

Ask Jon Eakes

# Rainscreen Detailing and the Canadian Building Code

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I have reproduced below an article from the construction professional publication Solplan Review November 2008 because it was such a good article on this complicated subject. In 2023, Solplan Review is no longer in publication. For an animation on what is a rainscreen, follow this link.

But first, an answer to a question in 2023 about the applicability of building codes from Jim in Victoria BC: "What are the code requirements for rainscreen on renovations in victoria bc?"

Hello Jim,

You are right to demand what are the "local" requirements in code as the National Building Code is just a "recommendation" document offered to the provinces, who accept or modify it as they like, and often local municipalities have the final say – yes that gets confusing and often web information does not apply to a given municipality.

Presently (2023) in Victoria BC the 2018 B.C. Building code is in force:

[https://www.victoria.ca/building-business/permits-development-construction/building-renovating/building-](https://www.victoria.ca/building-business/permits-development-construction/building-renovating/building-permits#:~:text=Before%20starting%20work%20related%20to,Code%202018%20is%20in%20effect.)

[permits#:~:text=Before%20starting%20work%20related%20to,Code%202018%20is%20in%20effect.](https://www.victoria.ca/building-business/permits-development-construction/building-permits#:~:text=Before%20starting%20work%20related%20to,Code%202018%20is%20in%20effect.)

The building codes are now free to the public so you can get your own copy:

<https://www.bccodes.ca/building-code.html>

For the rest of Canada: <https://joneakes.com/jons-fixit-database/1018-What-are-BUILDING-CODES-and-why-do-I-care>

Electronic copies are searchable so you can simply look up "rainscreen".

But your question was also more specific – "on renovations". You are right that renovations often are not totally regulated by current building codes but are in many cases regulated by the code in effect at the time of construction. There are various rules, practices or guide lines as to when a renovation is no longer "maintenance" of an existing part of the building, and becomes a "new" construction subject to the current building code – and that is usually controlled by how extensive the renovations are – such as what percentage of the siding is being replaced. Unfortunately that is often an arbitrary call by a building inspector.

Understand that the building code tries to avoid problems in construction, and in most of BC, rainscreens are an essential system that avoids rotting walls. I understand that Victoria is almost a desert compared to Vancouver which is almost a rain forest: <https://joneakes.com/jons-fixit-database/1934-Finding-enough-water-for-the-Butchart-Gardens>. Hence I would rely on a call to the permits department in Victoria to see just what are the requirements/recommendations for your home.

I hope this helps more than it confuses. Work safely, Jon

Back to Solplan Review

Changes to the Building Code mean that in some parts of Canada, in particular coastal areas with high precipitation, rainscreen detailing is mandatory. However, whether or not the code requires a rainscreen, it is a better way to detail exterior cladding of buildings. After all, moisture problems attributed to poor cladding installation details have even been discovered in the dry climates of the prairies. The introduction of rainscreen requirements in coastal BC has created considerable confusion. Differences in interpretations are creating problems. Building officials, designers and builders are trying to work out proper detailing approaches to comply with the code. For a number of years, CMHC's Best Practice Guide: Building Technology Wood-Frame Envelopes in the Coastal

Climate of British Columbia has been the reference document largely used by the multi-family construction sector. The new home warranty companies operating in BC banded together and developed a package of standardized details for typical conditions found in house construction to provide builders some guidance. The Home Owner Protection of BC (HPO) also published Building Envelope Guide for Houses: Part 9 Residential Construction as an illustrated construction detail guide for rainscreen construction. The HPO and the BC Government's Building and Safety Policy Branch (which administers the BC Building Code) have had multi-stakeholder meetings to try and resolve some of these issues. Yet there are still some builders and building officials that are having challenges. The Building Policy Branch is issuing an interpretive bulletin to help building officials with code interpretation. The bulletin will address issues with a number of new Code provisions in Division B (Section 9.27, Cladding). The intent is to deal with the inconsistency in the application and interpretation of some of the new "rainscreen" provisions and to provide some guidance towards more consistency. The bulletin goes along with the Building Envelope Guide for Houses published by the Homeowner Protection Office that was developed in cooperation with the Building & Safety Policy Branch and other industry stakeholders.

Depth of Rainscreen Cavity: Does 3/8" equal 10 mm? Although Canada is a metric country, and the Code is therefore a metric document, it makes sense to allow a bit of flexibility for materials that don't quite match the metric dimensions in the Code. Maybe one day Canadian construction materials will be metric, but until that day 3/8" plywood is an acceptable substitute for 10 mm plywood. A 3/8" (9.53 mm) air space is close enough to 10 mm and more than enough to allow free drainage of water between the cladding and the sheathing membrane. From a scientific standpoint anything less than about 6 mm could be a problem so the Standing Committee settled on 10 mm as a nice round number with plenty of room for normal construction variations.

Strapping: Does It Need To Be Treated? There is no Code requirement setting out the moisture resistance of the material employed to provide a capillary break. This question relates to wood strapping such as lumber, plywood and OSB. There is no requirement for wood siding to be treated, or even painted or stained, and there is no requirement for the weather-protected strapping to be treated either. There is no harm in using treated wood but all the fasteners for the strapping and the siding must be compatible with the type of preservative selected. ACQ wood treatments are totally incompatible with contact with aluminum siding or aluminum nails.

What about Proprietary Materials for the Capillary Break? A number of "rainscreen" products have been introduced in recent years that are intended to provide the capillary break. The new capillary break provisions in the Code were written in performance language specifically to allow for various acceptable solutions and this is discussed in Appendix note A-9.27.2.2. Products, materials or systems must create a 10 mm or larger gap between the two planes of protection, and allow drainage. The capillary gap must be not less than 80% open in cross section. In addition, like all building materials, they must "possess the necessary characteristics to perform their intended functions when installed in a building" (Div. A, Article 1.2.2.1.) and Appendix note A-9.27.2.2. points out the need for "non-moisture-susceptible" materials. Another property to consider is whether the material could hold moisture in contact with the cladding or sheathing membrane for extended periods. A sponge could be considered at least 80% open in cross section but it impedes drainage and would not comply with 9.27.2.2. The appendix note states that "products used to provide the capillary break include a variety of non-moisture susceptible, open mesh materials." In the first instance, it is the manufacturer's responsibility to offer a product that is suitable and Code compliant. In the second instance, it's up to the builder to apply some judgment regarding any product's or material's suitability for their specific application. The building official should not be expected to assess anything beyond conformance with the measurable properties specified in the Code (i.e. does it provide a 10 mm gap, is it 80% open, does it allow drainage?). It is also important to note that there are no certification standards for materials that define a capillary break, so anyone insisting on a third party certification for a capillary break product is out of line.

Does Strapping Have To Be Vertical? The wording of Clause 9.27.2.2.(1)(a) is clear - the capillary break cavity must drain so if strapping is used it should be nominally vertical. Strapping at an angle

won't necessarily prevent drainage but it will likely slow it down and it will guarantee that any leak through the cladding will encounter strapping on its way down the wall. With vertical strapping there is at least an 80% chance the leak will occur where no strapping will impede its drainage. Every effort should be made to keep the strapping nominally vertical so that water is not in contact with the sheathing membrane for any longer than it takes for gravity to draw it downward.

Does the Drainage Cavity Need Venting at the Top? Is a Bug Screen Required? Venting the top of the rainscreen cavity is not a Code requirement. However, research is showing that venting the rainscreen is the mechanism by which the cladding assembly dries. So although venting the top of the capillary break cavity is good practice there is no Code requirement to do so. Standard practice among many building envelope consultants now is to vent at the top. Needless to say it must drain at the bottom. There is no requirement for any bug screens but it is probably a good idea to keep the little critters out of the drainage cavity.

Can the 10 mm Cavity Vent into the Attic? No. Sentence 9.27.2.2.(3) specifically prohibits connecting the capillary break air space with "construction" projecting over it. Projecting construction would include roof overhangs and floor assemblies. Venting the capillary break into an attic could be a problem because venting of the rainscreen is the mechanism by which the cladding assembly will dry. End Dams on Head Flashing, Minimum 25 mm? The code requires that flashings over window and doors have an end dam. The wording of Clause 9.27.3.8.(4)(c) implies end dams should not be less than 1" (25 mm) high and higher in some locations. However, this was not the intention of the Code Committee on Houses and Small Buildings. Clause (4)(c) was intended to provide a choice to the builder - either calculate the appropriate height in millimetres using the formula "1/10th the driving rain wind pressure" or just make the end dam 25 mm high. This means builders in locations with very high driving rain wind pressures can ignore the calculated height and just make 25 mm end dams. Builders in areas with lower driving rain wind pressure can use lower end dams. In metro Vancouver where the driving rain wind pressure does not exceed 160 Pa, end dams can be as short as 16 mm high. On the other hand, on the west coast of BC (areas exposed to the open Pacific), or other exposed locations, they may need to be 2" (50 mm) high or even more based on the calculation, but do not need to be more than 1" (25 mm) high because that should be adequate most of the time. (see photo above for one type of manufactured End Dam product, and follow this link for how to make your own End Dams on site.)

Window Sub-Sill Drainage, Why and How? The space between the bottom of a window and the top of the sub-sill (rough opening) needs to be treated similarly to the space between the cladding and the sheathing. The window is part of the first plane of protection (cladding) and the sub-sill needs to be protected by a second plane of protection that prevents potential window leaks from migrating any further into the building. Wall sheathing membranes (building papers and house wraps) are not designed for use on horizontal or near horizontal surfaces so a more appropriate "flashing" material must be used on the sub-sill. Peel-and-stick, sheet metal and molded plastic pans are all suitable materials. Although it can be argued that where a capillary break is required the 10 mm gap should be provided in the sub-sill area, that is not as important as ensuring that this space is able to drain. Where flange-mounted windows are installed outboard of the capillary break drainage from the sub-sill is not a problem. However, some provision must be made for drainage through or under the flange where it is installed directly to the sheathing membrane and it must drain to the exterior. This can be awkward if there is no capillary break to drain into.

Trim, On Top of Strapping or Not? Casings around windows and doors and other trim work such as "belly bands" are part of the cladding and should probably be installed outboard of the capillary break. However, as there is no imperative to install windows and doors outboard of the capillary break it should not seriously compromise the water management performance of the wall if the casings are installed directly to the sheathing membrane. Horizontal trim such as "belly bands" could also be installed directly to the sheathing so long as they are flashed and the flashing extends all the way back under the sheathing membrane.

Do Dryer Ducts and Hose Bibbs Need Flashing? These types of penetrations are not considered as "openings" so flashing is not strictly required, although it would be good practice. However, it is

important that these penetrations be very well sealed at the second plane of protection (sheathing membrane) and also sealed at the cladding. The HPO Building Envelope Guide provides useful suggestions for sealing duct and pipe penetrations.

What about Meter Boxes? Meter boxes can be installed either on the sheathing membrane or outboard of the capillary break, similar to trim. The penetration of the conduit through the second plane of protection needs to be very well sealed, regardless of how the box is mounted. Where the conduit penetration is behind the box it may be difficult to do a good job of sealing the penetration. Where the conduit is directly behind the box, it may be appropriate to install a head flashing with end dams over the box to reduce the likelihood that moisture will get between the box and the sheathing membrane.

What Is "Exposed to Precipitation?" Sentences 9.27.2.1.(1) and 9.27.2.2.(4) and (5) apply to exterior walls that are "exposed to precipitation." The HPO Building Envelope Guide describes what is considered to be "protected from precipitation". In simple terms, a typical eight-foot high wall protected by at least a two-foot overhang will provide reasonable protection in normal exposure conditions. Each eight-foot storey needs its own two-foot overhang. The overhang at a gable end would not meet these criteria because most of the overhang is more than eight feet above the bottom of the wall. The average subdivision will usually present a normal exposure condition, but hillsides must be considered very carefully and exposure to rivers, lakes, oceanfront or large open fields is not considered normal exposure. Different orientations can have different exposure conditions, so one or two faces of the building may require a rainscreen, but not the others.

What about Shingles and Vertical Siding? The Code does not permit shingles or vertical siding without a capillary break, but these materials clearly need something other than vertical strapping to provide the 10 mm drainage cavity. One solution is horizontal strapping on top of the vertical strapping but most of the proprietary rainscreen products will also provide a suitable drainage cavity as well as support for the cladding materials in a way that is easier to build. A cladding material that provided its own Code conforming capillary break would also be acceptable.

What about Gable Ends? If a capillary break isn't required under the roofing material why is it needed under the cladding on a gable end? If there is a vented and un-insulated attic space behind the gable end it is questionable whether a capillary break is needed. Two dissimilar environments are not being separated, and if we accept that the gable end cladding provides weather protection at least as good as the roofing, we could conclude that the lack of a capillary break "will not adversely affect occupant health or safety" (9.27.2.1.(1)) and is not required. However, maintaining alignment with the cladding below the gable end needs to be considered.

More information: Building & Safety Policy Branch, Office of Housing and Construction Standards (British Columbia) bulletin B08-02: <http://www.housing.gov.bc.ca/pub/index.htm> Information about the Building Envelope Guide for Houses: Part 9 Residential Construction: Home Owner Protection Office: [www.hpo.bc.ca/building-envelope-guide-houses](http://www.hpo.bc.ca/building-envelope-guide-houses) CMHC Best Practices Guides and other information: [www.cmhc-schl.gc.ca](http://www.cmhc-schl.gc.ca) Homeslicker & Mortairvent: [www.benjaminobyde.com](http://www.benjaminobyde.com)

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