

IMPACTS OF AN INNOVATIVE RESIDENTIAL CONSTRUCTION METHOD ON INTERNAL CONDITIONS

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New Zealand houses are known for producing sub-optimal internal thermal conditions and unacceptably high internal relative humidities. (Howden Chapman et al 2011). These contribute to poor levels of health and can coincide with the decay of structural timber frames. A proposed solution is to provide an alternative structure utilising plywood instead of building paper, a wrap on the internal face of the timber frame and an additional air gap followed by the internal lining. The internal wrap is designed to reduce moisture vapour diffusion into the frame in winter and in summer to permit moisture diffusion through the structure to the internal environment. Two full scale houses had temperatures, dew points and humidity levels monitored in passive, unoccupied conditions over a full season. The test case house for the research incorporated the innovative construction solution. The second, control house was of identical design and location, using standard construction practice. The houses were situated to prevent shadowing each other, but in close enough proximity to be on identical sites.

Results indicated that the calculated internal moisture content profile appeared to be unrelated to the external moisture content as expected in unoccupied conditions. Instead it followed the profile of the changing internal temperature. Whilst the innovative construction appeared to prevent moisture diffusion into the structure in winter and permit it inside in summer this resulted in a generally higher internal relative humidity than the control house and recommended levels for comfort. Despite the average level being higher the test house did appear to smooth the variations in internal relative humidity.

Howden-Chapman, P., Crane, J., Chapman, R., & Fougere, G. (2011). Improving health and energy efficiency through community-based housing interventions. *International Journal of Public Health*, 56(6), 583-588.

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