



February 2021 Frequently Asked Questions

What are Structural Insulated Panels (SIPs)?

Structural insulated panels, or SIPs, are high performance panels used in walls, roofs and floors for residential, commercial, industrial and agriculture buildings. The panels are manufactured by sandwiching a rigid core insulating material between two high strength facings. SIPs can be custom designed for any project and provide an extremely strong, energy-efficient, cost-effective, sustainable building system.

(insert image of TechPanel)

What makes ZS2 TechPanels™ different from other SIPs?

ZS2 TechPanels integrate proprietary TechBoard™ which is a magnesium-based cement board into the assembly. TechBoard is a proprietary, high-performance, zero-chloride board with significant benefits vs. conventional construction materials such as oriented strand board (OSB). Unlike traditional SIPs, TechPanels are highly fire resistant, mold proof, bacteria/pest resistant and stronger.

What makes TechBoard™ unique?

TechBoard is our proprietary magnesium based cement board. Our R&D team, led by Dr. Doug Brown (Ph.D. Chemistry), has developed a proprietary cement formulation which are highly fire resistant, mold proof, bacteria/pest resistant, high strength with a significantly reduced carbon footprint vs. other traditional “Portland” cement products. TechBoard can be used as a stand-alone high-performance sheathing for interiors and exteriors, can be finished with a variety of coatings and materials, is easy to work with and is integrated as the facing in high-performance TechPanels.

How much faster can I build with TechPanel SIPs?

TechPanel construction is significantly faster than traditional construction. A 2006 detailed study by RSMMeans (Reed Construction Data) concluded that SIP construction is **55%** faster than standard 2x4 or 2x6 stick frame construction. TechPanels are manufactured in a state of the art factory setting to custom specifications and arrive on-site ready for install eliminating the need for multiple steps such as framing, insulating, sheathing and significantly reducing labour requirements. Further, electrical chases are typically provided in the core of the panels so there is no need to drill through framing for wiring.

How are TechPanels assembled on a job site?

TechPanels are installed rapidly on site. TechPanels arrive flat packed directly to job site where they are unloaded and stood up, attaching to a base plate which is installed prior to assembly. This 'tilt-up' method of construction is rapid and panels are labelled for easy and precise installation in pre-determined order. Cut-outs for windows and doors are pre-fabricated and integrated in the factory saving additional job-site time. TechPanels are attached to the baseplate and each other using staples or screws and each panel joint is then sealed with elastomeric caulking. Roof panels are lifted into place and connect rapidly and easily using standard connection details. On average a 2,000 square foot building takes less than two days to assemble.

How much safer are TechPanels vs. conventional materials?

TechPanels and TechBoard is highly fire resistant and most importantly produces **NO Harmful Gasses** during a fire event. TechPanels and TechBoard are mold, bacteria and pest resistant resulting in superior indoor air quality and a healthier building. No toxic VOCs. No harmful off-gassing. Fire-resistant. No mold. No bacteria. No pests. High strength.

Why is TechBoard and TechPanels so fire resistant?

ZS2 Technologies utilizes a proprietary magnesium cement formulation to create TechBoard which in turn is used as the external skin in TechPanels. Magnesium is one of the most stable and highly resistant elements to heat hence why magnesium is used to make molds for other elements like liquid steel and other molten metals.

When considering resistance to a fire event there are actually three key considerations: 1. Flame spread/flammability 2. Heat transfer and 3. Offgassing. Many fire resistant materials, including flame retardant chemicals, still produce noxious off gasses which can render a person unconscious and susceptible to injury or worse. Further, materials which conduct heat result in higher risk of fire acceleration and transfer to materials which may not be fire resistant. Finally, flame spread and flammability in many conventional construction materials is accelerated with the harmful chemicals and additives. TechBoard is highly flame resistant, produces no toxic off gasses and prevents significant heat transfer. The reason is the chemistry...TechBoard contains nearly 50% chemically encapsulated H₂O...nearly double the amount of drywall or gypsum which is traditionally used to build 1 hour and 2 hour fire walls.

How much money can I save building with TechPanels?

While conventional construction projects are too often behind schedule and over-budget, ZS2 Technologies provides our clients with cost and time certainty. ZS2 TechPanels are cost competitive with lower quality traditional materials. The use of TechPanels decreases project risk and builders/clients save money through decreased construction and labour costs. Increased R-Values, and just as importantly U-Values, results in significantly improved heating and cooling costs. A high-performance building envelope often allows HVAC equipment to be downsized and ductwork to be minimized resulting in additional savings.

Are TechPanels an environmentally friendly construction solution?

TechPanels are one of the most environmentally friendly construction solutions available. To start with, TechBoard has a very low embodied carbon footprint in addition to all of the high-performance attributes. TechPanels in turn are manufactured in a all of the high-performance attributes. TechPanels in turn are manufactured in a high-tech factory where material waste is minimized and delivered directly to site. On-site labour requirements are significantly reduced resulting in further efficiencies. Once completed a TechPanel building has continuous rigid insulation and is extremely airtight which results in lower energy requirements to heat, air-condition and operate. TechPanel buildings are built to last and are extremely resilient resulting in a longer useful life. All of these factors make TechPanels one of the most sustainable building solutions on the planet!

How strong are TechPanels?

TechPanels are incredibly strong thanks in part to our proprietary ZS2 TechBoard in combination with a rigid core insulation. TechPanels have been tested to exceed traditional SIPs (which themselves are extremely strong) in handling compressive loads by 25%-30%. TechPanels exceed some of the most stringent hurricane testing standards (Miami-Dade standard, ASTM E1886) and do not lose material structural integrity during flooding or fire events. In fact, in a recent test conducted by a third party engineering department at a post-secondary testing lab to determine compressive loads the testing equipment failed before the TechPanels!

Can TechPanels be modified onsite?

Yes. Modifications onsite are easy using normal construction tools. Thick panels can be cut using a beam saw/reciprocating saw. Rigid insulation can be cut and modified using a hand held hot wire cutter or angle grinder. With proper up front planning and design, the use of TechPanels should minimize on-site changes which are too frequently a source of frustration and cost overruns in traditional construction.

How are electrical wiring and fixtures installed?

TechPanels are manufactured with electrical chases installed ready to accept wiring and electrical fixtures. These chases (pre-cut channels) are typically spaced at regular intervals for easy access and installation but can also be customized both vertically and horizontally to meet any client's requirements. Electricians can feed wires without the need to drill through conventional framing saving additional time and effort.

Can TechPanels be replaced or repaired if damaged?

As with any construction material if damage occurs from events such as fire, flood or storm a qualified professional should do a thorough assessment. TechPanels, thankfully are highly resilient as compared to conventional construction materials in when these events occur. Simple cosmetic damage is drastically reduced due to the high strength characteristics of TechBoard vs. other sheathing products. However, if required cosmetic damage can be easily repaired with approved coatings and materials. Structural damage can be repaired either by site modification or replacement of the panels. In case of structural damage a structural engineer along

with ZS2 should be consulted to confirm and recommend appropriate steps for repair.

Are TechPanels accepted by building codes?

Traditional SIP construction is recognized by the International Code Council body of building codes, which are used by most jurisdictions in the U.S. and Canada. For residential buildings, SIP wall systems are included in Section R614 of the 2009 International Residential Code. With the incorporation of TechBoard, ZS2 TechPanels generally exceed all performance attributes of traditional SIPs with the added fire protection and resiliency against water and wind. ZS2 has conducted extensive third party testing on TechBoards and TechPanels partnering with Intertek, QAI Laboratories, Simon Fraser University and the Southern Alberta Institute of Technology. All ZS2 projects are reviewed, signed off and stamped by an accredited civil engineer for the projects respective jurisdiction.

What is the R-value of TechPanels?

R-values for TechPanels are dependent on the thickness and type of rigid insulating core. A typical 6 ½” TechPanel is rated at R-28 (effective R-30) and a 8 ½” TechPanel at R-38 (effective R-40). However, actual real-world performance of TechPanels is much better than conventional fibreglass insulation with traditional framing. According to SIPA (Structural Insulated Panel Association), “...R-value doesn’t tell the whole story. Laboratory tests that determine R-value have little resemblance to how insulation actually performs in a home. When real world factors such as air infiltration, extreme temperatures and thermal bridging are present, field-installed fiberglass insulation can lose more than half its R-value.”

What is U-value and is this an important factor?

U-value is also known as thermal transmittance and is the rate of transfer of heat through a structure divided by the difference in temperature across that structure. Different materials and different construction methods have different U-values which can result in heat or cooling loss as energy is transferred between the exterior and interior or vice versa. TechPanels have significantly lower U-values than conventional framing and fibreglass insulation.

How are TechPanels secured to other components of the structure?

TechPanels can be installed both below and above ground. They can sit on strip footings, conventional foundation slabs, screw piles, or any type of horizontal element. A 'basetrack' is attached to the foundation or floor using conventional bolts/screws. Adhesive foam is applied, the TechPanels are 'slid' on top and screwed or stapled. TechPanels come prefabricated with 'tongue and groove' vertical splines. As TechPanels are tilted into place the vertical connection is also screwed or stapled. Together, this rapid method of installation and construction provides an extremely strong structural base. If additional stories are required a header plate is provided from which joists, I-beams or other horizontal structural elements can be joined. Integration with conventional building materials and methods is quick, easy and designed for superior strength and performance.

How are TechPanels manufactured?

TechPanels are manufactured in the same way as traditional structurally insulated panels (SIPs). A rigid core of insulation, typically EPS (extruded polystyrene) is laminated to our proprietary TechBoard. TechPanels are manufactured in one of two manufacturing facilities under strict quality control processes and custom sized to our client's specifications for their individual project. Wood, steel or composite splines and studs are incorporated as specified by the client in the factory. Electrical chases are pre-cut in the insulation to provide ease of electrical install on the jobsite. The manufacturing process is straightforward and completed by experienced technicians which provides our client with a high quality, high performance solution while reducing the amount of jobsite labour and uncertainty with conventional construction projects....saving our clients money.

How is TechBoard and TechPanels finished?

TechBoard and TechPanels can be finished to any client specifications. For the exterior a water/vapour barrier is usually required (as with conventional materials). ZS2 recommends a Weatherskin (weatherskin.com) aqueous coating which is environmentally friendly and formulated for TechBoard. Alternatively conventional materials can be used. From this point TechBoard and TechPanels can be finished with paint or clad with whatever finish the client requires. For the interior, TechBoard is rigid but can be painted and finished easily to a Level 4 quality. TechBoard makes an excellent substrate to handle tiles, wallpaper or other interior finishes.

Can TechPanels be installed in seismic zones?

Yes! TechPanels are an excellent building material for seismic zones with their superior strength and the physical attributes of the rigid foam insulation.

TechPanels meet the requirements various seismic hazard zones but different jurisdictions may have different requirements. Experienced civil engineers review all ZS2 projects and would consider the requirements for any project in a seismic zone in combination with the local building code requirements.

How do TechPanels stand up to extreme storm events such as hurricanes?

Extremely well. With a high strength outer shell which is highly resistant to projectiles owing to its high strength proprietary cement formulation TechPanels are built to stand up to extreme wind. For geographies susceptible to hurricanes, tornados and strong storm events TechPanels make an excellent upgrade over conventional building materials. Specific strapping and bracing would generally be recommended to join TechPanels to the foundation/floor and the roof, whether a TechPanel roof or conventional. Additionally, TechPanels do not loose structurally capabilities when submersed in water. TechBoard is impervious to mould ensuring any flood event will not result in significant remediation costs post event. Further, ZS2 will be conducting ballistics and blast testing in early 2021, for those buildings and clients requiring a higher degree of structural strength, security and safety.