

Preliminary Results of a Research Program Evaluating Polyurethane Structural Insulated Panel Load Performance

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ABSTRACT Structural Insulated Panels (SIPs) are an alternative building envelope system to conventional stud wall and roofs in commercial and residential construction. SIPs are considered a composite material as they are made of two Oriented Strand Boards (OSBs), metal, cement or plywood as facings and a foam core. The foam core acts as insulation material and is bonded to the skins to form a structural element. The foam core is usually made of expanded polystyrene (EPS), extruded polystyrene (XPS) or polyurethane (PE). SIPs are made in variety of sizes with 1220 x 2440 mm (4'x') being the most common size. Panel thickness ranges from 100 mm to 300 mm (4" to 12"). Construction with SIPs is faster, insulation properties are better, their load-carrying capacity is greater than conventional stick-frame construction and a tighter building envelope. Although SIPs have been used in the construction industry since the 1950's, they didn't fully attract the construction industry's attention until the 1980s. Design engineers and regulatory authorities need information on structural capacity, thermal performance and durability. This paper presents results to date of a research program being carried out at the Alternative Village at the University of Manitoba. The focus of this research is on creep performance and the effect of debonding on the structural performance of polyurethane SIPs. The paper will discuss results of full scale structural testing and preliminary results of debonding studies.

Keywords: Structural Insulated Panels (SIPs), polyurethane, creep, debonding