

PERMCON

GROUND CLEARANCE FOR CLADDING SYSTEMS

TECHNICAL GUIDE

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BRICK VENEER CLADDING

PURPOSE

This technical note addresses the applicable ground clearance category for Permcon permeable concrete paving installed adjacent to brick veneer cladding under the New Zealand Building Code (NZBC).

It provides a reasoned basis for treating Permcon as permanent paving for the purposes of E2/AS1 ground clearance requirements, and explains why the system performance equals or exceeds that of conventional impermeable concrete paving in this context.

RELEVANT CODE REQUIREMENTS

E2/AS1 (External Moisture) sets minimum clearances between ground level and the DPC/weephole level of brick veneer cladding systems. Two clearance categories are defined:

GROUND CONDITION	MINIMUM CLEARANCE TO DPC / WEEPHOLE	MINIMUM CLEARANCE TO FINISHED FLOOR	REFERENCE
Unpaved / unprotected ground	100mm	150mm	E2/AS1; *NZS 4229*
Permanent paving	25mm	100mm	E2/AS1; *NZS 4229*

Note: Both clearances must be met; the finished floor level may govern paving height. Maintain a minimum 1:25 fall away from the building for at least 1m. The 50mm slab rebate step-down is separate from ground clearance.

RATIONALE FOR PAVED CATEGORY CLASSIFICATION

The distinction between the two clearance categories reflects the moisture risk presented to the base of the cladding. The 100mm clearance for unpaved ground addresses two primary hazards:

- Capillary rise through saturated soil in direct contact with the wall base.
- Splash from rain impact on exposed ground adjacent to the wall.

Permanent paving warrants the reduced 25mm clearance because a hard, formed surface eliminates soil contact, prevents capillary rise through the substrate, and sheds water laterally away from the wall. Permcon permeable concrete paving meets all of these criteria and provides additional moisture management benefits not present in conventional impermeable paving, as detailed on the following page.

PERMCON SYSTEM PERFORMANCE AT THE WALL INTERFACE

SURFACE CHARACTERISTICS

Permcon permeable concrete is a hard, formed, cementitious surface. It presents no exposed soil, no risk of capillary rise through the slab matrix, and no splash from exposed ground. In all respects relevant to the code clearance rationale, it performs as permanent paving.

VERTICAL DRAINAGE

Unlike conventional impermeable concrete, Permcon drains stormwater vertically through the paving matrix into the subbase. Water does not pond on the surface or track laterally toward the wall base. This eliminates the primary residual moisture risk associated with conventional paving — lateral surface flow directed toward the building — and results in a drier environment at the wall base under all rainfall conditions.

IMPERMEABLE EXPANSION JOINT

At the interface between the Permcon slab and the building foundation, Permcon NZ installs an impermeable closed-cell expansion foam joint. This joint provides a positive physical break in any potential capillary path between the paving and the structure. It prevents moisture transmission along the slab/foundation contact and ensures the wall base remains isolated from the paving system under all conditions.

The cumulative effect of these three characteristics is summarised below:

MOISTURE RISK FACTOR	STANDARD CONCRETE PAVING	PERMCON SYSTEM
Soil contact / capillary rise	Eliminated (hard surface)	Eliminated (hard surface)
Rain splash from exposed ground	Eliminated (hard surface)	Eliminated (hard surface)
Surface water ponding at wall base	Possible if poorly graded	Eliminated (vertical drainage)
Lateral surface flow toward wall	Managed by fall only	Eliminated (vertical drainage)
Capillary path at slab/foundation joint	Present (continuous contact)	Eliminated (impermeable foam joint)

CONCLUSION AND DESIGN GUIDANCE

Permcon permeable concrete paving installed with an impermeable closed-cell expansion foam joint at the building interface should be classified as permanent paving for E2/AS1 ground clearance purposes. Both minimum clearances from the top of the Permcon surface must be met – 25mm to the brick veneer DPC/weephole level and 100mm to the top of the finished floor slab. Set the paving level to satisfy both measurements. The minimum 50mm slab rebate step-down is a separate, unchanged requirement.

The applicable minimum clearance from the top of the Permcon surface to the DPC/weephole level of brick veneer cladding is therefore 25mm.

This classification is supported by the following:

- Permcon is a hard, formed, cementitious surface — no soil contact, no capillary rise through the matrix, no rain splash from exposed ground.
- Vertical drainage through the paving matrix eliminates surface ponding and lateral flow toward the wall base.
- The impermeable foam expansion joint provides a positive capillary break at the slab/foundation interface that is absent in conventional concrete paving.
- The net moisture environment at the wall base is materially drier than that produced by standard impermeable concrete paving at equivalent clearance.

Designers and consenting authorities should note that these characteristics represent a conservative and technically defensible basis for the 25mm clearance. Where a BCA requires additional confirmation, Permcon NZ can provide further technical support.

The 1:25 minimum fall requirement away from the building must be maintained regardless of paving type and should be confirmed in site grading design.

LIMITATIONS AND DISCLAIMER

This technical note provides general design guidance based on the requirements of *NZBC E2/AS1*, *NZS 4229*, and *NZS 3604:2011* as understood at the date of issue. It does not constitute a specific consent or engineering determination for any individual project. Designers and BCAs retain responsibility for confirming compliance with applicable standards for specific site conditions. Permcon NZ accepts no liability for use of this document in circumstances not consistent with its intended scope.

TIMBER AND LIGHTWEIGHT CLADDING SYSTEMS

PURPOSE

This technical note addresses the applicable ground clearance category for Permcon permeable concrete paving installed adjacent to timber framing with lightweight cladding systems under the New Zealand Building Code (NZBC).

Cladding types covered include but are not limited to: timber weatherboards, fibre cement weatherboards, fibre cement sheet, stucco/plaster systems, and profiled metal wall cladding on timber-framed construction.

It provides a reasoned basis for treating Permcon as permanent paving for the purposes of E2/AS1 ground clearance requirements, and explains why the Permcon system performs equal to or better than conventional impermeable concrete paving in managing the moisture risks that the clearance requirements are designed to control.

RELEVANT CODE REQUIREMENTS

E2/AS1 (External Moisture) sets minimum clearances between finished ground level and the bottom edge of wall cladding for timber-framed construction. Unlike brick veneer, where the critical measurement is to DPC/weephole level, for lightweight cladding systems the clearance is measured to the bottom edge of the cladding itself. Two clearance categories apply:

GROUND CONDITION	MINIMUM CLEARANCE TO CLADDING BASE	REFERENCE
Unpaved / unprotected ground	175 mm	E2/AS1; *NZS 3604:2011*
Permanent paving	100 mm	E2/AS1; *NZS 3604:2011*

Note: The floor slab level must also sit a minimum of 150mm above paved ground and 225mm above unpaved ground (E2/AS1). The ground adjacent to the wall must slope away from the building at not less than 1:25 for a minimum distance of 1m. These requirements apply regardless of paving type and are unchanged by this assessment.

MOISTURE RISK PROFILE FOR TIMBER-FRAMED CLADDING SYSTEMS

The higher clearance requirements for lightweight cladding compared to brick veneer reflect the different moisture vulnerability of these systems. The primary risks addressed by E2/AS1 clearance requirements for timber-framed construction are:

- Rain splash from adjacent ground onto the base of the cladding, which causes prolonged wetting of cladding materials and any exposed building wrap or framing.
- Capillary wicking of ground moisture into timber framing or cladding bottom rails in contact with, or in close proximity to, saturated soil.
- Ponding of surface water against the wall base, which elevates localised humidity and extends the time of wetness at the most vulnerable part of the cladding system.
- Blockage of cavity drainage and ventilation openings at the base of drained cavity cladding systems, preventing moisture that has entered the cavity from escaping

Unlike brick veneer, which manages moisture primarily through the DPC/weephole system, lightweight cladding systems rely on the base of the cladding and building wrap remaining free-draining and exposed to air. Ground moisture, splash and ponding at this level are therefore the critical failure mechanisms that the clearance requirements target.

PERMCON SYSTEM PERFORMANCE AT THE WALL INTERFACE

ELIMINATION OF SOIL CONTACT AND SPLASH

Permcon permeable concrete is a hard, formed, cementitious surface. It presents no exposed soil at the wall base, eliminating capillary rise through the substrate and rain splash from exposed ground — the two moisture pathways that drive the higher 175mm unpaved clearance requirement. In this respect, Permcon performs identically to conventional impermeable concrete paving, and the 100mm paved clearance is the appropriate standard.

ELIMINATION OF SURFACE PONDING

This is where Permcon provides a material advantage over conventional impermeable paving. Impermeable concrete relies entirely on surface gradient to move rainfall away from the wall base. If the slab is poorly graded, or if the drainage path becomes obstructed over time by landscaping, mulch, or accumulated debris, water can pond against the wall base and remain in contact with the bottom of the cladding for extended periods.

Permcon drains stormwater vertically through the paving matrix at rates typically exceeding 200 litres per m^2 per minute. Rainfall is absorbed at the point of impact and does not accumulate on the surface. Ponding against the wall base is eliminated under all normal rainfall conditions regardless of surface fall, providing a consistently drier environment at the cladding base than conventional paving can guarantee.

ELIMINATION OF LATERAL SURFACE FLOW

Conventional concrete paving in close proximity to a building can direct surface runoff toward the wall base, particularly where falls are inadequate or where the paving has settled. Permcon eliminates lateral surface flow as a moisture pathway by absorbing rainfall before it can track across the surface. The wall base remains dry even during heavy rainfall events.

IMPERMEABLE EXPANSION JOINT

At the interface between the Permcon slab and the building foundation, Permcon NZ installs an impermeable closed-cell expansion foam joint. This joint provides a positive physical break between the paving and the structure, preventing any residual subsurface moisture transmission along the slab/foundation contact zone. It also maintains a clear air gap at the base of the wall, supporting cavity ventilation and drainage at the critical zone immediately above the paving surface.

LONG-TERM PERFORMANCE

The moisture management characteristics of Permcon are inherent to the material and do not rely on maintenance of surface gradient, clearance of drainage paths, or management of landscaping against the wall. Unlike conventional paving, where the risk profile can deteriorate over time as falls reduce or vegetation encroaches, Permcon maintains consistent drainage performance for the life of the pavement. This provides greater long-term protection to the base of the cladding than an equivalent impermeable concrete installation.

RISK FACTOR COMPARISON

MOISTURE RISK FACTOR	STANDARD CONCRETE PAVING	PERMCON SYSTEM
Soil contact at wall base	Eliminated (hard surface)	Eliminated (hard surface)
Rain splash from exposed ground	Eliminated (hard surface)	Eliminated (hard surface)
Surface water ponding at wall base	Possible if poorly graded	Eliminated (vertical drainage)
Lateral surface flow toward wall	Managed by fall only	Eliminated (vertical drainage)
Risk deterioration over building life	Present (fall degradation)	Eliminated (inherent drainage)
Capillary path at slab/foundation joint	Present (continuous contact)	Eliminated (impermeable foam joint)
Cavity drainage/ventilation blockage	Possible if paving level rises	Reduced (no surface accumulation)

CONCLUSION AND DESIGN GUIDANCE

Permcon permeable concrete paving installed with an impermeable closed-cell expansion foam joint at the building interface should be classified as permanent paving for the purposes of E2/AS1 ground clearance requirements for timber-framed construction with lightweight cladding systems.

The applicable minimum clearance from the top of the Permcon surface to the bottom edge of wall cladding is therefore 100mm. This classification is supported by the following:

- Permcon is a hard, formed, cementitious surface — no soil contact, no capillary rise, no rain splash from exposed ground.
- Vertical drainage through the paving matrix eliminates surface ponding and lateral flow at the wall base, which are the primary moisture risks that E2/AS1 cladding clearance requirements address.
- The impermeable foam expansion joint eliminates the slab/foundation capillary path and maintains a clear air gap supporting cavity drainage and ventilation at the base of the cladding.
- Long-term drainage performance is inherent to the material and does not depend on fall maintenance or landscaping management.
- Net moisture exposure at the cladding base is materially lower than that produced by standard impermeable concrete paving at equivalent clearance under all rainfall conditions.

The 1:25 minimum fall requirement away from the building and the minimum floor slab to ground clearance requirements (150mm to paved ground; 225mm to unpaved ground) must be maintained regardless of paving type and should be confirmed in site grading and floor level design. Where a BCA requires additional confirmation of the paved ground classification for Permcon, Permcon NZ can provide further technical support including material data and independent test results for drainage performance.

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