

# **S I Construction Systems Ltd.**

*Designers and Suppliers of Structural Insulation for Residential and Commercial Projects*

## The Polycore No-concrete R-Floor System Details and Compliance Information

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## **INTRODUCTION:**

The Polycore R-Floor system is an insulated and structural component building product manufactured by S I Construction Systems Ltd. that was developed in, and is currently manufactured in, Alberta. It is relatively new in the building industry, first used in 2007 and currently installed in approximately 350 homes in several of the western Canada provinces. Product component sections are made from two materials - EPS (expanded polystyrene) as an insulating core, and strategically sized and integrated galvanized steel construction channels/studs for strength. The sections are installed onto a suitably prepared packed sand base with a standard 6-mil or greater vapor barrier and tongue and groove plywood or OSB sheeting in place of the concrete slab that is traditionally used in the basement level of newly constructed homes.



Each R-Floor package is custom designed and manufactured to exceed the performance standards outlined in current Building Codes through combined properties of the materials used and the methods of installation. The lightweight component-build product is easily adaptable to both light commercial and residential building uses except situations having continuous vehicle traffic.

## **POLYCORE R-FLOOR CONSTRUCTION:**

The R-Floor System offers a wide range of environmental advantages from production of products to long lasting energy savings in use. Each project is custom cut and designed to ensure that when the product is delivered to a construction site there is no waste, packages include only the specific amount of product needed for completion. The factory produced integration of insulation and structure and the simple installation process and materials use less resources when compared to traditional construction methods, with the product offering a high R-value in support of long term energy efficiency of the home and significantly more comfort as a day to day living surface than concrete floors.

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S I Construction Systems, the manufacturer of the product, utilizes an inhouse EPS recycling system allowing for the creation of all Polycore products with no waste ending up in a landfill. Steel is custom ordered from local manufacturers to meet the specific requirements of each package produced, and metal cuttings where required are collected and locally recycled as well. R-Floor systems will continue to provide energy savings for the life of the structure, resulting in less greenhouse gas emissions and exponential utility savings over the life of the structure. The R-floor is a healthy product that eliminates mold potential, has no off gassing or other detriment to indoor air quality. S I Construction Systems is dedicated to revolutionizing the building industry through its commitment to environmental leadership.

## **R-FLOOR COMPLIANCE - LOAD**

The Building code requires floor design to meet certain load expectations. A typical 40 psf standard basement floor occupancy live load acts in combination with any dead loads such as partition walls, and concentrated point loads of any significant magnitude if present require bearing support footings as with any other flooring material.

The EPS used for R-Floor manufacture is sourced from local EPS producers that are required to test and confirm that properties of their product meet certain industry standards including a minimum compressive resistance that reflects the loading capacity of the foam. Type1 EPS, the density used in the R-Floor system, is certified through compliance with CSA and CAN/ULC testing to meet 1440 psf, a value 36 X greater than the 40 psf floor design that is specified by code. The integrated steel studs, locally produced to meet industry specified regulations for strength and materials, and industry standard OSB or plywood sheeting subfloor attached as a surface layer on the R-Floor sections, both combine to spread any common or point loads over larger areas of the EPS to further increase the load capacity of the installed sections far in excess of the foam only 36 X above design measure.

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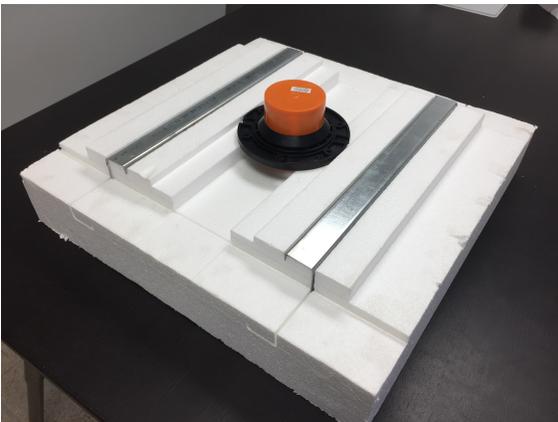
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The R-floor is installed on a levelled and packed sand layer placed on the un-excavated native clay fills exposed during the digging of the foundation at the start of construction. This substrate, properly installed, easily exceeds the compressive resistance of the EPS material itself. The entire system, from unexcavated clay base up to and including the sub floor sheeting, therefor significantly exceeds the requirements of building code specifications.



## **R-FLOOR COMPLIANCE –SOIL GASES:**

The Building code requires that all new buildings specifically incorporate a Radon mitigation system into the floor system of all residential and most commercial projects. Radon is commonly occurring soil gas which can build up to harmful levels in today's "well sealed for energy efficiency" homes. In traditional concrete basements, this is accomplished by a 6" layer of washed rock placed to create a porous covered with a 6mil poly barrier sealed to the foundation edges then covered with a poured slab. A vent placed before the slab into the porous layer allows the extraction of any future soil gas levels by connection of a depressurization fan to the vent as needed.



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The R-floor is specifically designed to meet the requirements of the mitigation code without the expensive and often troublesome (improperly packed washed rock can settle under slabs to cause cracking) layer. The upper face of the EPS-steel floor sections has a grooved profile that connects through installed spacers and defined layouts to create a significantly more “porous” depressurization zone that is fully sealed under the same layer of poly used under traditional slabs. A code compliant vent stack is directly connected to the groove system through the floor deck for soil gas mitigation by any typical removal system.

## **R-FLOOR COMPLIANCE – MATERIAL PROPERTIES:**

Insulation specifications for basement floors vary significantly by location and jurisdiction, but in general are now requiring increasing levels of performance with every code update. The increasing focus on energy efficiency of the building envelope in residential construction has recognized that the heat loss of a poured basement slab is a significant energy use, though current codes still require no (or at best minimal R4-R8) insulation be included in a poured floor. When used, insulation must of course also be suited for a below grade environment which will exist in for the life of the home.



The R-Floor uses a 5.50” thickness industry certified EPS that when profiled and integrated with the steel stud structure then provides an R-18 insulation value for the floor. The EPS material, though greater in thickness, is the identical product used under traditional slabs where insulation is required. EPS is already both recognized and prescribed by current building codes, meeting all the requirements of resistance to moisture, compressive strength under concrete, thermal R-Values, and other properties and specifications that already allow it to be used in many areas of residential construction. Additionally, EPS is known for having no harmful emissions or off gassing, such as is associated with extruded polystyrene boards, and for its inability to support or promote the growth of mold or mildew.

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The steel studs, brackets, and screws use in the R-floor system is provided from local sources that manufacture all products to North American Design and Material Specifications. Steel products are Zinc-coated (galvanized) to CSA and CAN/ULCF standards that require commercial grade tolerances and coatings. The properties of the R-Floor with the integrated and approved steel also exceed the required conformance to strength requirements stated in codes for Basements and Utility Areas simply through the inherent beam strength of the steel channels with specified plywood covering attached.

Sheeting for the system is construction industry grade and approved plywood or OSB (oriented strand board) products used commonly in all residential and commercial construction.

## **R-FLOOR – INSTALLATION:**

The R-Floor is installed directly into the foundation footprint, as would be done for a traditional concrete slab, with simple preparation of the ground before laying sections. A 2-4" layer of sand is placed and leveled on top of the native unexcavated clay base, then moistened and packed with any simple mechanical plate tamper. Leveling is done by screeding and raking using the same tools and processes as for any commercial building slab, which is well above the level either provided or required for traditional "below slab" preparation. Compaction is important, but easily done. The leveling process requires diligence, but is not critical as the installation of the sheeting once sections are laid will "structure out" the floor into a solid platform.

Sections are laid directly onto the prepared sand base, following any required pattern that may be relevant if the system is to include in floor pipe style heating tubes in specific runs and zones. S I Construction provides layouts of all packages they manufacture to allow for fast and easy placement, including spacers and fillers to ensure the soil gas grid formed by the upper surface of the laid sections is continuous and complete. Precut sections, which require only minor trimming for plumbing risers and teleposts, match to project specific layouts in order to reduce site waste and provide a need to use puzzle style placement that self insures proper alignment.



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If desired, in floor heat piping runs are then anchored within the top face channels using standard foam staples, then connected and tested for no leaks as would be done for any floor heat installation. A layer of 6mil poly vapor and gas barrier is laid on top of the completed placement, taped at all joints and risers and further sealed with the use of caulking on perimeter angle bracket supports that connect the system to the walls of the foundation where the barrier turns to extend up and connect to the vapor barrier of the basement walls.



Sheeting of the floor runs perpendicular to the stud lines of the sections, and is attached using approved supplied screws on 12 inch centers through the deck into the section steel studs. Sheets are butt jointed on studs at the short ends and tongue and groove connected don the long edges, the identical process of installing sheeting on any floor joist system used in residential construction.

It should be noted that S I Construction Systems provides various levels of installation support and confirmation. These include install documents, onsite training and support during installation, and pictures and inspections at different stages of the install that confirm proper procedures and results.

For additional information, please contact our office at your convenience:

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