PacifiCan

PacifiCan Fire-Resilient Construction Checklist

Version 1.2

Pacific Economic Development Canada
Développement économique Canada pour le Pacifique
Canada

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On June 30, 2021 a wildfire destroyed the village of Lytton and surrounding area. Through the *Lytton Homeowner Resilient Rebuild Program,* PacifiCan is supporting eligible homeowners who wish to rebuild fire-resilient and Net Zero Homes.

The following checklist outlines the *Lytton Homeowner Resilient Rebuild Program*'s requirements for fire-resilient construction. The checklist was developed for the program in partnership with Natural Resources Canada and expert consultants with RDH Building Sciences Inc. It was informed by leading Canadian wildfire resources and expertise, including the Canadian Wildland Urban Interface (WUI) Guide, other wildfire construction literature, and discussions with industry experts. Input from local builders and officials were also considered to ensure that the program's fire-resilience requirements are compatible with the current Lytton context, including building bylaws.

Fire-Resilient Construction Checklist:

Instructions: All items must be signed off by the builder before submission to PacifiCan program officials.

To complete the form, the builder must:

1. Initial in the right-hand column of each numbered item below to confirm construction is in conformance with the direction associated with that item.
2. Fill out the section at the end with a name, position, and associated company.
3. Sign and date the form.

Assembly	Description	
Roof	1) Roof coverings have a Class A classification when tested using CAN/ULC-S107, "Fire Tests of Roof Coverings."	
	2) Valley and hip flashing, roof penetration flashing, sill plate flashing, and any other flashing that could be exposed to accumulated embers are non-combustible.	
	3) Drip edges are: a) Non-combustible; **and** b) Extend at least 75 mm upslope from the edge of the roof.	
	4) Roof penetrations, such as pipes are non-combustible.	

	5) Any gaps larger than 3mm on the roof, including gaps at junctions or around penetrations or attachments that could allow the entry of embers are sealed with non-combustible material.	
	6) For all roof cover products, manufacturers' instructions concerning application of underlayment to achieve CAN/ULC-S107 Class A fire rating have been followed.	
	7) Cant strips, roof curbs, nailing strips, and similar components used in the installation of roofing are non-combustible.	
	8) Openings required for soffit venting or the ventilation of roof spaces are: a) Ember-resistant rated vents per ASTM E2886 ; **or** b) Screened with corrosion-resistant, non-combustible mesh with a maximum mesh aperture of 3mm, and c) Constructed of non-combustible material	
Gutters and downspouts	1) Gutters and downspouts are: a) Non-combustible; **and** b) Fitted with corrosion-resistant, non-combustible screens or guards to prevent the buildup of combustible materials in the gutters and downspouts.	
Eaves, Soffits and Roof Projections	1) Eaves, fascia, and roof projections on buildings are finished with non-combustible material.	
	2) Except as required for ventilation, eaves, soffits, and roof projections are enclosed without openings.	
Exterior walls	1) The exterior wall cladding extends from the top of the foundation to the underside of the roof, which may include the following: a) The top plate (track) of the exterior wall; **or** b) The bottom chord of the roof truss; **or** c) The intersection of the exterior wall and the soffit; **or** d) The bottom of the built-up roof deck.	
	2) All joints in the exterior wall cladding or related wall components are covered, sealed, overlapped, backed, or butt-jointed with no unprotected gaps greater than 3mm.	
	3) All openings and penetrations in the exterior wall cladding or related wall components are sealed with no gaps greater than 3mm.	

	4) Exterior vertical surfaces that are less than 200 mm from the ground, or a deck, roof, or similar horizontal surface where embers may accumulate, are protected on the exterior by: a) Non-combustible material, **or** b) At least one layer of Type X exterior gypsum sheathing or cement board.	
	5) Exterior walls have: a) A fire-resistance rating of minimum 1h based on fire exposure from the exterior side using the results of tests conducted in conformance with CAN/ULC-S101/ASTM E119; **or** b) A fire-resistance rating of minimum 1h based on fire exposure from the exterior side as designed by a qualified professional.* * *A qualified professional refers to an experienced professional engineer or architect licensed to practice in Canada.*	
	6) Exterior wall assemblies are: a) Clad with non-combustible material; **or** b) Meet the recommended acceptance criteria stated in Table 9 in Chapter 3 of the NRC WUI Fire Guide when tested using ASTM E2707, "Standard Test Method for Determining Fire Penetration of Exterior Wall Assemblies Using a Direct Flame Impingement Exposure."	
	7) Where required for the ventilation of wall assemblies, ventilation gaps greater than 3mm in width are covered by non-combustible screening with a maximum mesh aperture of 3mm.	
Foundation walls	1) Foundation walls are: a) Constructed of concrete or unit masonry; **or** b) Have a fire-resistance rating of minimum 1h based on fire exposure from both sides using the results of tests conducted in conformance with CAN/ULC-S101 or by using Appendix D of the National Building Code 2020.	
	2) The exposed portion of the foundation wall are protected on its exterior face with: a) Non-combustible materials; **or** b) At least one layer of Type-X gypsum or cement board.	
	3) All joints in the external wall cladding or related wall components of the foundation wall are covered, sealed, overlapped, backed or butt-jointed with no unprotected gaps greater than 3mm.	

	4) All openings and penetrations in the exterior wall cladding or related wall components of the foundation wall are sealed with no gaps greater than 3mm.	
Doors and Windows	1) Exterior doors on buildings are: a) Non-combustible door skin, solid wood core not less than 1 ¾ inches thick (44mm); **or** b) Have a fire-protection rating of not less than 20 mins when tested using CAN/ULC-S104, "Standard Method for Fire Tests of Door Assemblies".	
	2) Glazing on exterior doors: a) Includes a minimum of one pane of tempered or heat-strengthened glass; **and** b) Are multi-paned with a fire-resistant exposed frame.	
	3) Where installed, secondary screen doors provided for exterior doors are: a) Non-combustible, fitted with a corrosion-resistant, non-combustible wire mesh with a maximum mesh aperture of 3mm, and have no gaps greater than 3mm at the perimeter of the screen assembly where it is fitted to the door; **and** b) Equipped with a self-closing device to keep the screen door in the closed position when not in use.	
	4) Window glazing and skylights are: a) Multi-pane (minimum double); **and** b) Have a minimum of one pane of tempered glass and a fire-resistant exposed frame.	
	5) All operable windows are fitted with a screen that: a) Is made of corrosion-resistant, non-combustible wire mesh with a maximum mesh aperture of 3mm; **and** b) Has no gaps greater than 3mm at its perimeter where it is fitted to the window; **and** c) Is supported by a non-combustible frame.	
	6) Where installed, shutters: a) Are made of non-combustible material; **and** b) Are fixed to the building; **and** c) When in the closed position, have no gaps greater than 3mm between the shutter and the wall, the sill, or the head; **and** d) Are readily manually operable from either inside or outside; **and** e) Protect the entire window assembly or door assembly.	

Builder attestation of completion:

By initialing the checklist items above and signing below, I attest that all of the *Lytton Homeowner Resilient Rebuild Program's* requirements for fire-resilient construction have been achieved.

Name	
Position	
Company	
Signature	**Date**

Supplemental Information:

Non-combustible material

In Canada, the National Building Code (NBC) defines non-combustible materials as those that will not ignite or burn, even when subjected to intense heat or flame. The NBC provides a specific definition of non-combustible materials in Part 3 - Fire Protection, Occupant Safety and Accessibility, which states:

"Non-combustible material means a material that, when tested in accordance with CAN/ULC-S114, "Standard Method of Test for Determination of Non-Combustibility in Building Materials," has a fire endurance rating of not less than 0.25 hours and exhibits no evidence of progressive combustion when the test specimen is subjected to the standard fire test exposure."

CAN/ULC-S114 is a testing standard developed by the Underwriters Laboratories of Canada (ULC) that provides a method for determining whether a building material is non-combustible. The standard specifies a series of tests that involve exposing the material to a specified temperature for a specific duration, and observing whether it ignites or shows signs of combustion.

Examples of materials that are typically considered non-combustible according to the National Building Code definition include:

- Concrete
- Brick
- Stone
- SteelR-28306 2023 05 29 LTR RPT Page 3
- Cast iron
- Glass
- Mineral wool insulation
- Ceramic tiles
- Cement board

These materials are known to have a high resistance to fire and heat and will not ignite, burn, or produce flames, smoke, or toxic gases when exposed to fire or heat within the specified time and temperature limits set out by the NBC 2020.

It is important to note that while these materials are considered non-combustible, their fire resistance can be affected by factors such as their thickness, composition, and the presence of other materials that may affect their ability to withstand fire.

Fire-Resilient Construction Checklist - Example solutions

The fire-resilient construction checklist outlines a list of enclosure requirements to reduce risk of building ignition due to wildfire. The list is primarily based on The Canadian Wildland Urban Interface (WUI) Guide, other wildfire construction mitigation literature and through discussions with industry experts, including one of the primary authors of the WUI Guide.

Recommended enclosure options in this checklist are limited to those that meet the intent of Construction Classification 1 (CC1) Fire Rating (FR), (the highest level of fire risk mitigation construction type in the WUI Guide), except for window specifications. This checklist specifies that windows should be multi-pane with the outermost pane being tempered; and window frame types should be made of uPVC, fibreglass with fire retardant resin, aluminum, or aluminum clad.

The solutions listed below are provided as examples of commonly used materials readily available in the Canadian construction market. It is not an exhaustive list and there will be acceptable solutions that meet the design requirement other than what is listed here.

Roof

Requirement	*1) Roof coverings have a Class A classification when tested using CAN/ULC-S107, "Fire Tests of Roof Coverings."*
Example solutions	• Asphalt impregnated fibreglass composite shingles (Class A) • Prefinished steel roofing (Class A) • Class B wood shingles with fire retardant coating (Class A) • SBS membrane with gravel ballast (Class A)
Requirement	*2) Valley and hip flashing, roof penetration flashing, sill plate flashing, and any other flashing that could be exposed to accumulated embers are non-combustible.*
Example solutions	• Prefinished steel flashing • Asphalt shingle (non-combustible)
Requirement	*3) Drip edges are:* *a) Non-combustible; and* *b) Extend at least 75 mm upslope from the edge of the roof.*
Example solutions	• Prefinished steel flashing
Requirement	*4) Roof penetrations, such as pipes are non-combustible.*
Example solutions	• Galvanized steel • Stainless steel • Cast iron • cPVC (ie. XFR system, System 636)
Requirement	*5) Any gaps larger than 3mm on the roof, including gaps at junctions or around penetrations or attachments that could allow the entry of embers are sealed with non-combustible material.*
Example solutions	• Prefinished steel or aluminum flashing • Exterior-rated fire caulking • Non-combustible Fibre cement board

Requirement	*6) For all roof cover products, manufacturers' instructions concerning application of underlayment to achieve CAN/ULC-S107 Class A fire rating have been followed.*
Example solutions	• Roofing material manufacturer's instructions (Class A)
Requirement	*7) Cant strips, roof curbs, nailing strips, and similar components used in the installation of roofing are non-combustible.*
Example solutions	• Prefinished steel or aluminum flashing • Fibre cement nailing strips • Rigid mineral fibre insulation
Requirement	*8) Openings required for soffit venting or the ventilation of roof spaces are screened with:* *a) Ember-resistant rated vents; **or*** *b) Corrosion-resistant, non-combustible mesh with a maximum mesh aperture of 3mm.*
Example solutions	• Aluminum or stainless-steel screen (mesh size <3mm)

Gutters and downspouts

Requirement	*1) Gutters and downspouts are:* *a) Non-combustible; and* *b) Fitted with corrosion-resistant, non-combustible screens or guards to prevent the buildup of combustible materials in the gutters and downspouts.*
Example solutions	• Prefinished aluminum gutters and downspouts • Manufacturer provided non-combustible screen/guard • Aluminum or stainless-steel screen/guard

Eaves, Soffits and Roof Projections

Requirement	*1) Eaves, fascia, and roof projections on buildings are finished with non-combustible material.*

Example solutions	• Prefinished steel flashing, aluminum or stainless-steel • Fibre cement board
Requirement	*2) Soffit, ridge, gable-end and button vents are non-combustible.*
Example solutions	• Prefinished steel flashing, aluminum or stainless-steel
Requirement	*3) Except as described above, eaves, soffits, and roof projections are enclosed without openings.*
Example solutions	Unless there are specific provisions for service openings and vents, any eaves, soffits, and roof projections must be enclosed without openings. In other words, any part of the exterior wall that extends beyond the main building structure (such as eaves or overhangs) must be constructed with solid materials, without any openings that could allow for the passage of fire, embers, smoke, or heat.

Exterior walls

Requirement	***1) The exterior wall cladding extends from the top of the foundation to the underside of the roof, which may include the following:*** ***a) The top plate (track) of the exterior wall; or*** ***b) The bottom chord of the roof truss; or*** ***c) The intersection of the exterior wall and the soffit; or*** ***d) The bottom of the built-up roof deck.***
Example solutions	This means that the exterior wall cladding, which is the outermost layer of the building's exterior wall system, must extend continuously from the top of the foundation to one of the specified points (exposed foundation concrete is acceptable): The top plate (track) of the exterior wall: This refers to the horizontal framing member that sits on top of the vertical wall studs and supports the roof structure. The bottom chord of the roof truss: This refers to the horizontal member that connects the sloping top chords of the roof truss and supports the roof decking. The intersection of the exterior wall and the soffit: This refers to the point where the exterior wall meets the underside of the roof overhang (soffit). The bottom of the built-up roof deck: This refers to the bottom layer of a

	multi-layered roof system, which is typically composed of layers of insulation, roofing felt, and asphalt or other materials.
Requirement	*2) All joints in the exterior wall cladding or related wall components are covered, sealed, overlapped, backed, or butt-jointed with no unprotected gaps greater than 3mm.*
Example solutions	Where gaps are greater than 3mm: • Prefinished steel or aluminum flashing • Exterior-rated fire caulking • Non-combustible Fibre cement board
Requirement	*3) All openings and penetrations in the exterior wall cladding or related wall components are sealed with no gaps greater than 3mm.*
Example solutions	• No open rainscreen cladding types • All rainscreen venting must include non-combustible screen • Prefinished metal screen closure for corrugated (profile) claddings
Requirement	*4) Exterior vertical surfaces that are less than 200 mm from the ground, or a deck, roof, or similar horizontal surface where embers may accumulate, are protected on the exterior by:* *a) Non-combustible material, **or*** *b) At least one layer of Type X exterior gypsum sheathing or cement board.*
Example solutions	• Prefinished steel flashing • 5/8" cement board • 5/8" Type X Gypsum Sheathing (protected from moisture)
Requirement	*5) Exterior walls Have* *a) A 1hr fire rated assembly tested assembly from exterior per CAN/ULC S101/ASTM E119 with ULC listing **or** A fire-resistance rating of minimum 1h based on fire exposure from the exterior side as designed by a qualified professional.*
Example solutions	Wall assemblies must be tested/listed per CAN/ULC S101/ASTM E119 or Be approved by a qualified professional (professional engineer or architect licensed in Canada with experience in fire protection of buildings). The approved (stamped) assembly can be submitted along with the completed checklist.

Requirement	*6) Exterior wall assemblies are:* *a) Clad with non-combustible material; **or*** *b) Meet the recommended acceptance criteria stated in Table 9 in Chapter 3 of the NRC WUI Fire Guide when tested using ASTM E2707, "Standard Test Method for Determining Fire Penetration of Exterior Wall Assemblies Using a Direct Flame Impingement Exposure."*
Example solutions	• Cultured stone • Brick • Stucco • Fibre cement
Requirement	*7) Where required for the ventilation of wall assemblies, ventilation gaps greater than 3mm in width are covered by non-combustible screening with a maximum mesh aperture of 3mm.*
Example solutions	• Metal screen (mesh size <3mm)

Foundation walls

Requirement	***1) Foundation walls are:*** ***a) Constructed of concrete or unit masonry; or*** ***b) Have a fire-resistance rating of minimum 1h based on fire exposure from both sides using the results of tests conducted in conformance with CAN/ULC-S101 or by using Appendix D of the National Building Code 2020.***
Example solutions	• Cast-in-place concrete • Masonry • CAN/ULC-S101 approved assemblies
Requirement	*2) The exposed portion of the foundation wall are protected on its exterior face with:* *a) Non-combustible materials; **or*** *b) At least one layer of Type-X gypsum or cement board.*
	• Prefinished metal flashing • 5/8" Type-X exterior gypsum • 5/8" Cement board

Requirement	*3) All joints in the external wall cladding or related wall components of the foundation wall are covered, sealed, overlapped, backed or butt-jointed with no unprotected gaps greater than 3mm.*
Example solutions	Ensure no gaps in foundation materials greater than 3mm.
Requirement	*4) All openings and penetrations in the exterior wall cladding or related wall components of the foundation wall are sealed with no gaps greater than 3mm.*
Example solutions	See above.

Doors and Windows

Requirement	*1) Exterior doors on buildings are:* ***a) Non-combustible door skin, solid wood core not less than 1 ¾ inches thick (44mm); or*** *b) Have a fire-protection rating of not less than 20 mins when tested using CAN/ULC-S104, "Standard Method for Fire Tests of Door Assemblies".*
Example solutions	• Tested/listed door in conformance with CAN/ULC-S104
Requirement	*2) Glazing on exterior doors:* *a) Includes a minimum of one pane of tempered glass; **and*** *b) Are multi-paned with a fire-resistant exposed frame.*
Example solutions	• Glazing: minimum double pane with tempered pane • Frame: uPVC, fibreglass with fire retardant resin, aluminum clad, aluminum
Requirement	*3) Where installed, secondary screen doors provided for exterior doors are:* *a) Non-combustible, fitted with a corrosion-resistant, non-combustible wire mesh with a maximum mesh aperture of 3mm, and have no gaps greater than 3mm at the perimeter of the screen assembly where it is fitted to the door; **and*** *b) Equipped with a self-closing device to keep the screen door in the closed position when not in use.*

Example solutions	• Aluminum or stainless-steel screen (mesh size <3mm)
Requirement	*4) Window glazing and skylights are:* *a) Multi-pane (minimum double);* ***and*** *b) Have an outer layer of tempered glass and fire-resistant exposed frame.*
Example solutions	• Glazing: minimum double pane with a minimum of one pane of tempered glass • Frame: uPVC, fibreglass with fire retardant resin, aluminum clad, aluminum
Requirement	*5) All operable windows are fitted with a screen that:* *a) Is made of corrosion-resistant, non-combustible wire mesh with a maximum mesh aperture of 3mm;* ***and*** *b) Has no gaps greater than 3mm at its perimeter where it is fitted to the window;* ***and*** *c) Is supported by a non-combustible frame.*
Example solutions	• Aluminum or stainless-steel screen (mesh size <3mm) and metal frame
Requirement	*6) Where installed, shutters:* *a) Are made of non-combustible material;* ***and*** *b) Are fixed to the building;* ***and*** *c) When in the closed position, have no gaps greater than 3mm between the shutter and the wall, the sill, or the head;* ***and*** *d) Are readily manually operable from either inside or outside;* ***and*** *e) Protect the entire window assembly or door assembly.*
Example solutions	• Prefinished steel, aluminum, stainless steel, cement board • No gaps greater than 3mm when closed

Support:

For questions and support related to the Fire-Resilient Construction Checklist, please contact: lytton@pacifican.gc.ca.