NTN 008.9

NASH TECHNICAL NOTE

Building Envelope – Patterned Staining on Plasterboard

Ensuring compliant construction and maintaining a healthy indoor environment minimises the risk of the unusual condition of patterned staining.

Patterned staining is an uncommon condition that may occur on ceilings and walls within the living space when cooler areas of plasterboard attract airborne particulates. Good internal moisture management, adequate ventilation, well-installed insulation and compliant construction practices help minimise the risk of both patterned staining and mould growth.

Patterned staining, sometimes referred to as “ghosting”, appears as faint marks on internal plasterboard that often align with framing members or areas of differing thermal performance behind the lining. The staining occurs when cooler surface areas attract airborne particulates, causing visible patterns to develop over time.

Thermal bypass at gaps around timber frame

Thermal bridging on non-complaint steel frame.

Patterned staining in cold climates due to poor workmanship and/or poor detail.

Patterned staining is more likely in cold climates

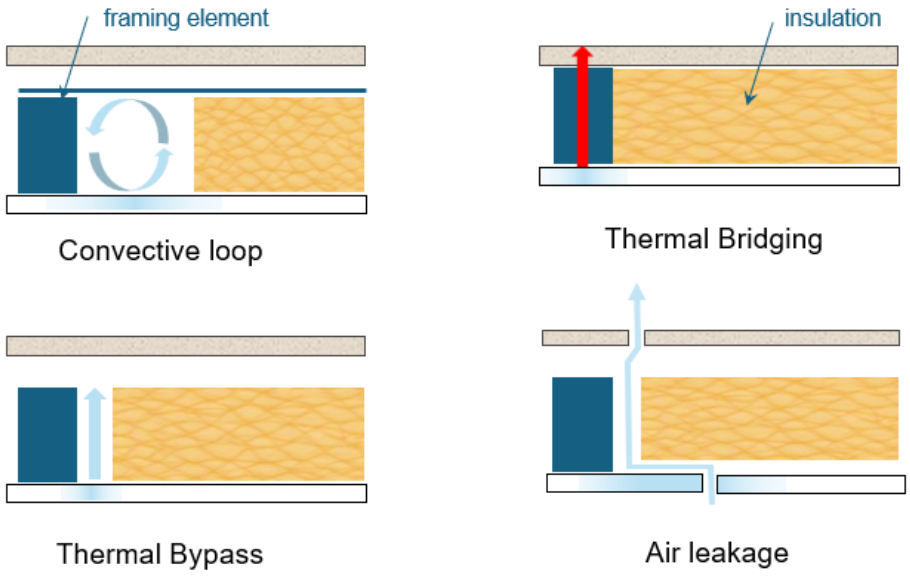
and in homes with certain indoor conditions or construction issues.

Indoor conditions can include;

- High indoor humidity, noting that sustained humidity can also lead to widespread indoor mould.
- Elevated indoor particulate levels from dust, indoor smoking, soot from open fireplaces, unvented combustion heaters and cooking.

Construction issues can include;

- Thermal bypassing, convective looping and possible air leakage from:
  - Gaps or missing insulation.
  - Areas of inadequate insulation.
- Excessive conductive bridging.
  - Steel framing with direct fixed lightweight cladding and lining that does not incorporate the required NCC thermal break may increase the likelihood of patterned staining in cold climates.
- Overly tight construction with a lack of compensating ventilation.
- Absence or poor performance of exhaust systems.



Cooler plasterboard surfaces (shown in blue) may attract airborne particulates resulting in patterned staining over time.

Patterned staining is uncommon in modern residential construction due to improvements in

insulation, ventilation, moisture management, exhaust systems and compliance with contemporary NCC energy-efficiency provisions.

- NCC requires exhaust in bathrooms, kitchens and laundries to discharge internal moisture to the outdoors.
- The NCC requires a minimum thermal break for steel framing with direct fixed lightweight cladding and internal lining.
- Modern appliances keep the air much cleaner, such as air conditioners, that do not produce aerosols and typically include air filtration.
- Unvented combustion heaters, open fireplaces, and smoking indoors have become increasingly uncommon.

Good practices that avoid patterned staining and mould risk within your home include.

- Compliant construction practices.
- Ensuring insulation is well-installed to avoid gaps.
- Regularly ventilating your home and using exhaust fans in bathrooms, laundry and kitchen.
- Avoiding unvented combustion or moisture producing appliances indoors.
- Maintaining general hygiene and cleaning to prevent particulate buildup.

NATIONAL ASSOCIATION OF STEEL-FRAMED HOUSING INC.

Building Envelope TECHNICAL NOTE SERIES

This NASH Technical Note forms part of a series discussing various aspects of the building envelope

This publication forms part of the National Association of Steel-framed Housing (NASH)'s Technical Note series, developed to support best practice in steel framed construction and building performance in the wider industry.

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