FIREHARD CANADA — TECHNICAL BULLETIN

TB-03: The New Normal

Best Practices for Wildfire-Resilient Construction in Canada

Eight construction practices that should be standard in every new Canadian home and every major renovation in wildfire-prone areas

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1. Purpose

TB-02 covered the features that invite disaster — the common design choices and maintenance habits that turn survivable wildfire events into total losses. This bulletin covers the opposite: construction practices that should be the new normal for Canadian homes.

None of these practices are exotic. They are standard construction in Australia, parts of California, and increasingly in other jurisdictions where wildfire-resilient building is mandatory. Every practice described here uses materials and methods available from Canadian suppliers, installable by Canadian trades, and compatible with Canadian building codes and climate requirements.

The goal is not to describe aspirational technology. It is to describe practical, proven, cost-effective practices that should be specified in every new build and every major renovation in wildfire-prone areas — which, in Canada, is most areas outside major urban centres.

THE COST OF DOING IT RIGHT

Building to WER-2 from the start adds roughly 5–10% to construction cost. The same measures as a retrofit cost 3–5 times more. Every practice in this bulletin is dramatically cheaper when specified at construction time than when retrofitted later. The new normal is not expensive. It is just different.

2. Hot Roof Assemblies: Eliminating the Attic Vulnerability

The conventional vented attic — cold roof with soffit and ridge vents — is the standard Canadian roof assembly and is also the single largest vulnerability in wildfire. Every vent is an ember entry point. IBHS research identifies ember intrusion through attic vents as the number one ignition pathway for structure loss in wildland-urban interface fires.

2.1 What a Hot Roof Is

An unvented (conditioned) attic assembly — commonly called a hot roof — eliminates attic ventilation entirely. Insulation is placed at the roof deck rather than the attic floor. The attic space becomes part of the conditioned building envelope. There are no soffit vents, no ridge vents, no gable vents. No ember entry points in the roof assembly.

2.2 Assembly Options

Option A: Closed-cell spray foam (ccSPF) applied to the underside of the roof deck. Minimum 50% of total roof R-value as air-impermeable insulation at the deck (IRC R806.5). Remainder as fibreglass or mineral wool batts between rafters below. For WER-3+, specify a 15-minute thermal barrier over spray foam (intumescent coating or gypsum board) because ccSPF is combustible.

Option B: Rigid mineral wool board above the roof sheathing (Rockwool TopRock DD or ComfortBoard 110), with a nailbase panel over it for the roof covering attachment. Non-combustible throughout. Best fire performance of any option. Preferred for WER-3+ new construction.

Option C: Hybrid — 50mm ccSPF at the deck as the air barrier, with mineral wool batts below. Combines the air-sealing reliability of spray foam with the non-combustible thermal mass of mineral wool.

2.3 Building Science

Hot roof assemblies are well-established in Canadian building science. They are permitted under NBC 9.19 and IRC R806.5. The key requirement is that the air-impermeable insulation layer prevents warm, moist interior air from reaching the cold roof deck and condensing. When properly designed for the climate zone, hot roofs perform as well as or better than vented assemblies for moisture management, while eliminating ice dams (no heat loss through the roof deck) and, critically, eliminating all attic ventilation openings.

FOR EXISTING HOMES

Retrofit to a hot roof is most cost-effective at re-roof time. If you are replacing your roof covering, that is the time to add above-deck mineral wool and convert to unvented. If a full hot roof conversion is not feasible, the alternative is ASTM E2886 ember-resistant vent screening on all existing vents — the highest-priority single upgrade for any vented roof in a wildfire area. See TB-01 Section 2 for the ventilation decision framework.

3. Wildfire Shutters: The Last Line of Defence

Windows are the weakest point in any building envelope. Standard annealed glass cracks at radiant heat exposures as low as 5–10 kW/m². Even dual-pane tempered glass has limits — it resists cracking far better, but at extreme exposures (burning neighbour at 3 metres, direct flame contact), it

can still fail. When glass fails, the opening is exposed to ember intrusion, flame entry, and convective heat — and the interior of the home ignites.

3.1 What Wildfire Shutters Do

External roller shutters create a continuous non-combustible barrier across the window opening. They reflect radiant heat, block embers and flying debris, and maintain the integrity of the opening even if the glass behind them cracks. Manual roller shutters (the type used in Australia under AS 3959 for BAL-29 through BAL-FZ) are deployed before evacuation and remain in place through the fire event.

3.2 When They Are Specified

At WER-3: Required on vulnerable openings (ground floor on exposed faces, large windows >2m², all CNEL faces). At WER-4: Required on all openings on exposed faces, fire-rated (FRL –/30/–). At CNEL-3: Required on all windows and doors on the neighbour-facing elevation.

3.3 The Unique Advantage

Shutters are the only wildfire hardening measure that costs the same whether installed during construction or added later. Every other measure (cladding, sheathing, insulation, roofing, framing) is dramatically cheaper when built in. Shutters can be retrofitted at any time for the same cost. This makes them an ideal first investment for existing homeowners and a standard inclusion for new builds at WER-2+.

FIRE HARD SHUTTERS

FireHard Canada manufactures exterior manual roller shutters designed for Canadian wildfire conditions. Tested to AS 3959 performance requirements. Available for retrofit and new construction. See firehard.ca for specifications and sizing.

4. Under-Shingle Membrane: The Hidden Fire Barrier

In Australia, it is called sarking. In North America, the closest equivalent is a self-adhering modified bitumen membrane (such as Grace Ice & Water Shield or Blueskin SA) applied over the entire roof deck beneath the roof covering.

4.1 Why It Matters

Roof coverings are not continuous. Asphalt shingles have gaps at every course and every ridge. Metal standing seam has joints. Concrete tile has gaps between tiles. Embers are small, wind-driven, and find every gap. Even a Class A roof covering can allow ember intrusion through gaps in the covering to the combustible roof sheathing beneath.

A continuous self-adhering membrane over the entire roof deck creates a secondary fire barrier. If an ember penetrates the roof covering, it lands on a non-combustible membrane rather than exposed wood sheathing. The membrane also prevents water intrusion at ice dams — which is why it is already standard practice at eaves and valleys in Canadian construction.

4.2 When to Specify

Full-roof sarking is specified at WER-3 and WER-4. At WER-2, sarking at eaves, valleys, and exposed roof junctions is recommended. For new construction at any WER level, full-roof sarking adds approximately $800–$2,000 to a typical home and is the most cost-effective time to install it. At re-roof, specifying full sarking adds minimal cost to the project since the deck is already exposed.

THE RE-ROOF OPPORTUNITY

If your roof covering needs replacement, that is the single best opportunity to add full sarking, upgrade to non-combustible covering (metal standing seam), and convert to a hot roof assembly. Three major fire resilience upgrades in one project, at a fraction of standalone retrofit cost. Plan ahead.

5. Metal Roofing: The Preferred Covering

Standing seam metal roofing is the preferred roof covering at WER-3 and WER-4 and recommended at WER-2. It is non-combustible, sheds embers and burning debris, resists radiant heat, and has the longest service life of any residential roof covering (50+ years versus 20–30 for asphalt shingles).

5.1 Fire Performance

Metal roofing is inherently Class A fire-rated without needing special underlayment. It does not ignite from ember accumulation. Its smooth, continuous surface sheds burning debris rather than trapping it (unlike tile or shingle profiles that can accumulate embers in valleys and courses). Standing seam profiles with concealed fasteners provide a continuous metal surface with minimal penetration points.

5.2 Beyond Fire

Metal roofing resists hail damage, sheds snow loads effectively, reflects solar heat (reducing cooling loads), and requires minimal maintenance. The initial cost premium over asphalt shingles (approximately 2–3x) is offset by the service life (2–3x longer), lower maintenance, and better insurance performance. On a lifecycle basis, metal roofing is often cheaper than asphalt.

5.3 Canadian Considerations

Standing seam metal is well-suited to Canadian climates. It sheds snow loads without ice damming (especially when combined with a hot roof assembly). It handles freeze-thaw cycles without degradation. It is available from multiple Canadian manufacturers in a range of profiles and finishes. For wildfire resilience, specify 24-gauge minimum steel or 0.032" aluminium in a standing seam profile with concealed fasteners.

6. Non-Combustible Cladding with Good Detailing

Vinyl siding is the most common cladding in Canadian residential construction. It is also one of the worst performers in wildfire. Vinyl melts at temperatures well below those produced by radiant heat from burning vegetation or a neighbouring structure, exposing the combustible sheathing and framing behind it. Vinyl is not acceptable at WER-3+ and is not recommended at any WER level.

6.1 Preferred Materials

Fibre cement board (James Hardie HardiePlank, Allura, or equivalent): Non-combustible, dimensionally stable, available in lap, panel, and shingle profiles. The most cost-effective NC cladding for residential use. Metal panel: Steel or aluminium, factory-finished. Excellent fire performance, long service life, low maintenance. Stucco: Traditional three-coat or one-coat systems over metal lath. Non-combustible, continuous, no joints. Masonry veneer: Brick, stone, or manufactured stone. Highest fire resistance and durability.

6.2 The Detailing That Matters

Non-combustible cladding only works as a fire barrier if the assembly behind it is properly detailed. The critical details: Type X gypsum sheathing (15.9mm) behind cladding on WER-3+ and CNEL-2+ faces provides 45+ minutes of fire resistance. Rain screen cavity with metal furring (not wood strapping) and non-combustible mesh at top and bottom prevents the cavity from acting as a chimney. Mineral wool insulation in the cavity provides non-combustible thermal performance. Metal flashing at every junction — wall-to-roof, wall-to-deck, wall-to-window, wall-to-foundation — prevents fire entry at transitions.

See TB-01 Section 4 for complete wall assembly design guidance and Section 4.6 for CNEL-specific wall assemblies.

THE ASSEMBLY, NOT JUST THE SURFACE

A non-combustible cladding over combustible foam insulation with wood furring strips and gaps at the wall-to-roof junction is not a fire-resistant wall. It is a non-combustible surface over a combustible assembly with a critical weak point. The assembly must work as a system. Every layer matters. Every junction matters.

7. FireSmart Site Design and Defensible Space

Construction hardening addresses the building. Site design addresses everything between the building and the wildland. FireSmart Canada provides the established framework for vegetation management around Canadian homes, organised into priority zones radiating outward from the structure.

7.1 Zone 1A (0–1.5m): The Non-Combustible Zone

This is the zone that FireHard addresses most directly. Within 1.5 metres of the building, everything should be non-combustible: gravel, stone, concrete, or pavers as ground cover. No combustible mulch, no vegetation touching the building, no firewood, no combustible furniture or storage. This zone is free to implement and is the single highest-impact site measure.

7.2 Integration with Landscape Architecture

Defensible space does not mean barren space. Good landscape architecture integrates fire-resilient plantings, hardscape features, and usable outdoor living areas into a design that is both beautiful and defensible. Low-growing, high-moisture deciduous plants in Zone 1B (1.5–10m). Stone or gravel pathways and patios that double as firebreaks. Metal or masonry raised beds. Irrigated green lawns that resist ignition. Non-combustible outdoor furniture.

Lazzarin Svisdahl Landscape Architects (BCSLA) provides defensible-space design services integrated with the FireHard WER system. Contact firehard.ca for referrals.

8. FireHard Decks, Fences, and Hardscaping

Decks, fences, and site features are the most common fire bridges between ground-level fuels and the building envelope. They are also the features most often overlooked in wildfire hardening because they are not considered part of the “building.” They are.

8.1 Non-Combustible Deck Systems

The new normal for decks in wildfire areas: Steel or aluminium framing (not wood joists). Non-combustible deck surface: concrete pavers on pedestals, natural stone, aluminium plank, or fibre cement. Metal flashing at the deck-to-wall ledger board junction. Enclosed under-deck with non-combustible screening or skirting. Non-combustible ground cover beneath.

IBHS research identifies the deck-to-wall junction as one of the top five ignition points on residential structures. A non-combustible deck eliminates this pathway entirely. The cost premium for steel framing over pressure-treated wood is $1,500–$3,000 for a typical residential deck — and the steel framing will last 50+ years versus 15–25 for wood.

8.2 Non-Combustible Fencing at the Building

NIST TN 2228 demonstrated through 187 experiments that combustible fences are efficient fire highways between structures. The new normal: Replace the first 2.4m (8 feet) of any fence attached to or within 1.5m of the building with non-combustible material. Metal gate section, steel panel, aluminium, or masonry. Cost: $200–$500 per connection. This is the cheapest high-impact measure in the entire WER system.

8.3 Hardscaping as Fire Defence

Every non-combustible surface in Zone 1A is a firebreak. Gravel driveways, stone patios, concrete walkways, masonry retaining walls — these are not just landscaping. They are fire defence infrastructure. The most effective residential wildfire strategy is often the simplest: replace combustible ground cover with non-combustible ground cover within 1.5m of every building face. Cost: $50–$80 per cubic yard of gravel, covering approximately 8 m².

THE $200 MEASURE

Replacing the first 8 feet of a combustible fence with a metal gate section costs $200–$500 and breaks the fire highway between your home and your neighbour’s. This single measure, based on NIST research, may be the highest return-on-investment wildfire mitigation action available to any homeowner. It takes one afternoon.

9. Putting It Together: The New Normal Checklist

For new construction in wildfire-prone areas (WER-2+), the following should be standard specification:

Roof: Metal standing seam or concrete tile. Full sarking (self-adhering membrane over entire deck). Hot roof assembly (unvented conditioned attic) with above-deck mineral wool. No attic vents.

Walls: Fibre cement or metal cladding. Type X gypsum sheathing on exposed faces. Mineral wool cavity insulation. Metal rain screen furring. Metal flashing at all junctions. CNEL wall assembly on close-neighbour faces.

Openings: 5mm tempered glass both panes on exposed faces. Aluminium or fibreglass frames. Wildfire shutters on vulnerable openings. Full weatherstripping and gap sealing throughout.

Vents: ASTM E2886 ember-resistant screening on all vents (if vented assembly). Hot roof eliminates most vents. Remaining vents baffled.

Decks and attachments: Steel or aluminium framing. Non-combustible surface. Metal flashing at ledger board. Enclosed under-deck. Non-combustible ground cover beneath.

Fencing: Metal gate section (minimum 2.4m) between any combustible fence and the building. Non-combustible fencing within 1.5m of building at WER-2+.

Site: Non-combustible ground cover 0–1.5m (gravel, stone, concrete). FireSmart vegetation management Zones 1A through 3. No combustible storage within 1.5m of building. Firewood 10m+ from any structure.

THE BOTTOM LINE

None of this is exotic. Metal roofing, fibre cement siding, mineral wool insulation, steel deck framing, gravel ground cover, and proper detailing. These are standard products installed by standard trades. The only thing that makes them different from what most Canadian homes have today is that someone specified them. Be that someone.

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About FireHard Canada

FireHard Canada (firehard.ca) is a trade name of Wildernest Systems Inc. The WER and CNEL systems were developed by professionals at Wildernest Systems Inc. and Bulkley Valley

Engineering Services Ltd., with landscape architecture expertise from Lazzarin Svisdahl Landscape Architects.

Products: Fire Hard exterior manual roller shutters (firehard.ca).

Professional services: P.Eng. WER assessments through Bulkley Valley Engineering Services Ltd. (EGBC Permit No. 1001683).

Landscape architecture: Defensible-space design through Lazzarin Svisdahl Landscape Architects (BCSLA).

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