

**SECTION R408
INSULATION EMBODIED CARBON EMISSIONS**

R408.1 Insulation Embodied Carbon

In order to earn Points from Table 402.1.2.3, complete calculation Table 408.1.1 to summarize estimated embodied carbon emissions from insulation materials used in the project. The output metric for this measure shall be global warming potential (GWP) intensity, capturing insulation GWP per conditioned square foot of project area. To complete the basic calculation, project teams shall provide the following information for foundation, wall, and roof insulation materials:

1. Insulation material type
2. Product R-value
3. Total surface area (ft²)
4. Default, industry-average GWP value, from Table 408.1.2 or GWP values from *Type III Product-specific Environmental Product Declaration (EPD)*
5. Total project area (conditioned square feet)

Projects may substitute product-specific data for the default GWP value if the specified product has a lower reported GWP than the default value. Product-specific shall be substituted in Column G of the calculation Table 408.1.1. Substitution of default GWP values is only allowed when type III product-specific EPDs are sourced and noted in Column G. Projects shall use GWP values that include A1-A3 lifecycle stages, as documented in product-specific EPDs, with the exception of SPF and XPS products. For these products, the A5 and B1 values shall be included in the documented GWP value to account for the on-site and offgassing impact of blowing agents. Projects shall provide the EPDs declaration number in Column G.

**TABLE R408.1.1
INSULATION GLOBAL WARMING POTENTIAL CALCULATION**

Table 1 - Insulation Global Warming Potential Calculation

A	B	C	D	E	F	G	H	I	
Assembly	Material	Product R-Value	Surface Area (gross square feet)	Framing Factor ("1.0" for continuous, "0.8" for cavity)	Default Global Warming Potential (kg CO2e/sq.m. RSI-1)	Project has sourced Type III - Product-specific Environmental Product Declaration 1)	Product Specific Global Warming Potential (kg CO2e/sq.m. RSI-1)	Conversion Factor	GWP Result (kg CO2e)
	List insulation material type from Table 2					Use Default GWP values from Table 2. Leave blank for products where product specific data will be provided.	EPD Declaration Number	Leave blank unless EPDs have been sourced. Use GWP values from product-specific EPDs.	
Slab edge			X	1.0	X			0.0164	=
Under slab			X	1.0	X			0.0164	=
Basement walls			X	1.0	X			0.0164	=
Above grade walls, cavity			X	0.8	X			0.0164	=
Above grade walls, continuous			X	1.0	X			0.0164	=
Roof, Flat			X	1.0	X			0.0164	=
Roof, sloped, cavity			X	0.8	X			0.0164	=
Roof, sloped, continuous			X	1.0	X			0.0164	=
		Input for basic calculation							
		Inputs for product-specific data							
		Calculation outputs							
						Summary Metrics	Total Insulation GWP (kg CO2e) Conditioned Floor Area (sf)		
							OUTPUT: Insulation GWP Intensity (kg CO2e/sf)		

**TABLE R408.1.2
DEFAULT INSULATION GLOBAL WARMING POTENTIAL VALUES**

All values are from Building Emissions Accounting for Materials (BEAM)^a, unless noted.

Material	Default Global Warming Potential (kg CO ₂ e /sq.m. RSI-1)
Cellular glass - Aggregate	3.93 ^b
Cellulose - Densepack	-2.10
Cellulose - Blown/loosefill	-1.10
Cork - Board	-6.80
EPS/graphite - Board, unfaced, Type II - 15psi	2.80
EPS/graphite - Board, unfaced, Type IX - 25psi, graphite	3.40
EPS - Board, unfaced, Type I - 10psi	2.80
EPS - Board, unfaced, Type II- 15psi	3.80
EPS - Board, unfaced, Type IX- 25psi	4.80
Fiberglass - Batt, unfaced	0.70
Fiberglass - Blown/loosefill	1.00
Fiberglass - Blown/spray	1.93 ^c
Hemp - Batt	-0.50
HempCrete	-3.00
Mineral wool - Batt, unfaced	1.70
Mineral wool - Blown	1.60
Mineral wool - Board, unfaced, "light" density	3.30
Mineral wool - Board, unfaced, "heavy" density	8.10
Phenolic foam - Board	1.54 ^d
Polyiso - Wall Board	4.10
Polyiso - Roof Board	2.90
SPF – Spray, open cell	1.40
SPF – Spray, closed cell HFO	4.20
SPF – Spray, high density HFO	4.90
SPF – Spray, closed cell HFC	13.10
SPF – Spray, high density HFC	17.00
Straw – Panel	-6.50
Vacuum Insulated Panel	7.40
Wood fiber – Board, unfaced, European	-6.50
Wood fiber – Board, unfaced, North America	-10.30
Wood fiber – Batt, unfaced	-2.40
Wool (Sheep) – Batt	1.00
Wool (Sheep) – Loosefill	0.80
XPS – Board, 25psi HFC	55.50
XPS – Board, 25psi “Low GWP” (HFO/HFC)	4.90

^a <https://www.buildersforclimateaction.org/beam-estimator.html>

^b EPD Declaration Number NEPD-2012-889-EN

^c EPD Declaration Number 4788647002.102.1

^d EPD Declaration Number EPD-KSI-20190072-IBC1-EN