Plasti-Fab EPS PRODUCT SOLUTIONS
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Product Information Bulletin

EnerSpan® Insulation and XPS Insulation ASTM C578 Types and Material Properties

The product specification for expanded polystyrene (EPS) insulation and extruded polystyrene (XPS) insulation in the United States is ASTM C578, "***Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation***." Since both EPS and XPS insulation products are available with similar material properties for product types identified in C578, the attached table provides a cross-reference to identify available ***EnerSpan*** insulation products for comparison.

EnerSpan insulation is manufactured using ***Neopor® F5300 Plus***, a graphite-enhanced expandable polystyrene (GPS) resin provided by ***BASF***. The graphite within the silver-gray cellular structure of ***EnerSpan*** insulation reduces radiation heat transfer and results in an enhanced thermal resistance compared to white EPS insulation. The minimum R-values for ***EnerSpan*** insulation given in the attached tables are as per published values in UL Evaluation Report ER-5817-02 for ASTM C578 Types.

The notes below provide relevant information for reference when reviewing the material properties values in the following tables:

1. The thermal resistance values (R-value) XPS insulation in the attached tables are minimum values per unit of thickness measured at a mean temperature of 24 ºC (75 °F) as per ASTM C578. **NOTE**: R-values for XPS insulation in ASTM C578 specification do not address long term thermal resistance (LTTR).
2. LTTR is deemed equivalent to the thermal resistance value of a product measured after 5-year storage in a laboratory condition – i.e. the LTTR is equivalent to the aged R-value after 5 years. LTTR is applicable to foam plastic insulation manufactured with blowing agents intended to be retained for greater than 180 days, such as such as XPS insulation.
3. ASTM C578 states that LTTR for XPS insulation types shall be determined using ASTM C1303, "***Standard Test Method for Predicting Long-Term Thermal Resistance of Closed-Cell Foam Insulation***." LTTR testing demonstrates reduction in R-value over 5 years, a relatively short period of time in a typical building life. Some XPS insulation manufacturers offer a 90% R-value warranty that states actual thermal resistance will not vary by more than ten percent from its published R-value for a specified period such as 10 or 15 years.
4. ***EnerSpan*** insulation R-value is not affected by LTTR because it is not manufactured with a blowing agent that is retained within the cellular structure. Therefore, ***EnerSpan*** insulation retains a constant R-value throughout the life of the product.
5. Water absorption % by volume values for EPS and XPS insulation types in the table are determined using a laboratory test method that involves submersion under a head of water. The water absorption values are applicable to specific end-use design requirements only to the extent that the end-use conditions would require submersion under a head of water.
6. Water vapour permeance values in the tables are maximum values for 1-inch thick insulation with natural skins intact. Lower values will result for thicker or laminated materials.
7. While an insulation material with a lower vapour permeance characteristic may resist moisture diffusion into it and provide lower water absorption values based upon short term laboratory test methods, it will also dry more slowly in the event moisture gets into the cellular structure as a result of long term in-service applications. For example, see the following Plasti-Fab Product Information Bulletins (PIBs) available at http://www.plastifab.com/technical-library/pib-plastifab.html for additional information on this subject:
    a. PIB 268 – EPS Insulation R-value Retention Outperforms XPS Insulation after 15 Year Below-Grade Service.
    b. PIB 297 – Drying Potential of EPS & XPS Insulation Exposed to Environmental Cycling.
    c. PIB 303 – XPS Insulation In-Situ Water Absorption.

EnerSpan® Insulation and XPS Insulation
ASTM C578 Types with Compressive Resistance 25 psi or Less

ASTM C578 Type No.	I	VIII	II	X	IX	IV
Insulation Type	*EnerSpan* 1.00 pcf	*EnerSpan VIII* 1.25 pcf	*EnerSpan HD* 1.50 pcf	XPS	*EnerSpan 25* 2.00 pcf	XPS
Compressive resistance *Minimum, psi*	10.0	13.0	15.0	15.0	25.0	25.0
Thermal resistance *Minimum R-value per inch, $ft^2 \cdot hr \cdot °F/BTU$*	4.7	4.7	4.7	5.0	4.7	5.0
R-value warranty *Minimum % of Original*	See Note 4	See Note 4	See Note 4	10-year 90%	See Note 4	10-year 90%
Water vapour permeance *Maximum, Perms*	5.0	3.5	3.5	1.5	2.5	1.5
Dimensional stability *Maximum % linear change*	2.0	2.0	2.0	2.0	2.0	2.0
Flexural strength *minimum, kPa (psi)*	25	30	35	40	50	50
Water absorption *Maximum % by volume*	4.0	3.0	3.0	0.3	2.0	0.3
Density *Minimum, pcf*	0.90	1.18	1.35	1.30	1.80	1.45
Standard Dimensions, in.						
Length	96	96	96	96	96	96
Width	48	48	48	48	48	24
Available Thicknesses – Minimum and Maximum, in.						
Minimum	½	½	½	1	½	1
Maximum	48	48	48	4	48	4