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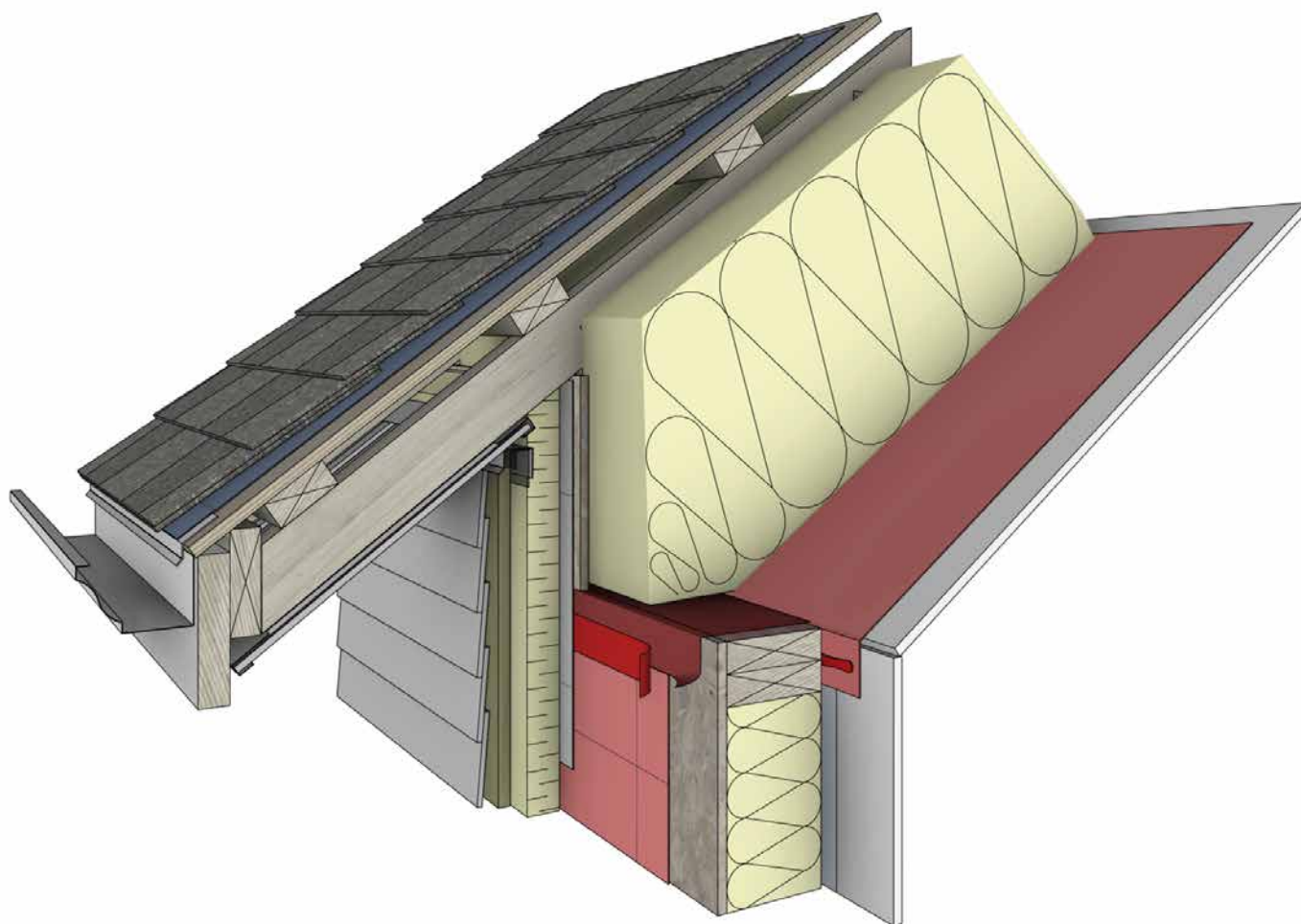
LEEP

LOCAL ENERGY
EFFICIENCY
PARTNERSHIPS

NET ZERO
ENERGY

Roof Guide #2

Vented Vaulted Roof Assembly



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

CanmetENERGY

Canada

LEEP Net Zero Energy Roof Guide #2 Vented Vaulted Roof Assembly

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Acknowledgements

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.

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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 Vaulted Roof Assembly Overview

A vaulted roof (also called a cathedral roof) is a cavity-insulated assembly with a slope of at least 2:12. It relies on high-performance air barrier continuity and adequate ventilation above the insulation 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 roof shapes without large, interconnected attic spaces may make venting more challenging.

A service cavity can be added on the interior side, between the ceiling finish and the ceiling air barrier. This approach typically allows electrical services to be routed without penetrating the ceiling air barrier system.

Water-Shedding Surface (Roof Finish)

The sloped roofing, trim, flashings, and any adjoining wall cladding together form the water-shedding surface (WSS). Sloped roof assemblies have at least 2:12 slope, but at least 4:12 slope is typical for most roofing types. An overhang helps protect the wall below from wind-driven rain and provides water control continuity.

The WSS typically consists of roofing shingles or metal panels. These finishes direct most water away by gravity drainage into perimeter gutters. The WSS and the water control layer are usually in direct contact, so these assemblies rely on adequate drainage from the sloped surface. The sloping is needed to avoid prolonged exposure to water and allow the WSS and water control layer to work using shingle-lapped materials.

Flashings, gutters, and downspouts are critical for directing water away from the building. Uninterrupted roof drainage is the key to reducing the potential for roof leaks and maintaining roof performance.

All sloped roofs face some risk of ice-dam formation in winter. This risk grows if the roof is under-insulated or lacks adequate ventilation. See [Ice Damming: Causes.](#)

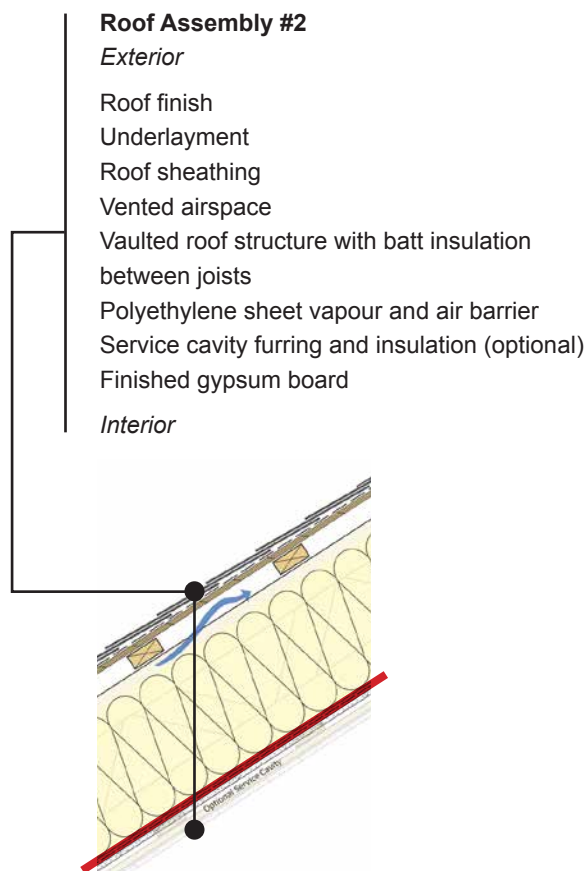


Figure 1 Typical assembly layers of the insulated vented vaulted roof assembly.

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.

Water Control Layer

In sloped roof assemblies, the roof underlayment beneath the roofing finish serves as the water control layer. Traditional asphalt-saturated organic building paper has often been used, but modern synthetic sheathing membrane can be more durable and easier to install. It is typically lighter weight and more flexible. Self-adhered non-permeable membrane is used for eaves protection.

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. Rigid 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 can help limit penetrations. See [Air Barrier Best Practices](#) on page 14 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). Vaulted 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 vaulted vented 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 vaulted 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 for the following reasons:

- › Airflow is a moisture-management strategy in case of minor leaks or condensation.
- › Venting can help reduce humidity if there is vapour flow or air leakage from the interior.
- › Keeping the roof sheathing cooler in the summer can help reduce heat stress on the roofing products.
- › Venting helps limit ice damming by keeping the roof sheathing colder and reducing melt and refreeze cycles at the eaves.

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 placed near the eaves and ridges to allow airflow to reach all areas beneath the roof sheathing. In some roof designs, ensuring continuous airflow can be challenging.

Consider the following design and construction factors when planning for vaulted roof venting:

- › **Minimum airspace:** 2.5" clear airspace is required between the insulation and roof sheathing. Clearance between the insulation and the sheathing can be created by using cross-strapping installed perpendicular to the joists. Cross-strapping also provides a pathway for cross-ventilation between port vents and across enclosed roof features like hips and valleys.
- › **Eave Venting:** Full-depth joists or raised-heel engineered joists are the best way to maintain adequate insulation thickness without blocking ventilation. Baffles can also be installed to keep the air channel clear. Eave venting is typically provided through perforated soffits. Top-side venting through port vents is also an option.
- › **Ridge Venting:** Port vents, gable vents, or proprietary ridge vent products are typically used. Specialty low-profile shingle strip vents are also an option.

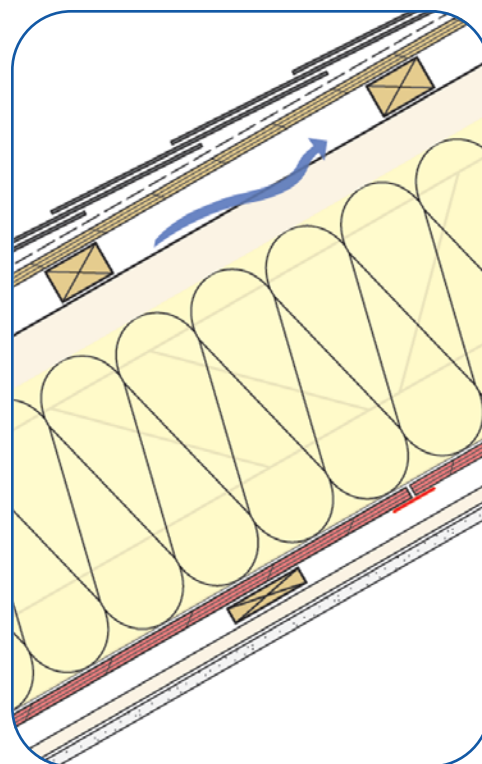


Figure 2 Vented vaulted roof assembly showing continuous airflow above the insulation to manage moisture and temperature in the roof space.

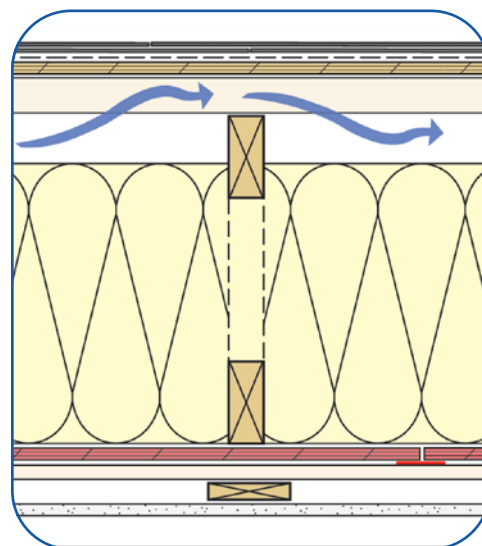


Figure 3 Cross-strapping over the top of the roof joists to provide continuous airflow to all areas of the insulated ceiling plane.

- › **Vent Opening Area:** Provide a total vent area of at least 1/150 of the insulated ceiling area, with at least 25% of the openings located near the eave and 25% near the ridge.
- › **Screening:** Vent screens and louvers reduce the net free vent area. Account for this reduction when determining the required vent ratio. Note that perforated metal soffits with maximum 1/8" holes may be needed for wildfire resistance to reduce the risk of embers entering the vent space.

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.

This seasonal discolouration does not typically result in damage or lead to decay, but avoiding surface microbial growth is still beneficial.

Surface treatments on the underside of the sheathing can be used to limit the risk of microbial growth. Research has shown that the following treatment options can work for this purpose:

- › Fungicidal or mold-inhibiting coatings like stain-blocking primer
- › Borate-based wood preservatives
- › Water-repellent wood coatings, sealers, and primers
- › Specialty restoration coatings to encapsulate surfaces

These treatments are not part of the roof assembly water control system but serve as a protective measure against microbial growth. Note that, regardless of the risk of discolouration, providing roof ventilation generally leads to more durable assemblies compared to unvented joist-insulated roof assemblies.



Figure 4 Test panel showing different coating treatments applied to clean wood to compare their effectiveness in limiting microbial growth.

Ice Damming: Causes, Risks, and Mitigation

An ice dam is a ridge of ice that forms along the colder edge of a sloped roof. Snow on the upper portion of the roof can melt when the roof sheathing becomes warm. The meltwater flows downward until it reaches the colder eaves, where it refreezes and begins to build up. Over time, this creates a blockage that stops additional runoff from draining off the roof.

Ice dams typically develop when heat escapes from the interior into the roof cavity causing temperature differences that encourage melting and refreezing.

Why Are Ice Dams a Problem?

- › Water can back up behind the ice and enter the roof assembly.
- › Refreezing below shingles can lift or damage the roofing materials.
- › Icicles that form at the eaves present safety hazards to people below.
- › Repeated freeze/thaw cycles can shorten the lifespan of roofing components.

Common Causes

- › Gaps in insulation or thermal bridges that warm the roof deck.
- › Air leakage from the interior that carries heat into the roof space.
- › Ceiling heat sources such as recessed pot lights, ducts, plumbing lines, chimneys, and skylight shafts.
- › Uneven snow cover or differences in sun exposure across the roof surface.
- › Insufficient or blocked roof ventilation that prevents the roof sheathing from staying close to outdoor temperatures.

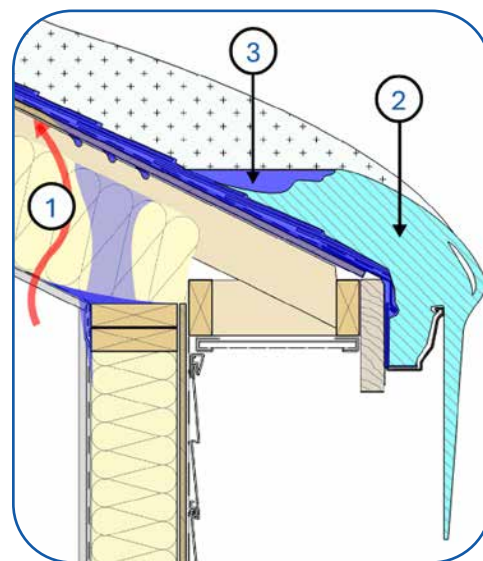


Figure 5 Illustration of an ice dam at the eaves showing warm air leakage from the interior (1), meltwater refreezing at the roof edge (2), and resulting water backup that can leak into the roof assembly (3).

Recommended Ice Damming Mitigation Measures

Ice dams are difficult to fully prevent in cold climates, but their effects can be significantly reduced through careful control of insulation, airtightness, ventilation, and eave protection. The following measures outline practical strategies that help limit ice dam formation and protect the long-term durability of the roof assembly.

Table 2: Roof Assembly Strategies for Ice Damming Control	
Measure	Explanation
Ensure an airtight ceiling plane	Seal gaps and penetrations to prevent warm interior air from entering the roof cavity.
Improve insulation continuity	Pay special attention at roof-to-wall transitions where insulation is often thin or compressed. Use 12" raised heel trusses.
Eliminate roof ceiling heat sources	Avoid deep recessed pot lights, air seal and insulate ducts, plumbing lines, vent chases, and other components that release heat.
Increase roof ventilation	Maintain a continuous ventilation channel to keep roof sheathing closer to outdoor temperatures.
Use waterproof membranes at eaves	Extend ice dam membranes high enough to manage potential meltwater backup above the wall line.
Consider full-coverage waterproofing	Use non-permeable self-adhered underlayment over all roof areas.

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 18 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.

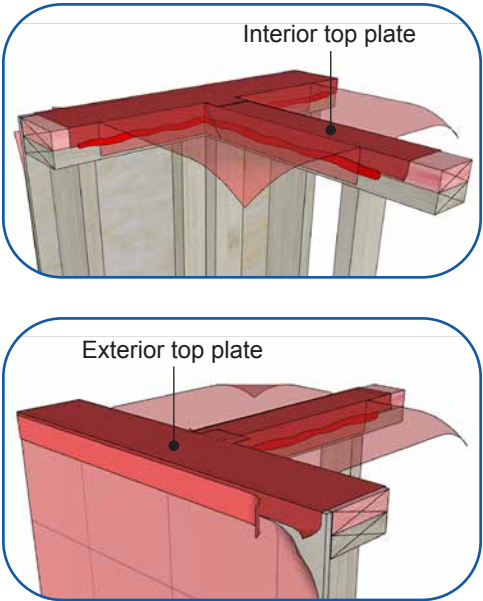


Figure 6 High-performance tape over all top plates to create a continuous air seal at the rooftop-to-wall transition.

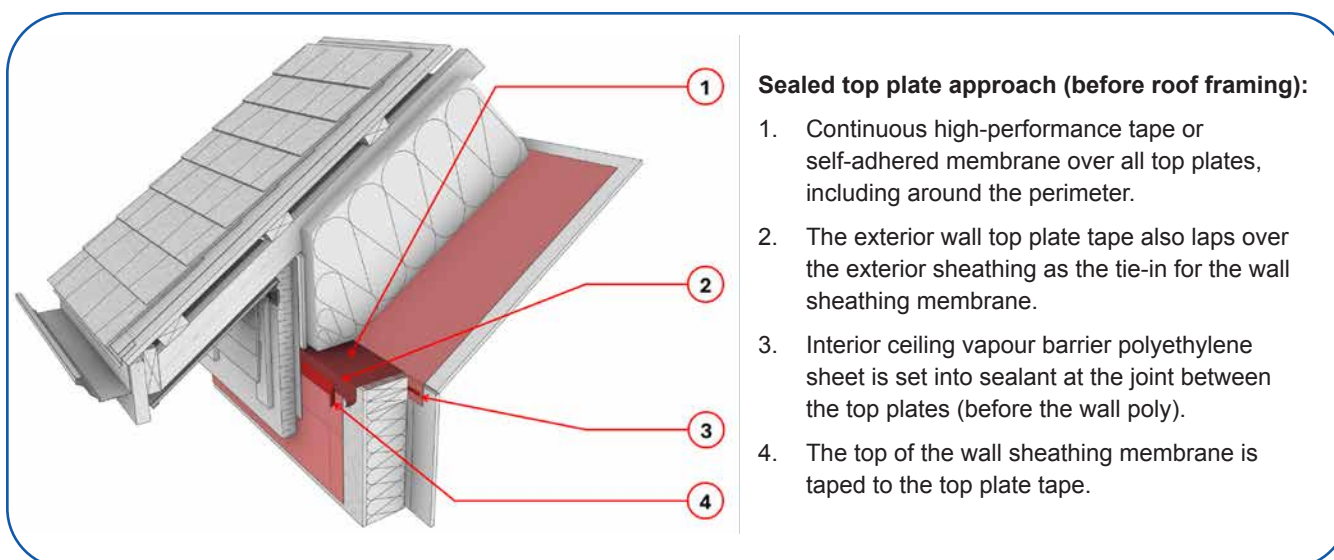


Figure 7 Overview of the key steps to achieving a continuous air barrier connection between the exterior sheathing membrane and the interior ceiling poly using the taped top plate approach.

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.

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.

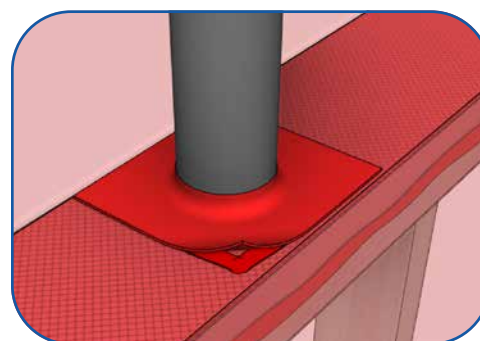


Figure 8 Air seal at a top plate penetration created with a preinstalled gasket sealed to the top plate tape for a continuous air barrier around the pipe.

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 vaulted 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 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.

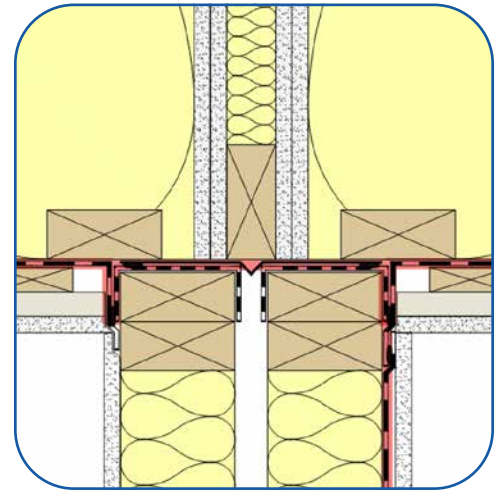


Figure 9 Air seal across the top plates of a double-stud party wall using metal flashing set into sealant.

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.

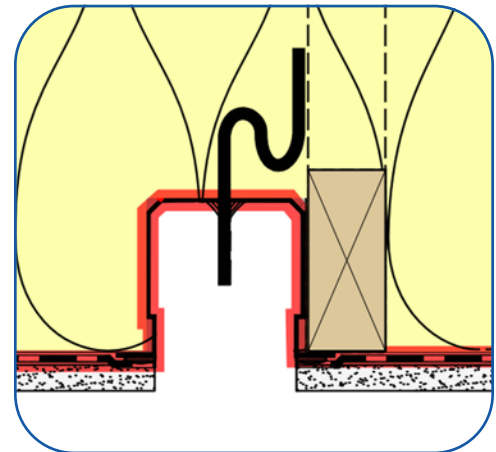


Figure 10 Airtight electrical box detail with utility putty at the wire penetration and sealant at the perimeter gasket.

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.

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.

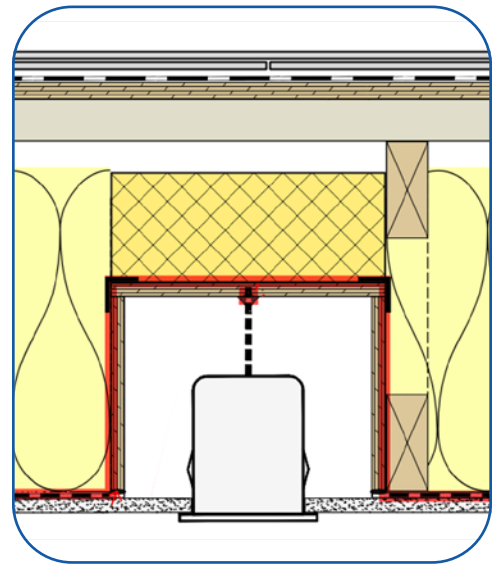


Figure 11 Sealed plywood housing with taped seams, utility putty at the wire penetration, sealant at the perimeter edge, and rigid insulation above the box.

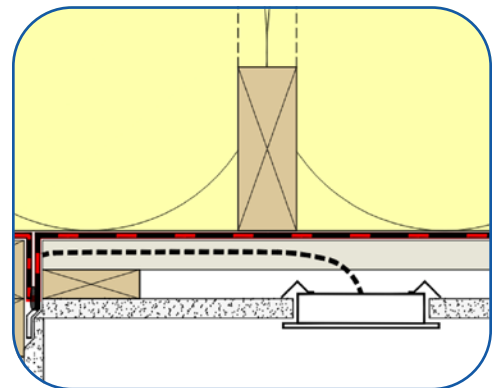


Figure 12 Fixture within a ceiling service cavity.

Construction Details

The example details in the following pages establish a common level of detailing for Vented Vaulted Roof Assembly Guide #2. 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.

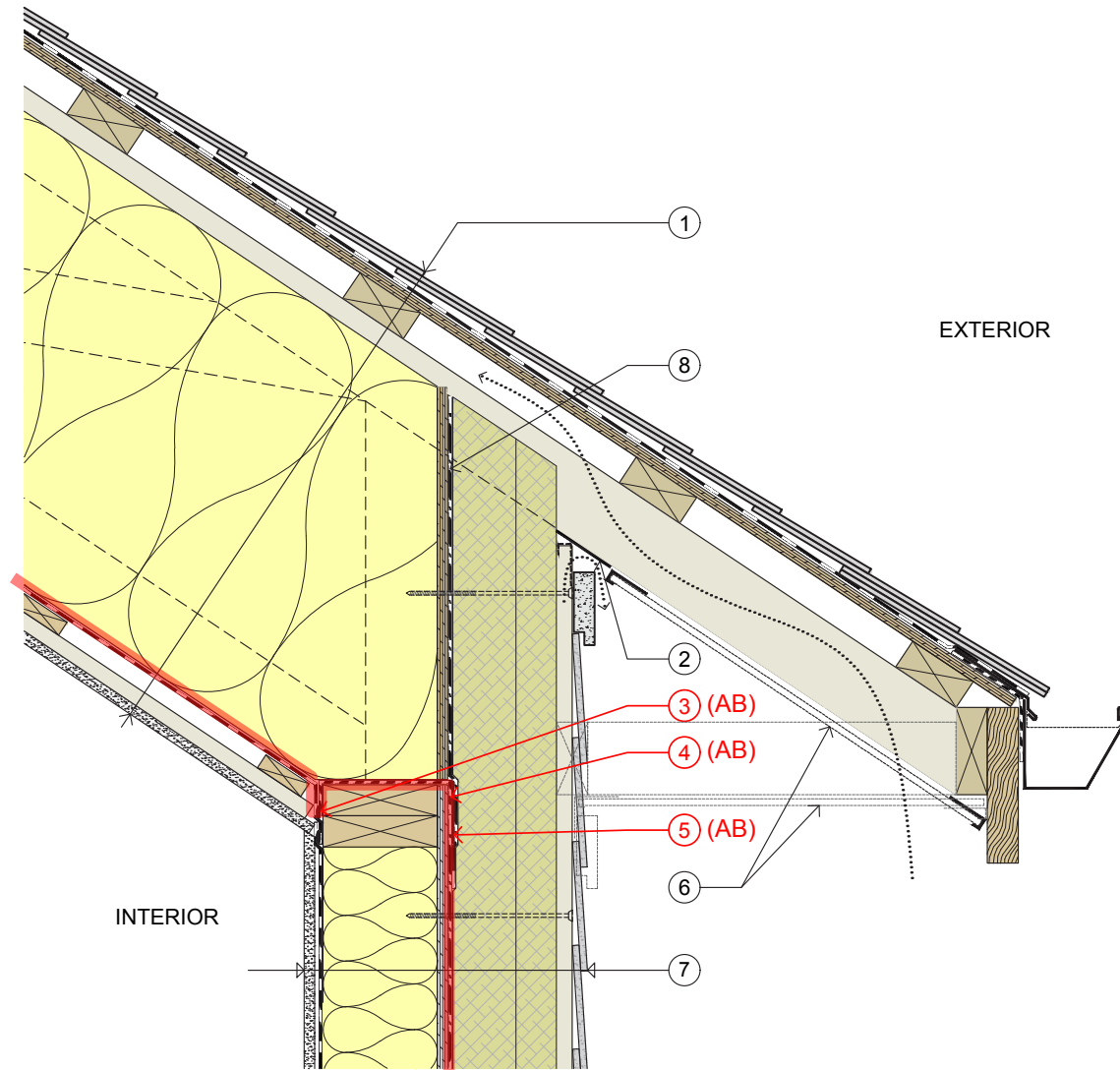
To reduce the risk of water penetration, mould, or other deficiencies, builders are encouraged to review details with a building-science engineer or architect, and to practice installation techniques using full-scale mockups for training and quality control.

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 2.01 Above-Grade Wall at Overhanging Sloped Roof

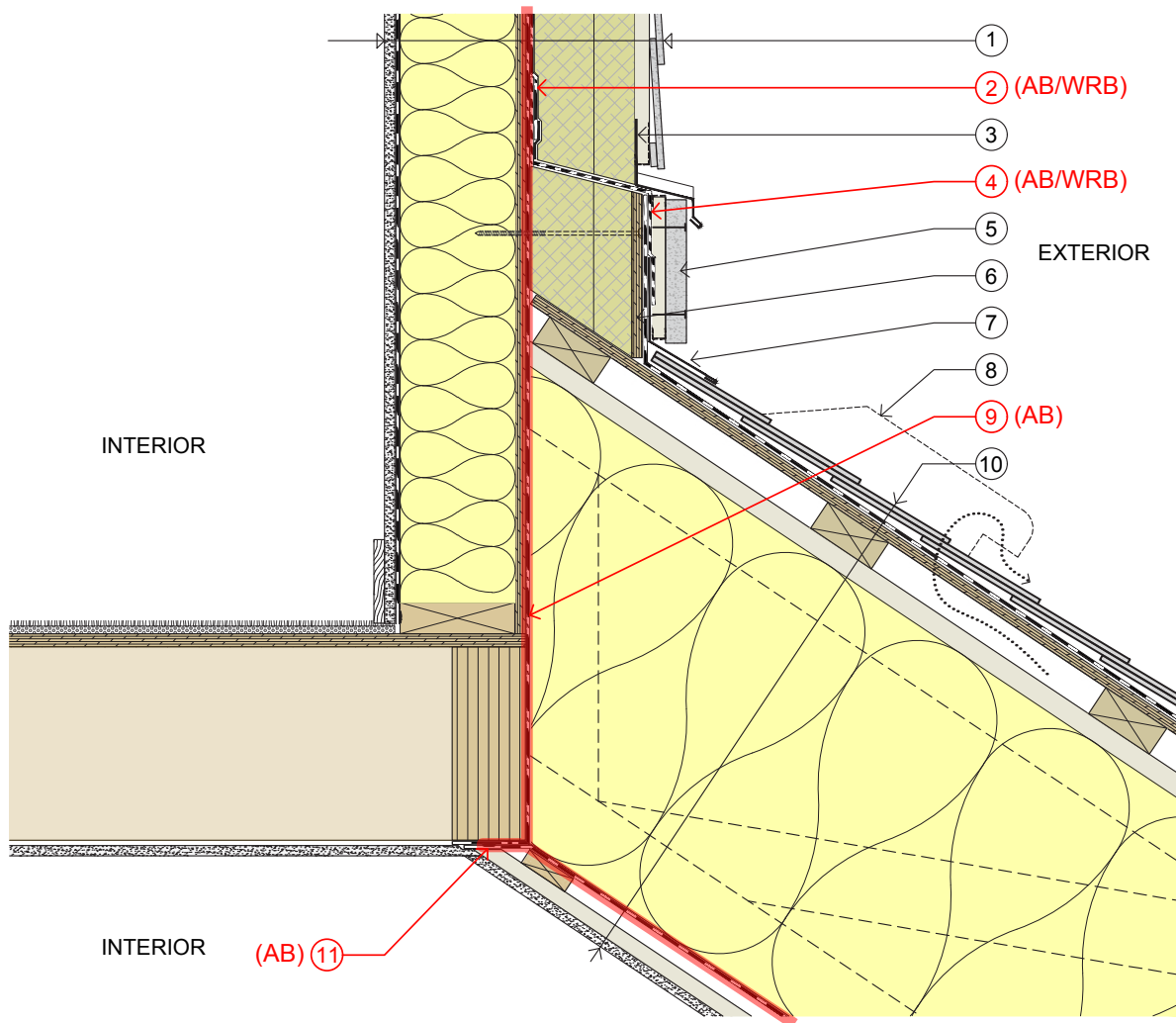


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| <p>① Vented vaulted roof assembly</p> <ul style="list-style-type: none"> • Roofing shingle • Roofing underlayment including eave protection • Roof sheathing • Air space at cross-strapping • Engineered joist framing with batt insulation • Ceiling vapour barrier poly (AB) • Ceiling service cavity • Interior gypsum ceiling <p>② Metal rainscreen closure flashing</p> | <p>③ Continuous sealant at ceiling poly (AB)</p> <p>④ Continuous self-adhesive membrane over all top plates (AB)</p> <p>⑤ Continuous tape seal (AB)</p> <p>⑥ Perforated sloped soffit and flat soffit alternative</p> <p>⑦ Above-grade wall assembly with exterior air barrier system (AB)</p> <p>⑧ Sheathing membrane strip on truss sheathing lapped over air barrier transition</p> |
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ABOVE-GRADE WALL AT OVERHANGING SLOPED ROOF | D2.01
ROOF #2 - VENTED VAULTED ROOF

Detail 2.02 Renewable Roof Abutment at Above-Grade Wall

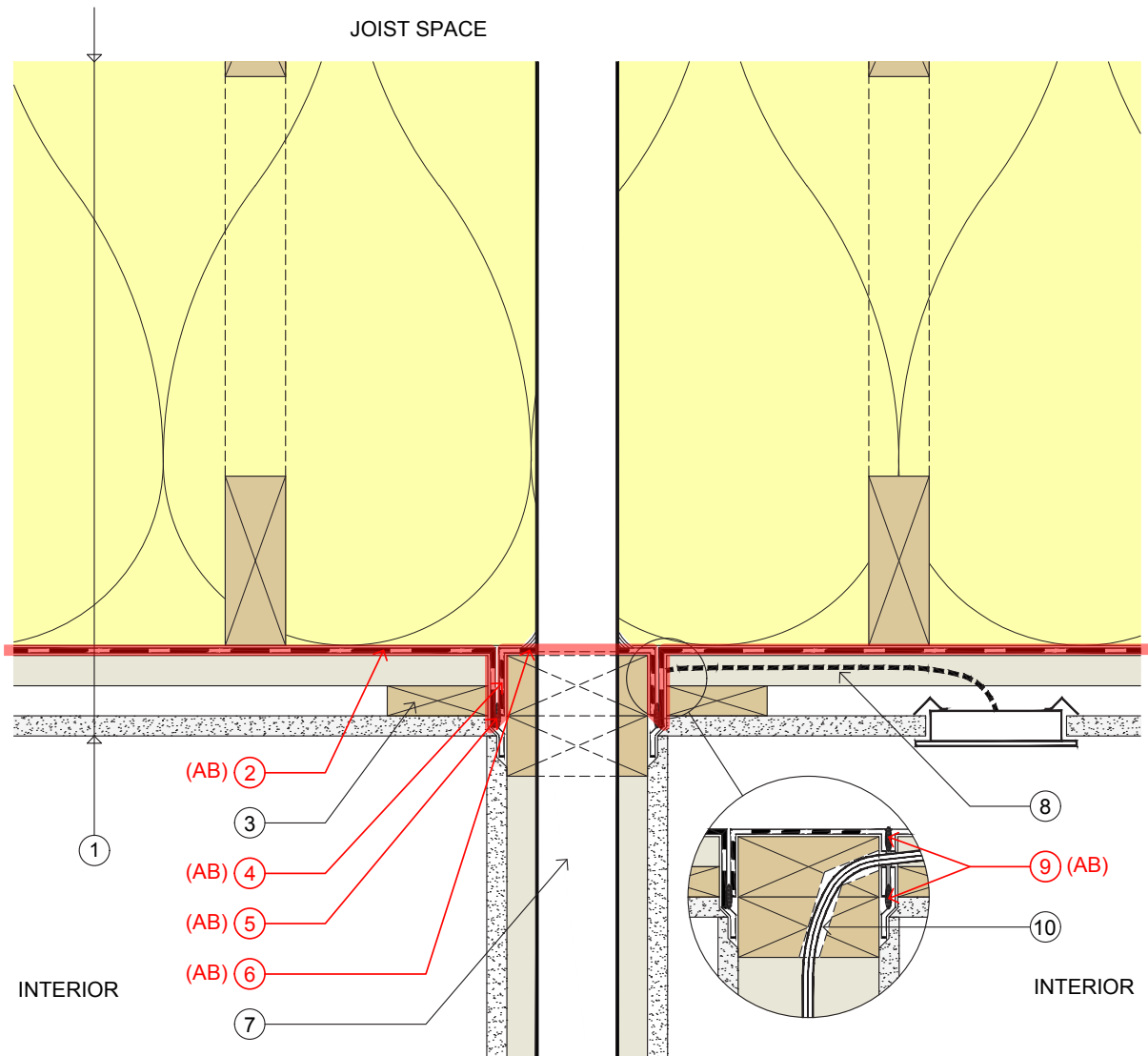


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| <p>① Above-grade wall assembly with exterior air barrier system (AB)</p> <p>② VP sheathing membrane taped to through-wall membrane flashing (AB/WRB)</p> <p>③ Pre-finished metal flashing</p> <p>④ Self-adhesive through-wall membrane lapped onto roof underlay and flashing (AB/WRB)</p> <p>⑤ Exterior trim</p> <p>⑥ Plywood starter curb for roof renewals</p> <p>⑦ Pre-finished metal flashing</p> <p>⑧ Roof vent beyond</p> | <p>⑨ Continuous VP sheathing membrane prestrip behind roof framing (AB)</p> <p>⑩ Vented vaulted roof assembly</p> <ul style="list-style-type: none"> • Roofing shingle • Roofing underlayment including eave protection • Roof sheathing • Air space at cross-strapping • Engineered joist framing with batt insulation • Ceiling vapour barrier poly (AB) • Ceiling service cavity • Interior gypsum ceiling <p>⑪ Continuous sealant between ceiling poly and sheathing membrane prestrip (AB)</p> |
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RENEWABLE ROOF ABUTMENT AT ABOVE-GRADE WALL | D2.02 ROOF #2 - VENTED VAULTED ROOF

Detail 2.03 Service Penetrations Through Top Plates at Roof

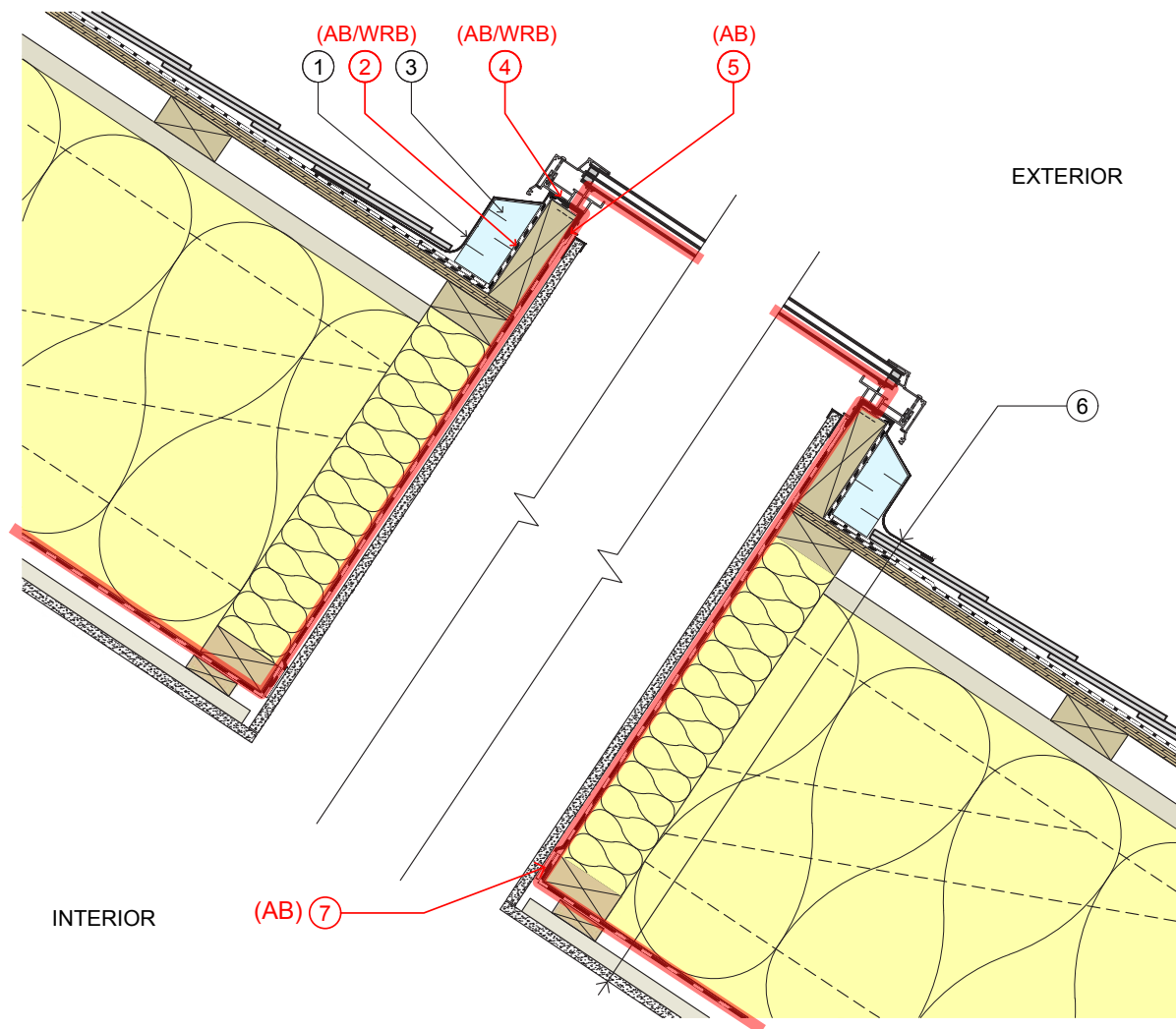


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| ① Vented vaulted roof assembly with ceiling vapour barrier system (AB) | ⑥ Continuous sealant around top plate penetration (AB) |
| ② Ceiling vapour barrier poly returned down face of top plates (AB) | ⑦ Top plate service penetration into ceiling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

SERVICE PENETRATIONS THROUGH TOP PLATES AT ROOF | D2.03 ROOF #2 - VENTED VAULTED ROOF

Detail 2.04 Skylight on Roof Curb

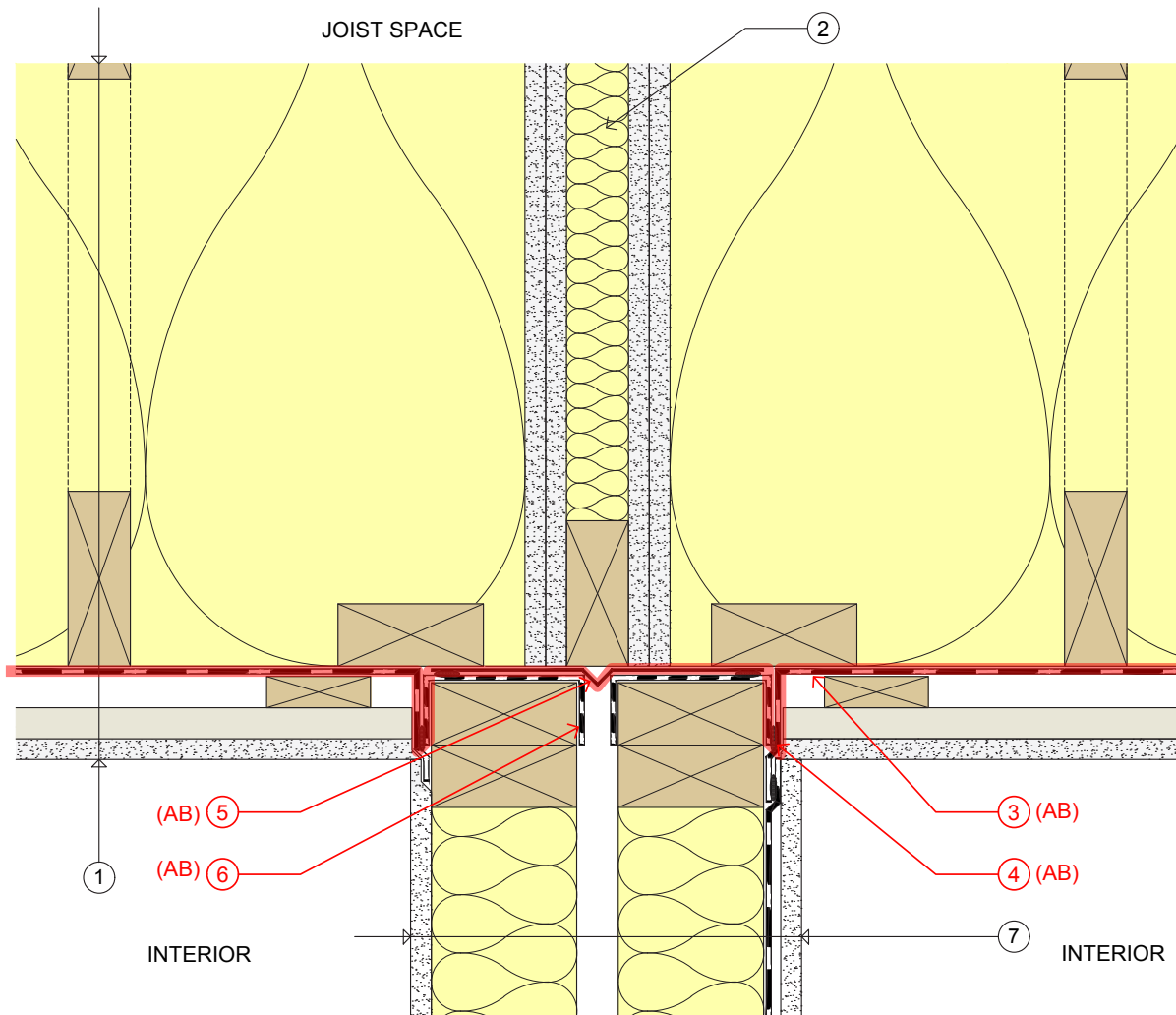


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| <p>① Pre-finished metal skylight head skirt flashing</p> <p>② Self-adhesive membrane on skylight curb (min 200mm tall in snowy climates) (AB/WRB)</p> <p>③ Rigid insulation adhered around skylight curb</p> <p>④ Skylight frame set into continuous sealant on top and inside edge of curb (AB/WRB)</p> <p>⑤ Top edge of skylight shaft vapour barrier poly set into continuous sealant at skylight curb frame (AB)</p> | <p>⑥ Vented vaulted roof assembly</p> <ul style="list-style-type: none"> • Roofing shingle • Roofing underlayment including eave protection • Roof sheathing • Air space at cross-strapping • Engineered joist framing with batt insulation • Ceiling vapour barrier poly (AB) • Ceiling service cavity • Interior gypsum ceiling <p>⑦ Continuous sealant between ceiling vapour barrier poly and skylight shaft vapour barrier poly (AB)</p> |
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SKYLIGHT ON ROOF CURB | D2.04 ROOF #2 - VENTED VAULTED ROOF

Detail 2.05 Top of Interior Double-Stud Party Wall at Roof

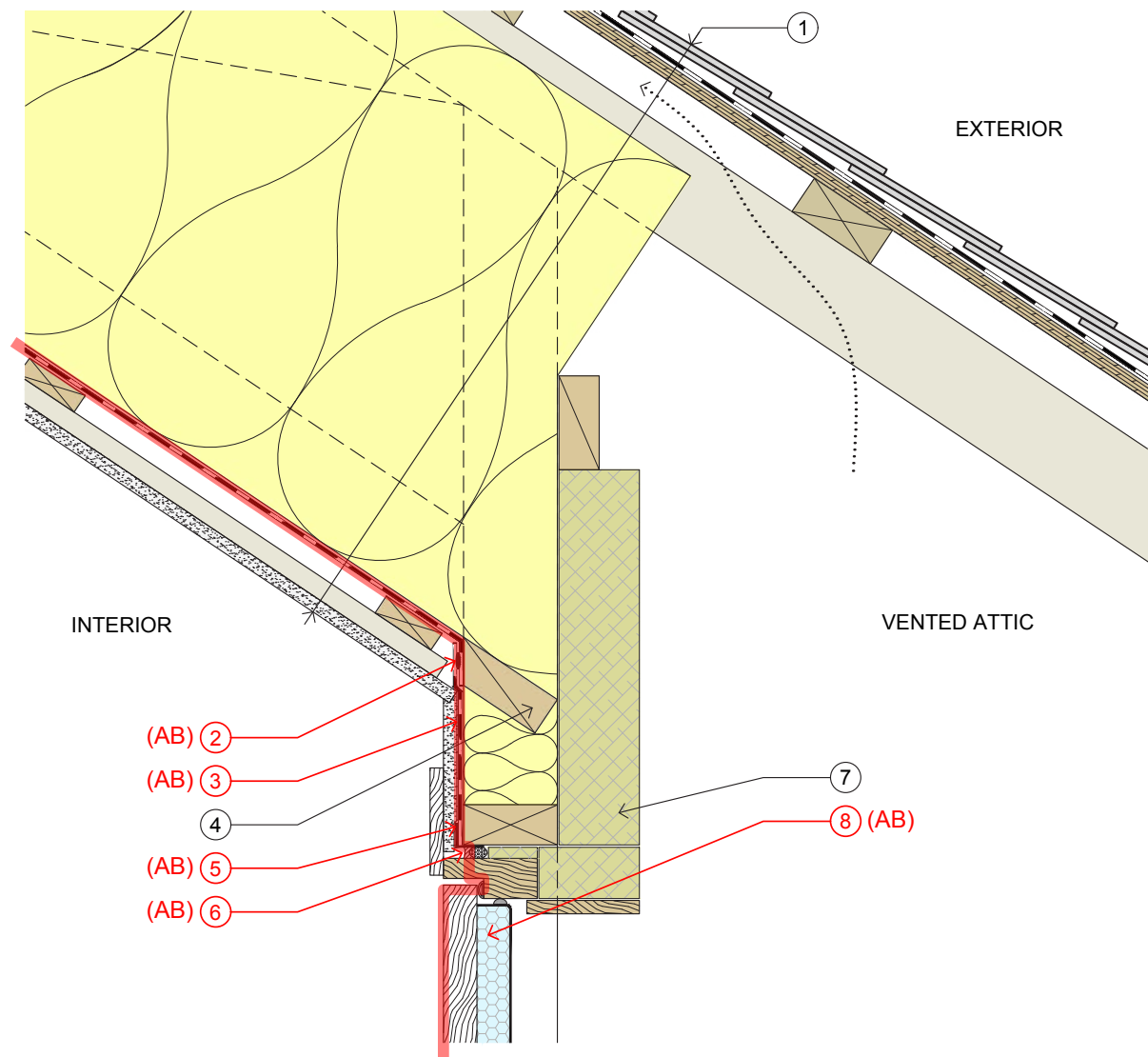


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| <p>① Vented vaulted roof assembly</p> <ul style="list-style-type: none"> • Interior gypsum ceiling • Ceiling service cavity • Ceiling vapour barrier poly (AB) • Engineered joist framing with batt insulation • Air space at cross-strapping (not shown) • Roof sheathing (not shown) • Roofing underlayment including eave protection (not shown) • Roofing shingle (not shown) <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 |
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TOP OF INTERIOR DOUBLE-STUD PARTY WALL AT ROOF | D2.05
ROOF #2 - VENTED VAULTED ROOF

Detail 2.06 Knee Wall at Vented Attic



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| ① Vented vaulted roof assembly | ③ Knee wall vapour barrier poly (AB) |
| • Roofing shingle | ④ Knee wall blocking |
| • Roofing underlayment including eave protection | ⑤ High performance tape seal around door opening (AB) |
| • Roof sheathing | ⑥ Backer rod and sealant (AB) |
| • Air space at cross-strapping | ⑦ Rigid mineral wool insulation secured with insulation fasteners |
| • Engineered joist framing with batt insulation | ⑧ Insulated wood attic access door (AB) |
| • Ceiling vapour barrier poly (AB) | |
| • Ceiling service cavity | |
| • Interior gypsum ceiling | |
| ② Continuous sealant between ceiling poly and knee wall vapour barrier poly (AB) | |

KNEE WALL AT VENTED ATTIC | D2.06
ROOF #2 - VENTED VAULTED 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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