

Assessing SIPs in New Zealand

To simplify the consenting process for structural insulated panels (SIPs), we need to know how they perform locally. A BRANZ research project is helping by examining SIP durability, earthquake and fire performance.

NEW ZEALAND HAS AN URGENT need for quality housing that can be built quickly and affordably. In response, the use of prefabricated building systems is becoming more widespread as recognition grows of their potential to provide resilient high-quality buildings.

Off-site prefabrication speeds installation

One example is the use of structural insulated panels (SIPs) for prefabrication of walls, floors and roofs off site with subsequent rapid assembly on site. This can contribute significantly to increased construction speed and reduced overall building cost. As a result, SIPs are being considered more often for a wide range of structural applications including residential construction and as an option for mid-rise buildings.

SIP composition and benefits

SIPs are made up of two face layers composed of timber, metal or cement-based boards and an insulating inner core sandwiched between them. Their high insulation



Structural testing of SIPs at BRANZ.

performance can make an important contribution to the energy efficiency of a building constructed using SIPs.

SIP walls can also be used as bracing elements to provide resistance to earthquakes and high winds.

Research focusing on New Zealand conditions

The BRANZ 2019 Industry Insights Survey highlighted that information about product performance and new materials continues to be important to industry. While SIPs have been widely used overseas, less is known about their performance in a New Zealand context. It is essential that both the short-term and long-term performance of SIPs are well understood.

The detailing and performance of SIP systems are significantly different to other commonly used building systems. Investigation is needed to ensure that SIP-based buildings will perform adequately when subjected to the environmental conditions and natural hazards encountered in New Zealand.

To do this, BRANZ is undertaking a research project to investigate the durability characteristics, earthquake resilience and fire performance of SIPs.

Delving into the durability

Durability work will build on previous BRANZ research that has provided a first step in understanding and assessing the long-term performance of small-scale SIP samples after accelerated ageing (see *Build 176 Assessing structural insulated panels*).

This project extends the initial test programme to include the performance of typical connection details. Well-established accelerated ageing tests will be used to look at how temperature and humidity affect the SIP samples.

Performance under earthquake loading

A key focus of the research is to understand how SIPs perform under earthquake loading since they can be used for wall bracing elements. This bracing relies on the connection details between the panels and the surrounding structure, and it is therefore important to evaluate the performance of these connections.

As well as providing a sound understanding of how buildings braced with SIPs would perform in an earthquake, the research results will also inform how walls built from SIPs perform in conjunction with other common New Zealand wall systems.

Fire performance

The fire performance of SIPs will be investigated by a review of existing literature on this topic. This will enable a better



understanding of the known issues relating to fire performance of typical SIP systems used in New Zealand.

Data from the experimental work, the majority of which has been done overseas, will provide the evidence base for understanding SIP performance in New Zealand conditions.

Project will help develop simplified compliance for SIPs

Results will be used to help inform the development of a compliance pathway for the use of SIPs in New Zealand.

Currently, SIPs are an Alternative Solution under the New Zealand Building Code, which requires an engineering assessment before a building consent can be issued. This step adds additional time and cost to a project. A simplified consenting process will benefit a wide range of industry players including manufacturers, regulatory bodies, designers and current and prospective building owners.

We are keen to engage with a wide range of audiences and welcome your feedback or interest in knowing more about this work.

For a short video showing laboratory testing of SIPs at BRANZ, see youtube.com/user/BRANZmedia. ◀

Note ▶ This project is funded by the Building Research Levy and the Earthquake Commission. For further information, contact the project leader Anna Walsh at anna.walsh@branz.co.nz.