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BULLETIN 2009-009-BU

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## RAINSCREEN DESIGN AND INSPECTION FOR ONE AND TWO FAMILY DWELLINGS

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As of May 01, 2007, the Vancouver Building By-law mandates that all one and two family dwellings be constructed with a cladding system that provides two planes of protection from water ingress. The intent of this bulletin is to provide home owners, designers and builders with important information related to rainscreen requirements for one and two family dwellings. This bulletin addresses some of the important technical requirements for a rainscreen design as well as the permitting and inspection process associated with building permit applications. This is an update and replaces Bulletin 2007-004-BU.

### FREQUENTLY ASKED QUESTIONS

**What is a rainscreen design?**

Rainscreen assemblies include both a first and second plane of protection from precipitation. The first plane is the cladding, which is designed and constructed to handle virtually all of the precipitation load. The second plane of protection is a sheathing membrane which is designed and constructed to handle only very small quantities of incidental water. The first and second plane of protection is separated by drainage cavity which is at a minimum, a 10mm space between the wall sheathing membrane and the exterior cladding.

**Do all new one and two family dwellings require a rainscreen?**

As of May 1, 2007, all new one and two-family dwellings require a rainscreen regardless of the size of the house. There are exceptions where a rainscreen design is not required, such as where the cladding system for the building is vinyl or aluminium siding or the exterior walls are mass wall construction.

**Is rainscreen design required for accessory buildings serving one and two family dwellings?**

No, detached accessory buildings such as garages and storage sheds are exempt from the rainscreen design requirements of the Building By-law.

**Does the rainscreen for a Part 9 one or two family dwelling need to be designed by a registered architect or professional engineer?**

No, should a building designer follow the specific requirements of the Building By-law as outlined in Division B, Part 9, professional involvement is not required.

An owner may nonetheless choose to use a Building Envelope Professional (Engineer or Architect) specializing in rainscreen design for the design of a rainscreen system in accordance with Part 5 of Division B of the Building By-law. In this case the registered professional must submit the appropriate letters of assurance. (Schedules D1 and D2).

### Building Permit Application Requirements

When applying for a building permit to construct a one or two family dwelling, sufficient details must be provided with the construction drawings to illustrate that a rainscreen design is being incorporated in accordance with Sections 9.27 or 9.28 of the Building By-law. As a minimum, the following rainscreen details are required for every building permit application:

1. Wall Detail - A typical detail illustrating the construction of the wall assembly. Should the building incorporate more than one type of exterior cladding system, a separate detail must be provided for each of the cladding systems. In addition, a detail must be provided that illustrates the transition between the cladding systems. This often can be drawn as a single detail.
2. Window Detail - A typical detail illustrating the top and bottom of the window must be provided. This detail must include information related to the installation of flashings.
3. Wall Penetration Details - A typical detail showing a hose bib and a dryer vent must be provided.
4. Parapet Detail - Where parapets are provided around decks and roofs, a detail of this parapet must be provided.
5. Guard Detail - Where guards or handrails are fastened through the exterior wall assembly a detail of this attachment must be provided.

It is important to note that if the exterior cladding materials change after the building permit has been issued the accepted plans must be revised to reflect the change.

### Technical Requirements

The following information should be addressed when preparing the above noted rainscreen details:

#### First Plane of Protection

The first plane of protection from water ingress is the outermost layer of the exterior wall assembly and is achieved by the building's exterior cladding. Usually this consists of siding, stucco, shingles etc. The first plane of protection must comply with Sections 9.27 or 9.28 of Division B of the Vancouver Building By-law.

#### Second Plane of Protection

The second plane of protection from water ingress is provided by a sheathing membrane which is separated from the first plane by a capillary break. This second plane of protection includes the sheathing membrane and flashings. The second plane of protection is intended to intercept incidental water and dissipate it to the exterior of the building.

1. Drainage Cavity - The drainage cavity is the space between the first and second planes of protection and must be at least 10mm wide. The cavity may be achieved using vertical strapping or an open drainage material. This cavity must be vented to the outside. Should vents be provided at the top of the cavity, the vents are not permitted to extend into the soffits or other enclosed areas above the top of the drainage cavity. Insect screening is required at all vent openings. Where pressure treated wood strapping is used, the mechanical fasteners must be compatible with the specific pressure treatment. (See Bulletin 2006-002-BU for additional information.)

2. Sheathing Membranes - The sheathing (usually plywood or OSB) must be protected by a membrane. This membrane may be building paper, Tyvek®, Typar®, house wrap etc. and must meet the Canada Standard CAN/CGSB 51.32.M. This may consist of one layer of 60 min. paper, two layers 30 min. paper or an approved house wrap. Should more than one sheathing membrane be used, it is important that the materials be compatible.
3. Flashings - The Building By-law requires flashing at the following locations:
  - a) above and below all window and door assemblies;
  - b) changes in cladding material;
  - c) the top of parapet walls; and
  - d) other through wall openings.

Flashings must extend at least 5mm outward from the outer face of the element below and be attached to the sheathing. These flashings must extend upward at least 50mm vertically behind the sheathing membrane and must incorporate 25mm high end dams at each end of the flashing. Where flashings are provided at the top of parapet walls they must be sloped.

It is important that all cap flashing joints have either locked or standing seams with no fasteners through the top of the flashings.

4. Exterior Wall Penetrations - It is often necessary for the exterior wall assembly to be penetrated by items such as hose bibs, electrical outlets and fixtures, ventilation ducts, piping, etc. The second plane of protection must be maintained around these penetrations with careful attention given to guardrail and handrail connection points.

### Inspection Requirements

The City monitors Building By-law compliance by carrying out building inspections at various stages of construction. These inspections require acceptance by the District Building Inspector in order to proceed to the next phase of construction. Inspection of the rainscreen system is carried out over three inspections.

First inspection - A **mock up** of one window, complete with window trim and flashings and demonstrating the surrounding rainscreen, must be completed for the **sheathing inspection**. (See Bulletin 2009-008-BU for additional information.)

Second inspection - Once the sheathing has been accepted by the District Building Inspector, the sheathing membrane (building paper, Tyvek®, Typar®, house wrap etc.) has been installed and the strapping or drainage mat forming the drainage cavity is complete, a rainscreen inspection may be requested. It is important that the items below are complete prior to making a request for this inspection:

1. Flashings for doors, windows and other through wall openings must be installed.
2. The drainage cavity must be installed, providing at least a 10mm. capillary break that is 80% open and vented to the outside complete with insect screens. Furring strips, nailed 400mm on centre, or approved drain mats may be used.
3. Sealing of all other penetrations through the second plane of protection must be complete.

This inspection should be performed at the same time as the **framing inspection**. Once the District Building Inspector has completed the second rainscreen inspection the cladding may be installed.

Third inspection - At the **final inspection** of the entire building the installation of the finished cladding is inspected by the District Building Inspector. Sealing of penetrations and caulking of cladding elements is reviewed at this time. Builders and homeowners should pay particular attention to the attachment of exterior components such as guardrails, handrails, vents and light fixtures etc. These components must be fastened such that they do not compromise either the first or second planes of the rainscreen system.

Note: The acceptance of the rainscreen by the District Building Inspector shall in no way relieve the owner of full responsibility for having the work carried out in accordance with the Vancouver Building By-law (1.1.1.3).

Additional Information related to Building Envelopes is available in the following Bulletins:

2006-002-BU - Protection of Steel Connectors, Fasteners, and Anchors Used with Pressure Treated Wood Products.

2009-008-BU - Sheathing and Rainscreen Mock Up Inspections for One and Two Family Dwellings.

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