

**FIREHARD.CA**

CONSTRUCTION DETAIL GUIDE 4

# Decks & Attachments

Deck Surface, Framing, Under-Deck, Carport & Pergola Details for WUI Construction

Adapted from AS 3959:2018, California Building Code Ch. 7A, NRC Guide, FireSmart Canada, and IBHS standards.

Version 1.0 | February 2026 | Free Resource — No Paywall

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# 1. Why Decks & Attachments Are Critical

An attached deck is not a separate structure — it is an extension of your home's fire envelope. When a deck ignites during a WUI fire, it becomes a large, sustained fire source directly against the building. IBHS research demonstrates that a burning deck can ignite combustible siding, cause glass breakage in sliding doors and windows, and expose the underside of eaves to direct flame contact. In effect, a deck fire converts an ember attack into a structural fire.

Decks are particularly vulnerable because they combine multiple risk factors simultaneously: a large horizontal surface where embers and debris accumulate, gaps between boards where embers lodge and transition from smouldering to flaming combustion, a substructure (joists and posts) that provides sustained fuel once ignited, and combustible materials commonly stored underneath (firewood, furniture, planters, yard equipment). IBHS testing found that all ember-ignited deck fires started in the gaps between deck boards, initially as small smouldering fires that transitioned to flaming fires. Even mild wind speeds of 20 km/h (12 mph) were sufficient to enable fire spread.

## The deck-to-building ignition pathway

IBHS research identified a specific and consistent ignition pathway from deck to building. Embers lodge between deck boards and ignite. The fire spreads in the gap between boards, both toward and away from the building. When the fire reaches a joist, the joist ignites and provides sustained fuel. The burning joist exposes the underside of surrounding deck boards to flame impingement. Once deck boards are burning from both above (ember-ignited gap fire) and below (joist fire), the deck fire produces substantial radiant heat directed at the adjacent building wall. This heat can ignite combustible siding, crack or break glazing in windows and doors, and drive flames into the eave area. IBHS testing showed that once a joist ignites due to initial flame impingement, it can burn for an extended period — a critical finding because it means a deck fire is self-sustaining even after the original ember exposure has passed.

## Substructure is the key finding

One of the most important findings from IBHS deck research is the critical role of the substructure (joists and beams). Testing revealed that if a joist was not engulfed in flames, the boards above it did not burn. This means the substructure, not the walking surface, determines whether a small ember-ignited fire grows into a full deck fire. IBHS research supports the use of non-combustible structural support systems (steel or aluminium framing) as the single most effective measure for reducing deck vulnerability. While metal substructures are more expensive than wood, they prevent the joist-as-sustained-fuel-source mechanism that drives deck-to-building fire spread.

### THE 1.5-METRE RULE

An attached deck within 1.5 metres of the building is effectively part of the building. Fire in this zone exposes the exterior wall, windows, doors, and eaves to direct flame contact and intense radiant heat. IBHS requires that the first 1.5 metres (5 feet) from the building be the highest-protection zone: non-combustible or ignition-resistant surface, no combustible storage, no combustible ground cover. This aligns with the FireSmart Canada Zone 1A (0–1.5m non-combustible surface zone). For WER-2 and above, the deck-to-wall junction within this zone must be treated as a critical fire-separation detail.

**Attached structures: carports, pergolas, and covered porches**

Any roofed or framed structure attached to the building shares fire risk with the building. AS 3959 is explicit: where any part of a garage, carport, verandah, or similar roofed structure is attached to or shares a common roof space with a building, the entire attached structure must comply with the same construction requirements as the building itself. Alternatively, the attached structure must be separated from the building by a wall with an FRL of at least 60/60/60 (loadbearing) or –/60/60 (non-loadbearing). This principle applies in the WER system: an attached carport or pergola at WER-2 must meet WER-2 construction requirements, or be fire-separated from the building.

**COMBUSTIBLE STORAGE UNDER DECKS**

Nothing that can ignite should be stored under a deck. This is the single most important behavioural change a homeowner can make for deck fire safety. IBHS testing showed that embers ignite combustible materials under decks — firewood, lumber, cardboard, yard debris — and the resulting fire attacks the deck substructure from below. Even with a non-combustible deck surface, combustible materials underneath can create a structural fire. If you must store items under a deck, enclose the deck perimeter with non-combustible material (fibre cement, metal mesh, or masonry) and maintain adequate ventilation to prevent moisture damage.

## 2. Specifications by WER Level

The following specifications are graded by FireHard Canada Wildfire Exposure Rating (WER) level. Each level builds on the previous. For a full explanation of the WER system, see the FireHard Canada WER Technical Document (free download at [firehard.ca](https://firehard.ca)).

### 2.1 Deck Walking Surfaces

Component	WER-1	WER-2	WER-3	WER-4
Walking surface	Maintain existing in good repair. Avoid untreated softwood. Composite, hardwood, or treated wood acceptable.	Non-combustible preferred: concrete, stone, porcelain tile, aluminium, or fibre cement. Composite (Class B+ flame spread) acceptable.	Non-combustible required within 3m of building: concrete, stone, aluminium, or fibre cement. Composite acceptable beyond 3m.	Non-combustible only: concrete, stone, metal, or fibre cement. Per AS 3959 Cl. 8.7.
Board gaps	Maintain clean. Clear debris from between boards.	6mm (1/4") gap preferred over 3mm (1/8"). Clean before fire season.	6mm gap minimum. Non-combustible gap filler or metal flashing strips at board-to-building junction.	Not applicable (non-combustible solid surface).
Board-to-wall junction	Seal gap between deck and wall. Remove debris regularly.	Metal flashing between deck surface and wall siding. Or replace first 300mm of deck boards adjacent to wall with non-combustible material.	Non-combustible deck boards within 300mm of building. Metal flashing at wall junction.	Non-combustible surface throughout. Fire-rated wall junction.
Stairs	Maintain in good repair.	Non-combustible treads and risers preferred. Metal stringers.	Non-combustible treads and risers. Metal or concrete stringers.	Non-combustible only. Metal or concrete construction.

#### COMPOSITE DECKING AND WILDFIRE

Composite (wood-plastic) decking is more resistant to ember ignition than untreated wood. IBHS testing confirms that composite products resist the initial ember lodging and smouldering phase better than softwood. However, once ignited, composite decking burns hotter than wood. The key takeaway: composite decking reduces the probability of ignition but does not eliminate fire risk. For WER-3 and above, non-combustible surfaces (concrete, stone, metal, fibre cement) are required near the building. All composite decking sold in North America is rated Class C or better; select products (Trex, TimberTech) carry Class B or Class A ratings.

## 2.2 Deck Substructure

Component	WER-1	WER-2	WER-3	WER-4
Joists and beams	Pressure-treated wood acceptable. Maintain in good repair.	Steel or aluminium framing preferred. Pressure-treated wood acceptable if deck enclosed or no combustible storage underneath.	Non-combustible framing (steel or aluminium) required. Or enclosed subfloor with non-combustible material.	Non-combustible framing only. Steel preferred. Per AS 3959 Cl. 8.7.
Posts and columns	Pressure-treated wood. 75mm clearance from grade on concrete pier or galvanised bracket.	Steel, aluminium, or PT wood on galvanised bracket with 75mm clearance. Posts within 400mm of grade: non-combustible.	Non-combustible: steel posts on concrete piers. Per AS 3959 Cl. 7.7.	Non-combustible only. Steel on concrete. Per AS 3959 Cl. 8.7/9.7.
Ledger board	Code-compliant attachment. Verify flashing intact.	Metal flashing between ledger and wall. Self-adhering membrane behind ledger.	Non-combustible ledger (steel angle or channel). Fire-rated separation between deck and building envelope.	Non-combustible ledger. Fire-rated connection. Bespoke engineering scope.
Joist protection	No specific requirement.	Foil-faced flashing tape on joist tops (IBHS recommendation).	Foil-faced flashing tape on all joist tops. Non-combustible joist hangers throughout.	Non-combustible joists. No protection needed.

### IBHS FOIL-TAPE RECOMMENDATION

IBHS research found that applying foil-faced self-adhering flashing tape to the top of each joist significantly reduces joist vulnerability to fire spreading through deck board gaps. The tape acts as a thermal barrier between the burning gap fire above and the joist below. This is a simple, inexpensive retrofit (<\$100 for a typical deck) that addresses the most critical mechanism in deck fire growth: joist ignition.

## 2.3 Under-Deck Zone

Component	WER-1	WER-2	WER-3	WER-4
Combustible storage	Remove all combustible materials from under deck.	No combustible storage. Clear zone under entire deck.	No combustible storage. Non-combustible ground surface under deck within 1.5m of building.	No combustible storage. Non-combustible ground surface under entire deck.
Vegetation	No vegetation in	No vegetation	No vegetation	No vegetation

Component	WER-1	WER-2	WER-3	WER-4
	contact with deck. Clear within 300mm.	under deck or within 300mm. Non-combustible ground cover preferred.	under deck or within 1m. Non-combustible ground cover required.	under or within 1.5m. Non-combustible ground cover.
Deck enclosure	Optional. If enclosed, maintain to prevent pest entry.	Recommended for elevated decks. Enclose with non-combustible mesh or panel.	Required for elevated decks (>600mm clearance). Non-combustible enclosure.	Required. Non-combustible enclosure matching wall requirements. Per AS 3959 Cl. 8.7.2.
Ground surface	Clean debris regularly.	Non-combustible ground cover under deck within 1.5m of building.	Non-combustible ground cover under entire deck area.	Non-combustible ground cover extending 1.5m beyond deck perimeter.

## 2.4 Attached Structures

Component	WER-1	WER-2	WER-3	WER-4
Attached carports	Non-combustible roof covering. Clear of combustibles.	Non-combustible roof and posts. Roof meets building roof standard.	Entire structure meets building WER level. Or separated by 60/60/60 FRL wall.	Full WER-4 compliance or fire-rated separation. Per AS 3959 Cl. 3.2.
Pergolas	Non-combustible materials within 1.5m of building.	Non-combustible framing within 3m. No combustible shade cloth.	Non-combustible throughout. Steel or aluminium framing.	Non-combustible. Or detached minimum 6m from building.
Covered porches	Porch ceiling: non-combustible or ignition-resistant.	Ceiling: fibre cement or aluminium. Posts: non-combustible within 1.5m.	Entire porch meets building WER level. Non-combustible ceiling, posts, fascia.	Full WER-4 compliance. Fire-rated assembly.
Shade structures	Non-combustible frame preferred. Retractable fabric during fire season.	Non-combustible frame required. Retractable fabric acceptable.	Non-combustible frame and covering within 3m.	Non-combustible throughout. Or detached minimum 6m.



## 2.5 Balustrades and Railings

Component	WER-1	WER-2	WER-3	WER-4
Railing material	Any code-compliant. Maintain in good repair.	Non-combustible preferred: metal, tempered glass, cable.	Non-combustible required within 125mm of glazing or combustible wall. Per AS 3959 Cl. 7.7.4.	Non-combustible only. Metal or tempered glass.
Privacy screens	Non-combustible preferred. Remove combustible screens during fire season.	Non-combustible: metal, tempered glass, or fibre cement. No wood lattice within 1.5m.	Non-combustible only within 3m of building.	Non-combustible throughout.

### THE 400mm ZONE REVISITED

AS 3959 applies additional requirements to any element within 400mm of the ground or within 400mm above a deck surface (see Module 1, Section 3). For decks, this means: glazing with a sill less than 400mm above the deck surface requires upgraded frame and screening even at lower WER levels. Any post or structural element within 400mm of grade must be non-combustible at WER-2+. The deck-to-wall junction at the lowest 400mm is the highest-risk zone for ember accumulation and fire spread.

## 2.6 Deck Framing: Member Size and Fire Resistance

Deck framing is uniquely vulnerable in wildfire because it is often directly exposed to fire from below. Unlike wall framing, which is protected by cladding and sheathing, deck joists and beams are typically open to the under-deck zone where embers accumulate and debris ignites. The size of these framing members directly determines how long the deck structure stands under fire.

### How deck framing fails

Wood chars at a predictable rate. For SPF (spruce-pine-fir, the dominant Canadian framing lumber), the charring rate is approximately 0.65 mm per minute under standard fire exposure. Douglas Fir chars slightly slower at approximately 0.60 mm/minute. When fire reaches the under-deck zone — typically from ember accumulation, debris ignition, or radiant heat from vegetation or a neighbouring structure — it attacks the joists from below and often from the sides simultaneously.

Deck Member (SPF)	Exposure	30-min Core	60-min Core	Practical Result
38 x 140 mm (2x6 joist)	3 sides	~0 x 100 mm	Failed	Fails 25–35 min
38 x 184 mm (2x8 joist)	3 sides	~0 x 144 mm	Failed	Fails 25–35 min
38 x 235 mm (2x10 joist)	3 sides	~0 x 195 mm	Failed	Fails 25–35 min
89 x 89 mm (4x4 post)	4 sides	49 x 49 mm	~7 x 7 mm	Marginal 30 min
140 x 140 mm (6x6 post)	4 sides	100 x 100 mm	60 x 60 mm	Stands 60+ min
Steel C-channel joist	Any	Full section	Full section	Does not burn
Aluminium extrusion	Any	Full section	Full section	Does not burn

Note: All dimensioned lumber joists exposed on three sides (bottom and both edges) fail at approximately the same time regardless of depth because the narrow 38 mm dimension controls. A 2x10 joist is no more fire-resistant than a 2x6 — both char through the 38 mm width in 25–35 minutes. Deeper joists are stronger structurally but not more fire-resistant. Post size matters because posts are square or near-square and char proportionally on all sides.

### What this means by WER level

**WER-1 and WER-2:** Wood deck framing is acceptable provided the under-deck zone is managed. The primary defence is preventing fire from reaching the framing: clear all debris from under the deck, install non-combustible ground cover, and apply foil-faced flashing tape to joist tops (prevents fire from burning down through gaps between boards into joists). These measures mean the framing may never be exposed to fire at all. If budget allows, 6x6 posts rather than 4x4 posts provide meaningful additional time.

**WER-3:** Steel or aluminium deck framing is required. At this exposure level, the probability of fire reaching the under-deck zone is high enough that wood framing is not adequate. Steel C-channel or aluminium extrusion joists and beams eliminate the framing vulnerability entirely. The deck surface (NC composite or metal) combined with metal framing creates a deck assembly that does not contribute fuel to the fire.

**WER-4:** Non-combustible framing and surface throughout. Steel or aluminium framing with NC deck boards and enclosed under-deck zone. All attached structures must meet the same WER level.

#### RETROFIT PRIORITY

If replacing an existing wood deck in a wildfire-prone area, upgrading to steel or aluminium framing adds \$2,000–\$6,000 over wood framing but eliminates the single most vulnerable structural element. If full replacement is not in budget, the lowest-cost highest-impact measures are: (1) clear everything from under the deck, (2) install gravel or NC ground cover under the deck, (3) apply foil-faced tape to joist tops, (4) install metal flashing at the deck-to-wall junction. These four measures can be done for under \$500 and prevent most deck-initiated ignitions. See Module 6 Section 2.5 for detailed charring rates and member size data.

## 2.7 Fire-Retardant Coatings and FRT Decking

Homeowners frequently ask about fire-retardant paints and coatings for existing wood decks. Intumescent coatings (fire-retardant paints) expand under heat to form an insulating char layer. They work under controlled test conditions, but research shows serious durability concerns for exterior applications. A 2018 IBHS study found intumescent coatings marketed with a 5-year service life were ineffective after just one year of natural outdoor weathering. California Chapter 7A does not accept fire-retardant coatings for WUI compliance.

Decks are particularly harsh environments for coatings: horizontal surfaces collect standing water, foot traffic abrades the coating, UV exposure is constant, and freeze-thaw cycles in Canadian winters are punishing. A coating applied to deck boards will degrade faster than the same coating on a vertical wall surface.

**Fire-retardant treated (FRT) decking:** A different and more durable option. Exterior-rated FRT decking (such as Mataverde SaferWood or Hoover ExteriorFireX) is pressure-impregnated with fire-retardant chemicals that are bonded within the wood fibres through kiln-drying. Unlike surface coatings, the treatment is permanent and does not wash away. FRT decking must pass ASTM D2898 accelerated weathering tests while maintaining Class A flame spread ratings. Some products have passed California's 10-year outdoor weathering test. FRT decking is a legitimate option at WER-2 where the homeowner wants to maintain a wood deck surface rather than switching to composite or metal.

**DECK COATING GUIDANCE**

Do not rely on fire-retardant paint as the primary protection for a wood deck in a wildfire-prone area. The coating will degrade in exterior conditions faster than you expect, and you have no way to verify it is still working. Better alternatives in order of preference: (1) NC composite or metal deck boards (permanent, no maintenance), (2) exterior-rated FRT decking if wood aesthetic is desired (permanent treatment, proven weathering durability), (3) fire-retardant paint as a temporary measure only while planning a deck replacement. For detailed comparison of coatings vs FRT vs NC envelope, see Module 6 Section 2.6.

### 3. AS 3959 to Canadian Adaptation: Decks & Attachments

The FireHard Canada WER deck specifications draw on AS 3959:2018 Sections 5.7 through 9.7 and IBHS research. Key adaptations for Canadian residential construction:

#### Decking materials

AS 3959 requires decking boards to be non-combustible or “bushfire-resisting timber” at BAL-29+. This classification (AS 3959 Appendix F) does not exist in Canadian codes. FireHard Canada translates: at WER-1/2, pressure-treated Canadian lumber and composite products are acceptable with proper maintenance. At WER-3+, non-combustible surfaces are required near the building. The 3-metre transition zone at WER-3 reflects the practical reality that most BC homes have existing wood decks.

#### Subfloor enclosure

AS 3959 addresses enclosed subfloor spaces at all BAL levels with material requirements only within 400mm of grade. At BAL-40/FZ, enclosure must match wall requirements. For Canadian applications, FireHard Canada recommends enclosure at WER-3+ for elevated decks. Enclosure materials must be non-combustible with adequate ventilation for moisture management — critical in BC’s wet climate.

#### Post clearance

AS 3959 requires posts within 400mm of ground to be non-combustible or bushfire-resisting timber, mounted on galvanised brackets with 75mm clearance. FireHard Canada adopts this at WER-2+. In Canadian practice, concrete pier foundations with galvanised post bases are standard construction and meet this requirement.

#### Attached structures

AS 3959 Clause 3.2 requires attached structures to meet the same BAL as the building or be fire-separated by a 60/60/60 FRL wall. FireHard Canada applies this principle at all WER levels. This is particularly important for BC homes where attached carports and covered decks are common and often constructed with combustible materials.

#### California deck testing

CBC Chapter 7A Section 709A requires deck materials tested to ASTM E2632 (under-deck flame) and ASTM E2726 (burning brand on surface). Products in the California WUI Products Handbook have been vetted to these standards. Canadian homeowners can reference these listings when selecting deck materials.

## 4. Construction Sequences

### 4.1 New Construction: Deck for WER-2+

#### Step 1: Foundation and posts

Install concrete piers or footings. Mount steel or aluminium posts on galvanised bases with 75mm clearance from grade. For wood posts at WER-2, use galvanised brackets; posts within 400mm of grade must be non-combustible.

#### Step 2: Substructure framing

Install steel or aluminium joists and beams (WER-3+) or pressure-treated wood (WER-2). Apply foil-faced flashing tape to joist tops before deck boards. Use non-combustible joist hangers throughout.

#### Step 3: Ledger connection

Install metal flashing between ledger and wall. Apply self-adhering membrane behind ledger. At WER-3+, use non-combustible ledger (steel angle or channel). Seal all penetrations.

#### Step 4: Deck surface

Install deck boards with 6mm gaps. Replace first 300mm adjacent to wall with non-combustible material. Install metal flashing at board-to-wall junction.

#### Step 5: Railings and stairs

Non-combustible railings at WER-2+. Metal stringers with non-combustible treads at WER-3+.

#### Step 6: Under-deck zone

Non-combustible ground cover (75mm gravel minimum) under deck and extending 1.5m from building. For elevated decks at WER-3+, enclose perimeter with non-combustible material. Include ventilation openings screened with  $\leq 2$ mm mesh.

#### Step 7: Attached structures

Covered structures must meet building WER level (see Module 2). Carports: either meet WER level or fire-separate with 60/60/60 wall.

### 4.2 Retrofit Upgrade Sequence

#### Step 1: Clean and clear (\$0)

Remove all combustible materials from under deck. Clear vegetation from under and within 300mm. Clear debris from between boards. Free and immediately effective.

#### Step 2: Non-combustible ground cover (\$200–\$600)

75mm gravel or river rock under deck and 1.5m from building. Prevents ground-level ignition.

#### Step 3: Foil-tape joists (\$50–\$150)

Foil-faced flashing tape on joist tops. Addresses the critical joist-ignition mechanism (IBHS).

**Step 4: Metal flashing at wall (\$100–\$300)**

Metal flashing between deck surface and wall. Prevents ember lodging at highest-risk junction.

**Step 5: Replace first row of boards (\$200–\$600)**

Non-combustible material for first 300mm adjacent to wall. Creates non-combustible buffer.

**Step 6: Enclose under-deck (\$1,000–\$3,000)**

Non-combustible perimeter enclosure for elevated decks. Include ventilation with  $\leq 2$ mm mesh.

**Step 7: Replace substructure (\$3,000–\$10,000+)**

Steel or aluminium framing. Best done at deck replacement. 30–50% more than wood.

**Step 8: Replace deck surface (\$5,000–\$15,000+)**

Full non-combustible surface. Major renovation. Steps 1–5 provide substantial protection at a fraction of the cost.

**COST-EFFECTIVENESS**

Steps 1–4 cost under \$1,000 total and address the most common ignition and spread mechanisms. A homeowner who completes Steps 1–5 has addressed the majority of deck-related wildfire risk for under \$2,000. Steps 6–8 provide additional protection based on WER level and exposure.

## 5. Product Research & Recommendations

FireHard Canada does not receive compensation from any manufacturer listed.

### 5.1 Non-Combustible Deck Boards

Aluminium decking: AluDek; Wahoo Decks; NextDeck. Fully non-combustible, no sealing required. \$15–\$25/lin ft installed. Fibre cement planks can serve as deck surface in low-traffic areas. Concrete pavers on pedestal systems: Bison Versadjust; Tile Tech; Hanover Architectural Products. \$25–\$45/sq ft installed.

### 5.2 Fire-Resistant Composite

Class A/B products: TimberTech Advanced PVC (Class A, no wood content); AZEK Harvest/Vintage (Class A PVC); Trex Transcend (Class B); Fiberon Concordia (Class B). Available through Canadian building supply.

### 5.3 Steel and Aluminium Framing

Fortress Building Products Evolution steel system; Trex steel framing; Wahoo Decks aluminium frame. Galvanised joist hangers: Simpson Strong-Tie; MiTek. All hardware non-combustible at WER-3+.

### 5.4 Flashing and Taping

Foil-faced tape: Grace Vycor Plus; Blueskin SA; Resisto SA Aluminum Flashing Tape; 3M 8067 All Weather. \$25–\$50/roll. Metal flashing: aluminium or galvanised angle, brake-formed. Stainless steel for coastal BC.

### 5.5 Enclosure Materials

Fibre cement panel (James Hardie; Allura; Nichiha); corrugated metal; concrete masonry; metal mesh  $\leq 2\text{mm}$  aperture. Include ventilation openings on opposite sides.

## 6. Maintenance Protocol

### 6.1 Annual Inspection Checklist

1. Clear all debris from between deck boards, deck-to-wall junction, and horizontal surfaces.
2. Clear all combustible materials from under deck. No firewood, lumber, cardboard, cushions.
3. Clear vegetation from under and within 300mm of deck. Trim grass within 1.5m.
4. Inspect deck boards for rot, splitting, or degradation. Old dry wood is highly flammable.
5. Inspect substructure for rot, insect damage, or structural issues. Check foil tape integrity.
6. Inspect ledger connection and flashing. Check for water intrusion or gaps.
7. Inspect deck enclosure (if installed). Check for damage, gaps, or pest entry.
8. Inspect railings, stairs, and connections. Check for corrosion or loosening.
9. Check attached structures. Clear debris from roofs/gutters. Inspect connections.
10. Pre-fire season: move combustible items off deck (cushions, rugs, brooms, planters).

### 6.2 Pre-Evacuation Actions

**Move combustible items indoors** from decks and porches.

**Close all windows and doors** facing the deck (see Module 1).

**Deploy shutters** if installed.

**Clear debris** from deck surface, deck-to-wall junction, and overhead gutters.

**Move vehicles** out of attached carports.



## 7. Referenced Standards

Standard	Title	Relevance
AS 3959:2018	Construction of Buildings in Bushfire-Prone Areas	Sections 5.7–9.7: decks, verandahs, steps. Clause 3.2: attached structures.
ASTM E2632	Under-Deck Fire Test Response	Flame impingement on deck board underside.
ASTM E2726	Deck Structures Burning Brand Test	Ember exposure on deck surface.
SFM 12-7A-4	Decking Test Standard (California)	Parts A and B: under-deck and surface fire performance.
CBC Chapter 7A	Exterior Wildfire Exposure	Section 709A (decks), 707A.7 (floor projections).
NRC WUI Guide	National WUI Fires Guide (2021)	Construction Class deck recommendations.
NFPA 1144	Reducing Structure Ignition Hazards	Deck and attachment guidance.
IBHS Standard	Wildfire Prepared Home (2025)	Deck research, 5-foot zone, substructure findings.

## 8. Neighbouring Structure Exposure: Decks & Attachments

Decks and attached structures on faces adjacent to close neighbours create a direct fire bridge between buildings. A deck that extends toward a neighbouring property reduces the effective separation distance and provides combustible fuel in the gap between structures. For full details on building-to-building fire spread, see Module 6.

### Decks as fire bridges

NIST post-fire investigations of the Marshall Fire (2021) documented cases where fire travelled from one structure to another via shared or adjacent decks and fences. A combustible deck extending from your wall toward a neighbouring property effectively reduces the separation between the two structures to the distance from your neighbour to the edge of your deck — not from your neighbour to your wall. If your deck extends 3 metres toward a neighbour that is 6 metres from your wall, the effective separation is only 3 metres.

### Radiant heat ignition from above

Most deck fire research focuses on ember ignition (embers lodging in gaps between boards) and fire from below (ground-level ignition spreading to the substructure). A burning neighbouring structure adds a third mechanism: radiant heat from above and to the side. A fully involved neighbouring home at 4–6 metres produces sufficient radiant heat to ignite combustible deck surfaces directly, without embers. This is why non-combustible deck surfaces and steel/aluminium framing are specified on faces adjacent to close neighbours.

### Attached structures in the gap

Carports, pergolas, covered porches, and similar attached structures in the space between your home and a neighbour are particularly dangerous. They provide additional combustible fuel in the gap, reduce air circulation (concentrating heat), and create a direct structural connection from the fire to your wall. On close-neighbour faces, all attached structures should meet the same WER level as the main building, or be separated by a fire-rated connection. See Module 6 Section 6 for the complete CNEL system.

## 9. References

### Standards and Codes

AS 3959:2018 + Amd 2:2020. *Construction of Buildings in Bushfire-Prone Areas*. Standards Australia. Sections 5.7–9.7, Clause 3.2.

ASTM E2632/E2632M. *Under-Deck Fire Test Response of Deck Materials*. ASTM International.

ASTM E2726/E2726M. *Fire Test Response of Deck Structures to Burning Brands*. ASTM International.

California Building Code, Chapter 7A [SFM]. *Exterior Wildfire Exposure*. 2022. Section 709A.

SFM Standard 12-7A-4. *Decking Test Standard*. California Office of the State Fire Marshal.

NFPA 1144. *Reducing Structure Ignition Hazards from Wildland Fire*. NFPA.

### Guides and Resources

Bénichou, N., et al. (2021). *National Guide for Wildland-Urban Interface Fires*. NRC Canada. doi:10.4224/40002647.

FireSmart Canada (2018). *FireSmart Begins at Home Manual*. [firesmartcanada.ca](https://firesmartcanada.ca).

IBHS (2025). *Wildfire Prepared Home Standard*. [ibhs.org](https://ibhs.org).

Fire Safe Marin (2025). “Fire-Resistant Decks, Patios, and Porches.” [firesafemarin.org](https://firesafemarin.org).

### Research Papers and Reports

IBHS (2025). “Vulnerability of Decks to Embers and Flames.” [ibhs.org/wildfire](https://ibhs.org/wildfire). Substructure, ember ignition, fire spread, metal substructure.

IBHS (2024). “Evaluating the Performance of Decks Under Wildfire Conditions.” Executive summary. Wind, joist spacing, propagation.

NFPA/Firewise/IBHS. “Fire Spread on Ember-Ignited Decks.” Fact sheet. Board gaps, foil tape, 1/4-inch gap.

IBHS/NFPA/Firewise. “Reduce the Vulnerability of Your Deck to Wildfire.” Non-combustible zone, enclosure, wall flashing.

Quarles, S.L., et al. (2010). *Home Survival in Wildfire-Prone Areas*. UC ANR Publication 8393.

## Verification Pathways

The WER system recognizes three pathways to meet each specification. This mirrors how building codes work — a prescriptive path for straightforward compliance, and alternative solution paths for flexibility.

### Deemed-to-Satisfy

Materials and assemblies explicitly named in the FireHard specification. If the design guide lists it, it meets the standard. Example: fibre cement panel, metal cladding, stucco, or masonry all satisfy “noncombustible cladding (or engineered equivalent)” without further testing.

### Tested Equivalent

Products tested to the referenced standard by a recognized testing laboratory. The manufacturer's test report is the evidence of compliance. Example: an ember-resistant vent not listed in this guide but tested to ASTM E2886 by an accredited lab meets the WER-2 vent specification.

### Engineered Alternative

A P.Eng. assessment demonstrating equivalent performance through analysis. The engineer's sealed report is the evidence. Example: a heavy-timber fence post (140×140mm minimum) may satisfy the WER-2 fencing specification through charring rate analysis, even though it is not noncombustible.

### Fire-Rated Timber

Where a specification says “NC or fire-rated,” fire-rated timber is an acceptable alternative when it meets minimum section dimensions. Large-section timber chars at a predictable rate (approximately 0.65mm/min for softwood per Eurocode 5) and can maintain structural integrity for defined periods. For fencing, outbuilding framing, and deck substructure, timber sized to resist ignition for the design fire exposure period is acceptable at WER-1 through WER-3. Minimum section dimensions are specified in the relevant design guides. At WER-4, all exterior materials must be noncombustible — no timber alternatives.

### Close Neighbour Exposure Level (CNEL)

Most Canadian subdivision homes are built 1.5–6 metres apart. If any face of your home is within 10 metres of a neighbouring structure, the CNEL system applies to that face. Measures scale with WER level. See the CNEL section in each FireHard design guide and Construction Detail Guide 6 for full technical details.

## Disclaimer

This document is published by FireHard Canada for general educational and informational purposes. It provides technical guidance on wildfire-resistant construction practices based on current Canadian building science, standards, and research.

**Not professional advice:** This document does not constitute professional engineering, architectural, or construction advice. It is not a substitute for the services of a licensed engineer, architect, or other qualified professional.

**No building is fireproof:** Compliance with the recommendations in this document does not guarantee that a property will survive a wildfire event. Wildfire outcomes depend on fire intensity, duration, wind conditions, ember density, suppression response, terrain, vegetation, neighbouring property conditions, and other factors beyond building construction.

**Building code responsibility:** Building codes vary by province, territory, and municipality. This document does not warrant that any specification satisfies the requirements of any specific jurisdiction.

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## About FireHard Canada

FireHard Canada ([firehard.ca](https://firehard.ca)) is a trade name of Wildernest Systems Inc. The Wildfire Exposure Rating (WER) system was developed by engineers at Wildernest Systems Inc. and Bulkley Valley Engineering Services Ltd., with landscape architecture expertise from Lazzarin Svisdahl Landscape Architects.

FireHard Canada publishes free wildfire hardening resources for Canadian homes. Six Construction Detail Guides, FireHard Self-Assessment Guides, four FireHard Design Guides, a New Construction Design Guide, and the FireHard Technical Reference are all available free at [firehard.ca](https://firehard.ca).

We are building FireHard Canada non-profit organization for stakeholder engagement, peer review, and ongoing refinement of the WER system. We are actively seeking engineers, architects, building scientists, insurers, building officials, researchers, and community advocates to participate.

Get involved: [firehard.ca/partners](https://firehard.ca/partners)

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