

AIRTIGHT AND SUPER INSULATED CONSTRUCTION TECHNIQUES



Professor Shane West

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ISS Institute

Suite 101
685 Burke Road
Camberwell Vic
AUSTRALIA 3124

Telephone

03 9882 0055

Facsimile

03 9882 9866

Email

officemanager@issinstitute.org.au

Web

www.issinstitute.org.au

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ISS Institute
101/685 Burke Road
Camberwell 3124
AUSTRALIA

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Executive Summary

Many of the significant advances in building science driven by the research and development work of organisations such as the Experimental Building Station (EBS) and the 'Notes on the Science of Building' series developed by the former Department of Housing and Construction are more than 40 years old. Techniques and products have advanced considerably since then. Global businesses now play a major role in the development of modern building materials. Companies such as BASF, Dow Building Solutions, SIGA and DuPont have a significant market share in plastics, foams, membranes, tapes, adhesives and patented insulation products now associated with airtight, super insulated construction.

Australian research and development efforts that meet our particular climatic and building specifications are essential if we are to keep a strong local construction industry. Australian construction businesses require secure supplies of quality materials. The synergistic systems approach to building is gaining ground as an advanced lean construction concept. Such systems require fast building techniques, high quality finishes and energy saving materials.

The Fellow travelled to Japan, Germany and the United Kingdom to evaluate airtight and super insulation construction techniques of the type developed by the Passivhaus Institut (PHI). PHI projects have been tried and proven in European climatic conditions. In particular the evaluation focused on whether PHI insulation materials and techniques are as effective in Australian climatic conditions as the techniques that are currently common in Australia.

The adoption of some PHI designs and construction techniques—such as vacuum double glazing—would bring benefits. Construction techniques that deliver airtight, super insulated interiors have the potential to be a contributor to improvements in energy efficiency.

The adoption of PHI-style construction designs into the Australian building and construction industry would require new and improved skills in vapour transfer: the capacity to handle condensation issues associated with creating airtight internal spaces and mechanical ventilation that use Heat Recovery Ventilation systems to maximise energy savings.

Existing Vocational Education and Training (VET) packages cover installation, thermal and acoustic environmental protection systems and the construction of thermally efficient sustainable structures. Existing education and training packages in Technical and Further Education institutions (TAFEs), Registered Training Organisations (RTOs), the Construction Property Services and Skills Council (CPSISC) and the Master Builders Association (MBA) can be upgraded if, and when, the Australian building and construction industry begin to embrace super insulation techniques such as vapour membrane installations.

Skill and knowledge deficiencies in super insulation and airtight construction techniques should also be addressed at the higher education level. Current and aspiring construction managers, architects and engineers undertaking degree and higher qualifications will need to be proficient in the many design and application techniques specific to this building methodology.