FIREHARD CANADA

WER-4 DESIGN GUIDE

ENGINEERED FIRE RESISTANCE

Professional engineering guide for extreme-risk properties — P.Eng. assessment required

New build: $40,000–$150,000+ premium | Retrofit: often impractical

Version 2.0 — February 2026 | firehard.ca | Free. Always.
IMPORTANT — WER levels are cumulative. WER-4 includes ALL WER-1, WER-2, and WER-3 measures plus the additional measures listed below. P.Eng. assessment required. Do not skip levels.
For approved products and assemblies: FireHard Component & Assembly Reference at firehard.ca/components.

DISCLAIMER

This guide 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. This guide is subject to the following conditions:

Not professional advice: This guide 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. Users should engage qualified professionals for design, specification, and construction of wildfire-resistant assemblies.

Building code responsibility: Building codes, standards, and regulations vary by province, territory, and municipality and are subject to change. This guide references specific code provisions for context but does not warrant that any specification contained herein satisfies the requirements of any specific jurisdiction. Compliance with applicable building codes is the responsibility of the property owner, their design professionals, their contractors, and local building authorities.

Site-specific conditions: The specifications and recommendations in this guide are general in nature. Actual wildfire resistance depends on site-specific conditions including but not limited to: topography, prevailing wind patterns, vegetation type and density, proximity to wildland fuels, local climate, neighbouring structures, and access to fire suppression services. A qualified professional familiar with local conditions should assess the applicability of any recommendation to a specific property.

Product references: Where this guide references specific products, materials, standards, or testing protocols, such references are for informational purposes only and do not constitute an endorsement. Product availability, specifications, and certifications are subject to change. Users should verify current product specifications with manufacturers and confirm suitability for their specific application.

Accuracy and currency: FireHard Canada endeavours to provide accurate and current information but makes no warranty that all information is error-free or current at the time of reading. Standards, research findings, and best practices evolve. Users should verify critical information against current sources.

No guarantee of wildfire survival: Compliance with the recommendations in this guide 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. The WER system measures resistance to specific wildfire exposure mechanisms; it does not predict outcomes.

Limitation of liability: To the maximum extent permitted by applicable law, FireHard Canada, Wildernest Systems, Bulkley Valley Engineering, and their respective directors, officers, employees, agents, contractors, and affiliates shall not be liable for any direct, indirect, incidental, special, consequential, exemplary, or punitive damages arising from or related to the use of or reliance on the information in this guide, including but not limited to property damage, personal injury, or financial loss. The Services are provided “as is” without warranties of any kind, either express or implied. Users acknowledge that wildfire is an inherently unpredictable natural hazard and assume all risks associated with wildfire exposure to their property. Full terms at firehard.ca/terms.

Contents

1. What WER-4 Means

Your home is in or immediately adjacent to the flame zone: dense conifers within 10m on flat ground, or immediately upslope. Direct flame contact, extreme radiant heat (>40 kW/m²), and sustained ember attack. This is equivalent to Australian BAL-40 or BAL-FZ. At WER-4, the building must resist direct flame contact and extreme radiant heat simultaneously. FireSmart Canada vegetation management is essential at this exposure level and should be implemented before or alongside construction hardening. WER-4 is also assigned automatically via slope correction when lower WER levels on steep uphill faces exceed the correction threshold (greater than 20 degrees with any fuel within 50 metres, or 15+ degrees with dense coniferous fuel within 30 metres). See the formal slope correction table in the WER Technical Document Section 3.1.

P.ENG. REQUIRED

WER-4 requires professional engineering assessment. The specifications in this guide are performance targets — the P.Eng. must verify that the specific design achieves these targets given site-specific conditions. Self-assessment is not sufficient at this exposure level.

NOT EVERY HOME CAN OR SHOULD BE SAVED

At WER-4 exposure, some sites cannot be practically hardened to a survivable standard. If vegetation cannot be managed and separation cannot be achieved, the honest answer may be that the site is not appropriate for construction, or that the cost of hardening exceeds the value of the structure. A P.Eng. assessment will provide this honest evaluation.

2. In Plain English

What You’re Dealing With

Your home is in or immediately adjacent to the most dangerous possible wildfire zone. Dense forest is right there — within 10 metres on flat ground, or even closer on a slope. When this vegetation burns, your home will face direct flame contact, extreme radiant heat, and sustained ember attack simultaneously. This is the equivalent of standing next to a structure fire, except the fire is the entire surrounding landscape.

What You’re Actually Doing

Everything in WER-3, plus engineering. At WER-4, the building must be individually designed by a professional engineer (P.Eng.) to resist the specific fire exposure conditions at your site. The general approach is a fully non-combustible building envelope with demonstrated fire resistance ratings, fire-rated shutters on all exposed openings, and preferably a non-combustible or heavy timber structural system. But the specific design depends on your site — slope, aspect, vegetation type, and distance all affect what’s required.

Alternatives and Options

At WER-4, the most important alternative is often not a construction choice but a site management choice. If you can increase the distance between your home and the vegetation — through clearing, thinning, limbing, or land management agreements with neighbours — you may be able to reduce your WER level from 4 to 3 or even 2. This is often dramatically cheaper than building to WER-4 specification. A registered professional forester or FireSmart representative can advise on vegetation management options. For the building itself, steel framing provides the highest fire reliability, but heavy timber (190mm+ members) provides significant fire resistance through charring and may be more practical and affordable. Your P.Eng. will evaluate the options for your specific situation.

What It Costs

New construction to WER-4 adds $40,000–$150,000+ to the build cost, depending on size and site conditions. That’s 15–40% above standard construction — a very significant premium. Retrofit to WER-4 is often impractical: the cost frequently exceeds 40–80% of the home’s value, and the structural system of most existing homes cannot provide the fire resistance required. This is why the honest assessment at WER-4 sometimes concludes that vegetation management is the better investment than construction hardening.

What Happens If You Don’t

At WER-4 exposure, a conventional home is very unlikely to survive a major wildfire event. This is not about probability — it is about the physical limits of standard building materials when exposed to direct flame and extreme radiant heat. Standard windows fail in minutes. Vinyl and wood cladding ignite. Light-frame wood structures lose structural integrity in 25–45 minutes of fire exposure. The question at WER-4 is not whether to invest in protection, but which form that investment should take.

Working With a Professional Engineer

WER-4 requires a P.Eng. assessment — this is not optional. The P.Eng. will evaluate your site conditions, determine the design fire scenario, specify the building assemblies required to resist that scenario, and take professional responsibility for the design. This is not a general contractor decision or a homeowner decision. Engage a P.Eng. with experience in fire engineering or wildfire-resistant construction. In British Columbia, Bulkley Valley Engineering Services Ltd. (EGBC Permit No. 1001683) provides WER assessments. For other provinces, contact your provincial engineering association for referrals.

Getting the Details Right

At WER-4, every detail is engineered and every assembly is specified. The P.Eng. will produce stamped drawings showing exactly how each assembly is to be constructed. These drawings are not guidelines — they are the design. Your contractor must build exactly what is shown on the drawings, using exactly the products specified, installed exactly per the manufacturer's instructions. Any deviation must be approved by the P.Eng. in writing. This is the same standard that applies to structural engineering — because at WER-4, fire resistance is structural.

Document everything. Photograph every assembly at every stage. Keep all material certifications, fire test reports, and product spec sheets. The P.Eng. will need these for the completion report, and your insurer will want them for the WER Compliance Report.

THE HONEST QUESTION

Before committing to WER-4 construction, have an honest conversation with your P.Eng. about whether the site is appropriate for building at all, or whether vegetation management can reduce the WER level to make hardening practical. Not every site should have a house on it. A good engineer will give you an honest answer, even if the answer is difficult.

3. Performance Targets

WER-4 specifications are performance targets that the P.Eng. must verify are achievable:

Component	Performance Target
Envelope FRL	Minimum FRL –/30/– (30-minute integrity) on all exposed faces. Higher FRL where site assessment indicates flame contact duration >30 minutes.
Glazing	5mm tempered both panes all faces. Fire-rated shutters (FRL –/30/–) or fire-rated glazing on exposed faces. BAL-FZ equivalent.
Roof assembly	Non-combustible covering. Full sarking. Non-combustible structure. No exposed timber at eave line.
Wall assembly	NC cladding tested to NFPA 268 or AS 1530.1 for radiant heat resistance. Type X gypsum all faces. Mineral wool all exposed faces. Fire-stopped rain screen.
Vents	ASTM E2886 ≤2mm all vents. Eliminate where possible. Baffled systems preferred.
Openings	Fire-rated shutters on all exposed openings. Steel or fire-rated doors. Minimal glazing on exposed faces.
Decks	NC throughout. Steel/aluminium framing. NC surface. Fully enclosed under-deck.
Structure	NC framing preferred (steel, concrete, masonry). If timber: heavy timber (190mm+) or mass timber with demonstrated char rate adequacy per Eurocode 5.
Site	NC throughout 6m. Hardscape only within 3m. Fuel management per FireSmart Canada Zones 1A, 1B, and 2. Engage a FireSmart representative or registered professional forester for vegetation management planning..

4. Material Requirements

Cladding

All cladding must be non-combustible AND tested for radiant heat resistance. Acceptable: fibre cement (tested to NFPA 268), metal panel, masonry, concrete, stone. Testing must demonstrate no ignition at 40 kW/m² radiant heat flux for minimum 30 minutes.

Structural System

Steel frame, concrete, masonry, or heavy timber (190mm+ members). Light-frame wood construction is NOT recommended at WER-4 — the envelope alone must carry the entire fire resistance, with no structural reserve. Heavy timber with demonstrated char adequacy provides reserve. Steel frame with fire-protected connections provides the highest reliability.

Glazing System

Fire-rated shutters are the primary defence for openings at WER-4. Manual roller shutters (FireHard or AS 3959 BAL-FZ compliant). All glazing 5mm tempered. Consider reducing glazing area on exposed faces to minimum required for natural light and ventilation.

5. Cost: New Construction and Retrofit

New build to WER-4: $40,000–$150,000+ above standard construction, depending on building size and site conditions. This represents 15–40% premium on a typical residential build.

Retrofit to WER-4 is often impractical. The structural system of most existing homes (light-frame wood) cannot provide the fire resistance required, and upgrading the entire envelope to WER-4 standards typically costs 40–80% of the home's value. A P.Eng. assessment will determine whether retrofit is technically and economically viable.

For some properties, the answer is mitigation through vegetation management and separation rather than construction hardening. If the vegetation setback can be increased to 30m+ through land management, the WER level may reduce to WER-3 or WER-2, making hardening practical and affordable.

THE VEGETATION ALTERNATIVE

Before committing to WER-4 construction hardening ($40K–$150K+), assess whether vegetation management can reduce the WER level. Increasing separation from 10m to 30m (through clearing, limbing, thinning, or land management agreements) can reduce WER from 4 to 3 or even 2 — at a fraction of the cost. A P.Eng. or registered professional forester can advise.

6. Close Neighbour Exposure Level (CNEL) at WER-4

At WER-4, close neighbour exposure is substantially addressed by the comprehensive specifications. The building envelope already provides maximum practical fire resistance on all faces. The gap between buildings should be managed as non-combustible hardscape with no combustible materials of any kind.

The Close Neighbour Exposure Level (CNEL) system provides a framework for properties where close neighbour risk exists alongside or instead of wildland exposure. For properties built to WER-4, no additional CNEL measures are typically required as WER-4 exceeds all CNEL levels. See the standalone FireHard Close Neighbour Exposure Level (CNEL) Guide at firehard.ca for the complete framework.

7. Verification Pathways

At WER-4, the Engineered Alternative pathway is the primary compliance mechanism. The P.Eng. designs the building to meet the performance targets above, stamps the design, and takes professional responsibility.

Deemed-to-Satisfy specifications are provided as baseline guidance, but site-specific conditions at WER-4 exposure often require tailored solutions that only a P.Eng. can determine.

Fire-Rated Timber at WER-4

Heavy timber (190mm+) or mass timber (CLT) may be acceptable at WER-4 with P.Eng. verification. Charring rate calculations per Eurocode 5 Part 1-2 (standard rate 0.65mm/min) must demonstrate adequate residual section for the design fire scenario. A 190mm post retains a 150×150mm core after 30 minutes. A 7-ply CLT wall panel can provide 90+ minutes of structural fire resistance.

8. Documenting Your Work

At WER-4, documentation must include the P.Eng. assessment report, stamped drawings, material certifications, fire test reports for all critical assemblies, and comprehensive construction photos. The P.Eng. report forms the basis of the WER Compliance Report for insurance purposes.

9. About FireHard Canada

FireHard Canada (firehard.ca) is a trade name of Wildernest Systems Inc. Developed by Wildernest Systems Inc. and Bulkley Valley Engineering Services Ltd., with Lazzarin Svisdahl Landscape Architects.

P.Eng. WER-4 assessments: Bulkley Valley Engineering Services Ltd. (EGBC Permit No. 1001683).

firehard.ca/partners | info@firehard.ca