HEAT-SHEET MATERIAL PROPERTY DATA SHEET

Rev.092116

PRODUCT NAME

Heat-Sheet - radiant floor heating expanded polystyrene (EPS) panels

MANUFACTURER

- Beaver Plastics Ltd.
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- AMC Foam Technologies Inc.
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- Form Systems Inc.
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PRODUCT DESCRIPTION

Heat-Sheet panels are made with high density expanded polystyrene (EPS) designed to support the weight of cast-in-place concrete, and foot traffic during construction.

The staggered nodules provide a simple and efficient system for tube installation, while ensuring a tight fit, and proper tube alignment.

The nodules create a tube channel that accommodates multi-directional placement of 1/2", 5/8", or 3/4" I.D. tubing, with 3" on-center points.

Heat-Sheet is manufactured in 2ft x 4ft panels with interlocking edges to ensure a stable fit between panel joints. Panels are available in a variety of thicknesses. See Table 1, Product Chart.

BASIC USE

Heat-Sheet can be used under concrete slabs where radiant floor heating is required such as slab-on-grade, sandwich slab construction, and snow melt systems. In addition, Heat-Sheet can be used in retrofit and overlay applications. Refer to the Heat-Sheet Installation Guide for details.

STANDARDS

- ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
- ASTM C518 – Standard Test Method for Steady-state Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- ASTM D1622 – Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- ASTM D2842 – Standard Test Method for Water Absorption of Rigid Cellular Plastics.
- ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
- ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
- ASTM C203 – Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
- ASTM C303 – Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
- ASTM D2863 – Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index).
- CAN/ULC-S701 – Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- CAN/ULC S102.2 - Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.
- NFPA 286 "Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth".

CODE EVALUATION APPROVALS

- CCMC 14007-L

PHYSICAL PROPERTIES

Heat-Sheet is made with Type 2 or 3 expanded Polystyrene (EPS), per CAN/ULC S701. And Type II or IX EPS, per ASTM C578.

However, available EPS densities can range from 1.35 pcf to 2.5 pcf to produce compressive strengths between 16 psi and 30 psi.

Additional vapor barrier may not be required. See Table 1, Product Chart.

Heat-Sheet conforms to the physical properties shown in Tables 2, 3 and 4.

ENVIRONMENTAL DATA

Heat-Sheet is produced without the use of chlorofluorocarbon (CFCs), hydrochlorofluorocarbon (HCFCs) or formaldehyde. As a result, Heat-Sheet will not produce harmful emissions to the environment.

FIRE INFORMATION

Heat-sheet products are made of combustible materials and may need to be protected from high heat sources. In addition, a thermal barrier may be required when used in the interior of a building. Refer to your local building codes for appropriate protection and thermal barrier requirements.

INSTALLATION

Installing Heat-Sheet involves laying the Heat-Sheet panels and tubing before concrete placement.

For detailed installation instructions refer to the Heat-Sheet Installation Guide.

Laying Heat-Sheet Panels

1. Ensure the ground is reasonably level.
2. Place a vapor barrier, if required, before laying Heat-Sheet panels.
3. Remove the interlock from the two sides of the starting panel to avoid an air gap.
4. Cut the interlock along the 4ft length only on the next panel to be placed. Place trimmed panels so they interlock along the 2ft dimension.

   NOTE: To secrue the R4 and R6 Heat-Sheet panels, apply foam friendly adhesive, such as PL300 Foamboard Adhesive, between the panels and the subfloor.
5. Continue placing panels until you come to a wall. You will likely need to cut the final panel in this row to fit.
6. Use the left over segments to start the next rows, and be sure to maintain the 3" spacing pattern of the nodules.

Laying The Tubing

1. Install the tubing by "stepping" into the panels.

   NOTE: Heat-Sheet panels are designed with a 3" grid for easy tube spacing. Consult a HVAC designer to determine the required separation points.
2. Ensure the tubing is fully seated when turning a corner before you begin your next run.
3. Place wire mesh and rebar directly on top of the panels if required.
4. Remove debris on top of the panels prior to placing concrete.

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Table 1: Product Chart

Screed volume rates:
To top of Heat-Sheet nodules = 0.043 ft^3/ft^2
For each additional inch of slab = 0.083 ft^3/ft^2

Product	Nominal Panel Thickness[1]	Total Panel Thickness[2]	Average R-value[3]	Panels/ Bundle[7]	Sqft/ Bundle[7]
HS-R4[4]	0.5"	1 3/8"	4	16	128
HS-R6[4]	1.0"	1 7/8"	6	14	112
HS-R8	1.5"	2 3/8"	8	8	64
HS-R10[5]	2.0"	2 7/8"	10	8	64
HS-R12[5,6]	2.5"	3 3/8"	12	6	48
HS-R14[5,6]	3.0"	3 7/8"	14	6	48

1. Refers to thickness of the panel minus the nodules.
2. Refers to thickness of nodule plus nominal panel thickness.
3. In accordance with ASTM C578, and CAN/ULC S701, at 75°F (24°C). R-value is determined based on weighted average R-value of nodule and panel profile.
4. These panels do not interlock, and are designed to be applied only over flat surfaces such as concrete slabs and wood subfloors.
5. Additional vapor barrier not required when using Type 3 EPS, per CAN/ULC S701.
6. Additional vapor barrier not required when using Type IX EPS.
7. Panels per bundle may vary. Contact your local Heat-Sheet representative to confirm.

Table 2: Material Properties

ASTM C578[1]	Type II	Type IX
Thermal Resistance Min. @ 75°F	See Table 1	See Table 1
Compressive Resistance Min., psi	16	25[2]
Flexural Resistance Min., psi	35	50
Water Vapor Permeance Max., perms	3.5	2.5[3]
Water Absorption Max., %	3	2
Dimensional Stability Max., %	2	2
Oxygen Index Min., %	24	24
CAN/ULC S701[1]	**Type 2**	**Type 3**
Thermal Resistance Min. @ 24°C	See Table 1	See Table 1
Compressive Resistance Min., kPa	110	140[2]
Flexural Resistance Min., kPa	240	300
Water Vapor Permeance Max., ng/Pa-s-m^2	200	130[3]
Water Absorption Max., %	4	2
Dimensional Stability Max., %	1.5	1.5
Oxygen Index Min., %	24	24

1. Unless noted otherwise, properties are based on a uniform 1" thickness.
2. Compressive strengths up to 30 psi (207 kPa) are available.
3. Additional vapor barrier may not be required depending on nominal panel thickness. See Notes 5 and 6 of Table 1.

Table 4: Surface Burning Characteristics

	Flame Spread Index Max.	Smoke Developed Index Max.	Thickness Max.	Density
ASTM E84	25	450	6 in.	2 pcf
CAN/ULC S102.2	210	415	102 mm	32 kg/m^3