

The background of the page is a photograph of several layers of dark grey, textured thermal insulation boards stacked on top of each other. The boards are rectangular and have a porous, cellular appearance. The text "THERMAL INSULATION SPECIFICATION GUIDE" is overlaid on the middle of the stack.

THERMAL INSULATION SPECIFICATION GUIDE





R-5 THERMAL INSULATION
for NEW AND EXISTING BUILDINGS

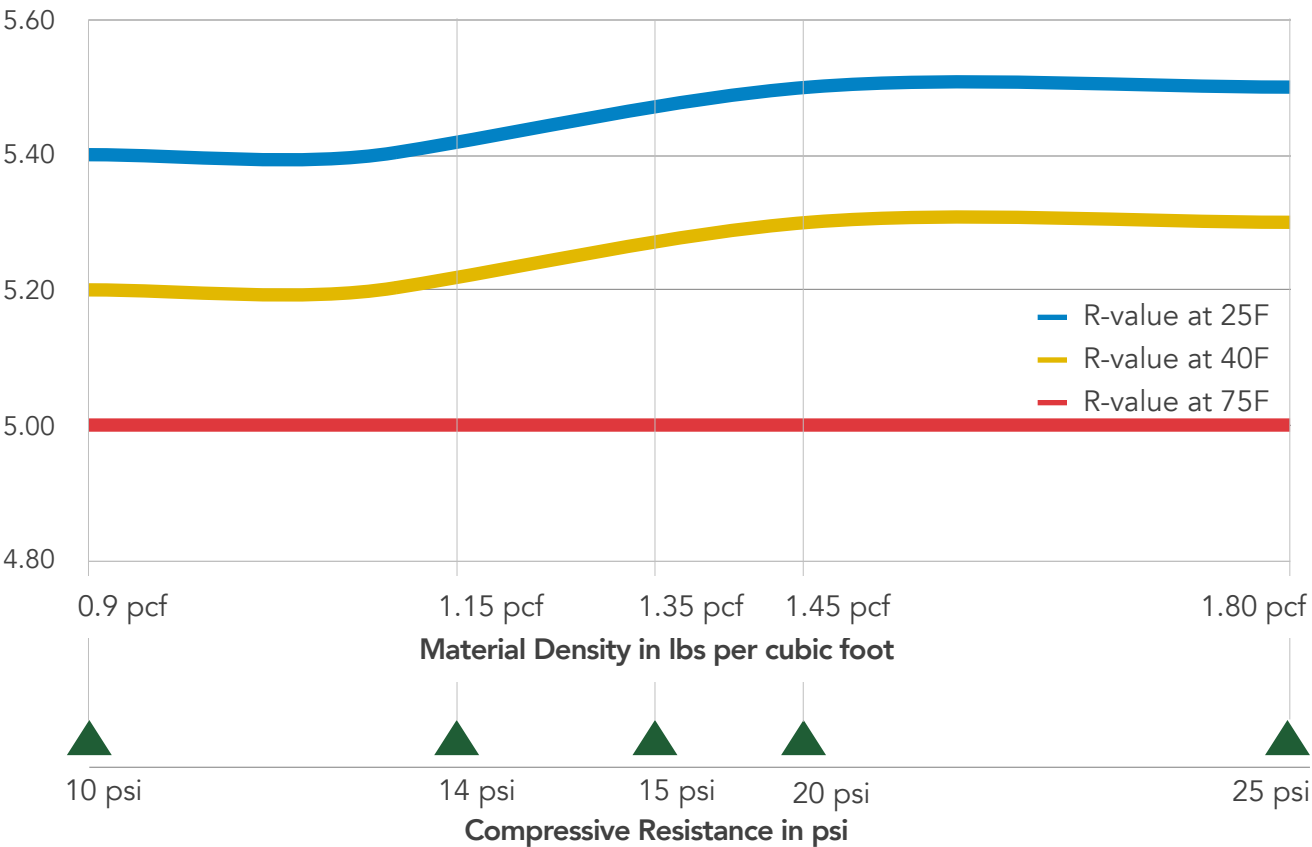


Thermal Insulation Specification Properties

R-value as a function of density and temperature
per test method ASTM C518

Compressive Resistance
per test method ASTM D1621

R-value* vs Material Density and Compressive Resistance



*R-value means resistance to heat flow. The higher the R-value, the greater the insulating power. The R-value properties are based on 1-1/16 in thickness.

Dimensional Accuracy and Size
per proprietary OCPO Quality Control methods

Metric	Thickness	Length	Width
Tolerance (in/in)	1/16"	1/16"	1/16"
Range	1/2" < t < 48"	1/2" < l < 216"	1/2" < w < 36"

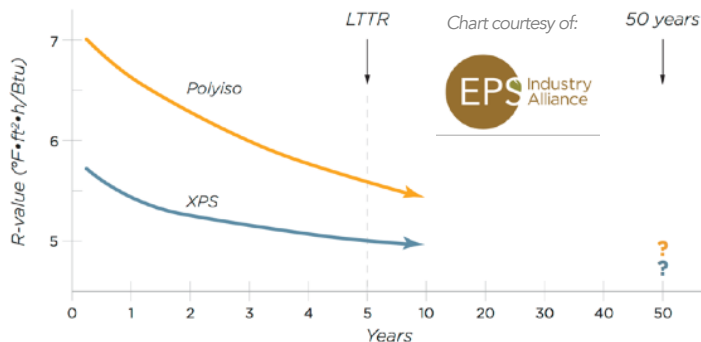
OPCORE-G+ can be sized and shaped to your specifications using proprietary processes. Thickness, length and width dimensions can be specified accurate to 1/16 of an inch on dimensions between 4" and 96".



TECHNICAL BULLETIN

Long-Term R-value Performance

Polyiso & XPS R-value over time



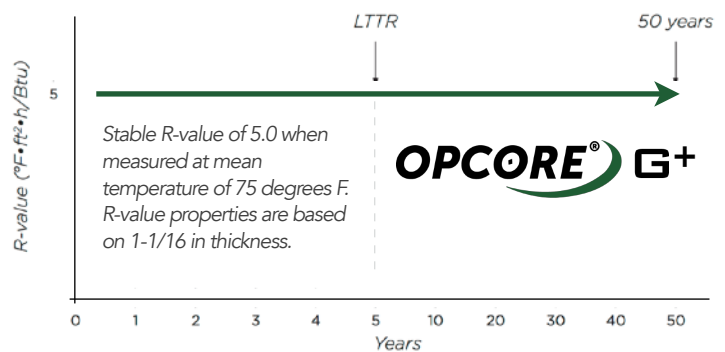
According to the EPS Industry Alliance Technical Bulletin 'XPS & Polyiso Long-Term Thermal Resistance & R-value Performance', polyisocyanurate (polyiso) and XPS (extruded polystyrene) lose R-value over their lifetime. This means the materials ability to resist the flow of heat will lessen well past the five year point reported using common LTTR test methods ASTM C1303 or CAN/ULC-S770.

Both materials make use of gases with a lower thermal conductivity than air. This allows the material to be described with a higher 'on-the-board' R-value than what would be achieved if the cells in the foamed materials contained just air. However, over time, air replaces these gases as the atmosphere in a given cell naturally seeks equilibrium with the atmosphere outside of the cell.

Starting in year five and for the remaining life of the materials, the R-values of polyiso and XPS are below LTTR published R-values.⁽¹⁾

Most insulation users are interested in a true long-term R-value for their energy demand calculations. They need to determine the true cost savings potential of thermal insulation and structure design options to optimize both cost and performance. While five-year LTTR values are of interest, a 50-year LTTR is more suitable for building insulation specifications.

OPCORE-G+ R-value over time



OPCORE recyclable thermal insulation and OPCORE-G+ graphite-enhanced recyclable thermal insulation demonstrate a stable R-value over time.

Both materials are made of small pockets of air surrounded by a recyclable polymer matrix. This means the R-value of the material is stable over time. The insulating gas in the cells starts as, and stays as, air.

OPCORE-G+ contains high purity graphite wholly contained in, and evenly dispersed throughout, a recyclable polymer matrix. Graphite naturally absorbs radiant energy, and therefore slows the flow of heat through the material. And, as an added benefit, graphite's effect on the material's radiant heat transfer rate is even more pronounced when measured at lower mean temperatures. This means the R-value of OPCORE-G+ is stable over time - and powers up as the mean temperature of the material drops.

Summer or winter, now, at five years or throughout the life of the installation, OPCORE and OPCORE-G+ Recyclable Thermal Insulation helps keep heat where it belongs.



Learn more about OPCORE and OPCORE-G+ rigid thermal insulation products at www.opcodirect.com.

(1) As stated in EPSIA Technical Bulletin 'XPS & Polyiso Long-Term Thermal Resistance & R-value Performance'.

OPCORE-G⁺ Physical Properties

Insulation Density

Property	Method	Units	0.90	1.00	1.15	1.35	1.45	1.80
Sustainability / Environmental	Opco and BASF Corporation		Recyclable as #6 Plastic. Can contain recycled content per specification. Retains R-value over time. Does not contain chlorofluorocarbons. UL GreenGuard Certified for Indoor Air Quality. Material expansion agent has zero ozone depletion potential.					
Compressive Resistance	ASTM D1621	at yield of 10% deformation in psi (kPa)	10 (69)	10 (69)	14 (97)	15 (103)	20 (138)	25 (172)
Thermal Resistance (R-value*), 75F ⁽¹⁾	ASTM C518	°F•ft²•h/BTU (K•m²/W) 75 ±2°F (23.9 ±1°C)	5.0					
Thermal Resistance (R-value*), 40F ⁽¹⁾	ASTM C518	°F•ft²•h/BTU (K•m²/W) 40 ±2°F (4.4 ±1°C)	5.2		5.3			
Thermal Resistance (R-value*), 25F ⁽¹⁾	ASTM C518	°F•ft²•h/BTU (K•m²/W) 25 ±2°F (-3.9 ±1°C)	5.4		5.5			
Flexural Strength	ASTM C203	psi (kPa)	25 (172)	25 (172)	32 (221)	39 (269)	40 (276)	50 (345)
Water Vapor Permeance ⁽²⁾	ASTM E96	For 1" (25.4 mm), perm (ng/PA•s•m²), max	4.0		3.1			2.5
Water Absorption by Total Immersion	ASTM C272	Volume % absorbed, max	1.1					
Dimensional Stability	ASTM D2126	max % linear change	< 1.5					
Oxygen Index	ASTM D2863	volume %	> 24					
Surface Burning Characteristics	ASTM E-84 or UL 723	Flame Spread / Smoke Developed	Flame Spread 5, Smoke Developed 25					
Biological Behavior			Will not support growth of mold or mildew. No harmful effects on health known.					
Chemical Resistance			Insensitive to water, the majority of acids and alkalis. Sensitive to organic solvents.					
Application Limiting Temperature		° F / ° C	165 (73.9) nominal / 180 (82.2) max					
ASTM C578 Classification ⁽³⁾			I	I	VIII	II	II +	IV
ICC-ES ESR ⁽⁴⁾			ESR available at www.opcodirect.com/library					

⁽¹⁾ R-value means resistance to heat flow. The higher the R-value, the greater the insulating power. Ask your seller for the fact sheet on OPCORE-G+ R-values. The R-value properties are based on 1-1/16 in thickness.

⁽²⁾ Values quoted are maximum values for 1 inch (25mm) thick samples and are based upon most recent raw material product quality audit data. Actual water vapor permeance data decreases as thickness increases. Where water vapor permeance is a design concern, use of the product is subject to professional engineering review at the specifiers option. Values are from data provided by BASF AG for NEOPOR F5300 PLUS.

⁽³⁾ OPCORE-G+ made of NEOPOR meets and exceeds ASTM C578-14 "Standard Specification For Preformed, Cellular Polystyrene Insulation"; published by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959.

⁽⁴⁾ OPCORE-G+ rigid thermal insulation foam, and its use and application requirements per building code, are described in ICC-ES ESR 3463 available at www.opcodirect.com/library and from ICC-ES.

The physical property data shown above are presented as typical average values as determined by industry accepted and standard test methods, except where noted, and may vary with normal manufacturing variation.



Opco, Inc.
205 W Harrison Avenue
Latrobe, PA 15650
Tel: 724.537.9300 / 800.229.6726
Fax: 724.537.9349
www.opcodirect.com



Structural Insulated Panel Association

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