

GREEN SCIENCE POLICY INSTITUTE Halogenated Flame Retardants (HFR) and Board Insulation

	Product	Primary Form	Cost	R- value / inch	Raw Materials	Health Issues	Fire Retardant	Water Resistant	Embodied Energy
CONTAIN HFR	Extruded Polystyrene (XPS)	Board	\$\$	5.0	Refined petroleum + blowing agent (HFC-134a); 15% recycled XPS	HBCD Flame Retardant, CO, Soot, Smoke, benzene	0.7% HBCD	Yes	High
	Expanded Polystyrene (EPS)	Board	\$\$	3.85	Refined petroleum + blowing agent (pentane); 60% recycled EPS	HBCD Flame Retardant, CO, Soot, Smoke, benzene	2.5% HBCD	Yes	High
	Polyisocyanurate	Board	\$\$	6.5	Refined petroleum + blowing agent (pentane); 10% recycled polyiso	CO, Soot, Smoke, Halogenated Flame Retardants	5-10% TCPP	Yes	High
	Spray Polyurethane Foam	Foamed-on	\$\$	3.6-5.0	Refined petroleum + blowing agent (HFC-245fa); 25% soy oil	Toxic during installation, CO Soot, Smoke, Halogenated Flame Retardants	? % TCPP	Yes	High
	Perlite	Board	\$	2.7	perlite, cellulose binders, and waterproofing agents	No known issues	NA	Yes	Low
DO NOT CONTAIN HFR	Mineral Wool (AKA Rockwool)	Board	\$\$	4.2	Slag wool fiber and/or basaltic rock, phenolic resin	Can irritate and congest lungs during installation	NA	Yes	Low (waste product)
	Cellular Glass Foamglas (Pittsburgh Corning)	Board	\$\$\$	3.45	Alumino-silicate cellular glass with a specially elaborated composition; totally inorganic; contains no binders	No known issues	NA	Yes	High
	Aerogel	Board	\$\$\$	10.0	Silica gel, PET, fiberglass	Can irritate and congest lungs during installation?	NA	Yes	High
	Carbon Foam	Board	\$\$\$	6.67	Calcined Coke	No known issues	NA	Yes	Low (waste product)
	Agrifiber	Board	\$\$	3.0	Rice hulls, mycelium roots, wheat or rice straw	No known issues	Borate	No	Low
	Cementitious Foam	Foamed-on	\$\$	3.9	Modified Oxychloride Cement	No known issues	NA	Yes	High

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	Example Product(s)	Typical Sizes / Uses	Website
Perlite	GAF EnergyGuard Perlite board Koppers Perlite Roof Insulation	Loose fill in cavities (roofs, walls, underslab), mixed with concrete (poured in, CMU), board: ¾", 1", 1.5", 2" TH, 2'x4', 4'x4'	<a href="http://www.gaf.com">www.gaf.com</a> <a href="http://www.koppers.com/roofing/roofperl.htm">www.koppers.com/roofing/roofperl.htm</a>
Mineral Wool (aka Rockwool)	Thermafiber Rainbarrier Roxul Board Insulation	Underslab, roofs, rainscreen 1"-6"TH, 16"/24"/36"W, 48"/60"L panels	<a href="http://thermafiber.com">thermafiber.com</a> <a href="http://www.roxul.com">www.roxul.com</a>
Cellular Glass Foam	Pittsburgh Corning Foamglas Insulation	Pipe, conduit, ducting, roofs 1.5"-6"TH, 18"W, 24"L panels (tapered opt'l)	<a href="http://www.foamglasinsulation.com">www.foamglasinsulation.com</a>
Aerogel	ThermaRock (bonded to GWB) Aspen Aerogels Spaceloft Insulation	Underfloor, rainscreen, roofs, interior walls 1/8", ¼", 3/8", 57" W roll	<a href="http://www.aerogel.com">www.aerogel.com</a> <a href="http://www.nanogel.com">www.nanogel.com</a>
Carbon Foam	Koppers Kfoam Graftech GraFoam	Aeronautics, Marine, Energy Industries 1" x 6" x 6", 18" x 72" x 6"	<a href="http://www.kfoam.com">www.kfoam.com</a> <a href="http://www.graftech.com/products/carbon-foam.aspx">www.graftech.com/products/carbon-foam.aspx</a>
Agrifiber	Agriboard SIP	Structural Insulated Panel: 4-3/8", 7-7/8" TH, 8-9'L, 8'-24'H	<a href="http://www.agriboard.com">www.agriboard.com</a>
Cementitious Foam	Airkrete	Masonry cavity fill, stud cavities, ceilings, pipe chases Foamed in place onto retention fabric	<a href="http://www.airkrete.com">www.airkrete.com</a>