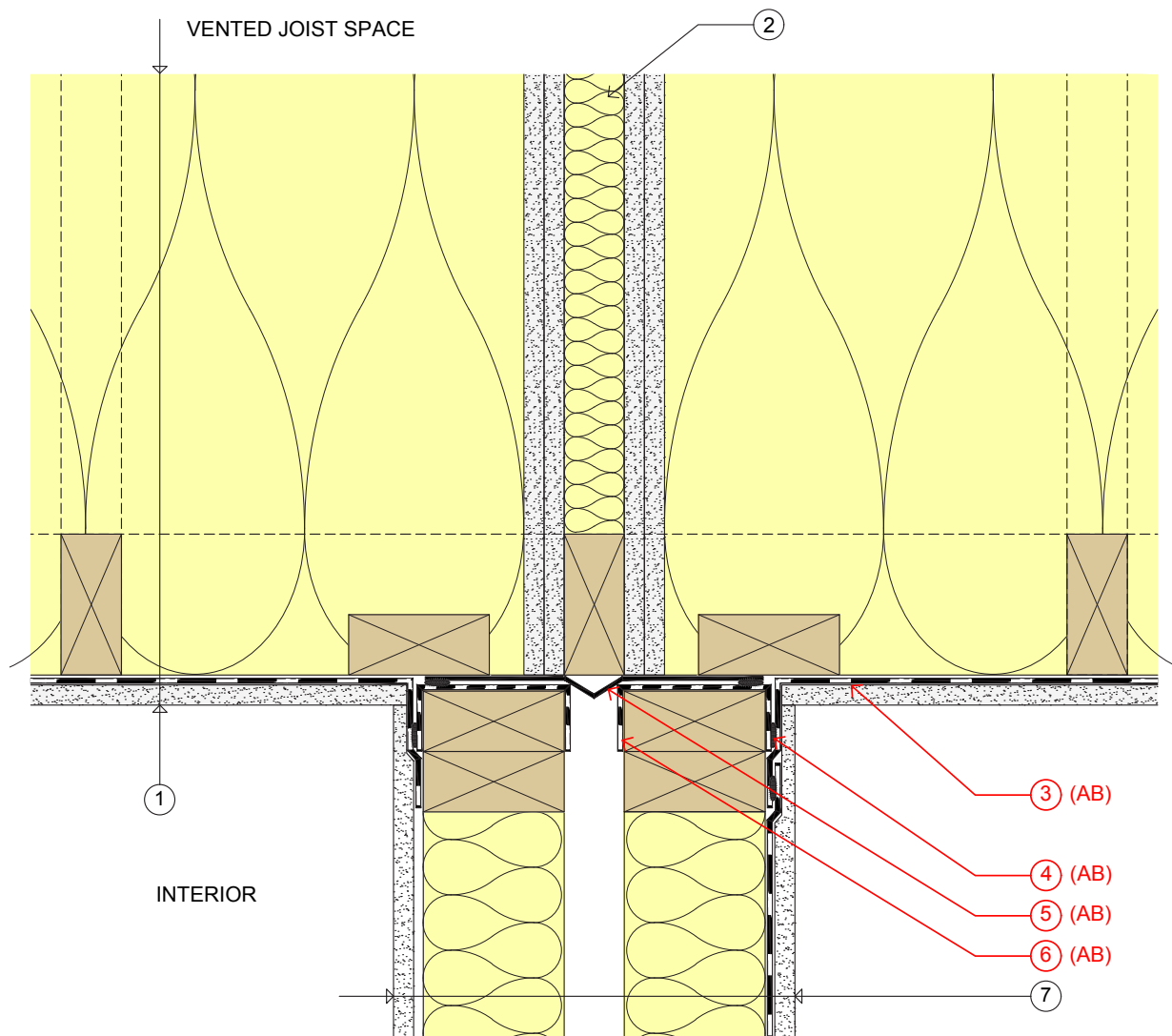


LEGEND

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| <p>① Vented Flat Roof Assembly</p> <ul style="list-style-type: none"> • Waterproof roofing membrane including perimeter edge detailing • Roof sheathing • Flat roof framing with vented cavity • Batt insulation • Ceiling vapour barrier poly (AB) • Ceiling gypsum board <p>② Skylight frame set into continuous sealant on curb (AB/WRB)</p> <p>③ Waterproof roofing membrane to top of skylight curb (AB/WRB)</p> | <p>④ Rigid insulation and drain mat adhered around skylight curb</p> <p>⑤ Pre-finished metal skylight skirt flashing</p> <p>⑥ Sealant at edges and joints in skylight curb frame (AB)</p> <p>⑦ Top edge of skylight shaft vapour barrier poly set into continuous sealant at skylight curb frame (AB)</p> <p>⑧ Continuous sealant between ceiling poly and skylight shaft poly (AB)</p> |
|---|---|

SKYLIGHT ON ROOF CURB | D4.05 ROOF #4 - VENTED FLAT ROOF

Detail 4.06 Top of Interior Double-Stud Party Wall at Roof



LEGEND

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| <p>① Vented flat roof assembly with ceiling vapour barrier poly air barrier system</p> <p>② Batt insulation</p> <p>③ Ceiling vapour barrier poly (AB)</p> <p>④ Continuous sealant at ceiling poly (AB)</p> <p>⑤ Continuous sheet metal firestop profile set into sealant on top plates and sealed at joints (AB)</p> | <p>⑥ Continuous self-adhesive membrane over all top plates (AB)</p> <p>⑦ Party wall assembly with partition air barrier system</p> <ul style="list-style-type: none"> • Interior gypsum wall board • Poly (AB) • Wood framing with batt insulation • Air gap • Wood framing with batt insulation • Interior gypsum wall board |
|--|---|

TOP OF INTERIOR DOUBLE-STUD PARTY WALL AT ROOF | D4.06
ROOF #4 - VENTED FLAT ROOF

Glossary

Air control layer	The control layer designed to resist the flow of air through the building enclosure. Also referred to as the air barrier system.
Air leakage	Uncontrolled airflow through openings in the building enclosure.
Air permeance	The degree to which a material allows air to flow through it.
Vapour control layer (vapour barrier / vapour retarder)	The control layer that manages the diffusion of water vapour through materials and resists movement of water vapour across the enclosure.
Vapour diffusion	The movement of water vapour through a material.
Water control layer	The innermost boundary against liquid water intrusion.
Water-resistive barrier (WRB) membrane	A sheathing membrane capable of resisting non-hydrostatic water pressure and deflecting water off vertical or high-sloped conditions.
Water load	The liquid water the enclosure manages, including precipitation, runoff, groundwater, and ice melt.
Water-shedding surface (WSS)	The outer surface of the building enclosure that deflects most exterior precipitation away from inner layers.
Thermal control layer	The control layer designed to primarily resist heat flow through the building enclosure.
R-value / RSI value	The measure of the thermal resistance of a material or assembly of materials.
Service cavity	An intentional space between interior finishes and the air barrier designed to contain services that would otherwise penetrate the air barrier.
Penetration	Any intentional opening through an assembly to allow ducts, wires, pipes, or fasteners to pass.
Condensation	The change of water vapour to liquid water.
Continuity (of control layers)	Control layers that span across different material types, transitions, interfaces, and joints without breaks.



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