

Product Information Bulletin

EnerSpan® Insulation and XPS Insulation CAN/ULC-S701.1:2017 Types and Material Properties

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The National Standard of Canada for expanded polystyrene (EPS) insulation and extruded polystyrene (XPS) insulation referenced in the National Building Code of Canada (NBC) 2010 is CAN/ULC-S701-11, **Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering**. CAN/ULC-S701.1:2017, **Standard for Thermal Insulation, Polystyrene, Boards**, is the most recent published version of the Standard now referenced in the NBC 2015. Since both EPS and XPS insulation products are available for some of the product types identified in S701 and S701.1, the attached tables provide a cross-reference to identify available **PlastiSpan**® 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 RSI (R-values) for **EnerSpan** insulation given in the attached table are as per published values in UL Evaluation Report ER-5817-02 for equivalent S701.1 Types.

The attached table provides a cross-reference to identify **EnerSpan**® insulation and XPS insulation that meet S701 and S701.1 product types. The notes below provide relevant information for reference when reviewing the material properties values for each product:

1. The thermal resistance values {RSI (R-value)} in the attached tables are measured at a mean temperature of 24 °C (75 °F).
2. RSI (R-value) provided in the table for XPS insulation types is the design “long term thermal resistance” (LTTR) for a 50 mm (2-inch) thickness provided in Table 1 of CAN/ULC-S701.1:2017 predicted using the accelerated aging laboratory test method CAN/ULC-S770. LTTR of a foam plastic insulation is intended to be equivalent to thermal resistance value measured after 5-year storage in a laboratory condition – i.e., LTTR is equivalent to the RSI (R-value) after 5 years in service.
3. The LTTR test method was developed for foam plastic insulation like XPS insulation manufactured with blowing agents intended to be retained for greater than 180 days to predict RSI (R-value) after the relatively short time of 5 years given the typical service life of a building. RSI (R-value) for XPS insulation will continue to decrease with time as the blowing agent in the cellular structure escapes. CAN/ULC-S701-11 and CAN/ULC-S701.1:2017 specifically require design value must be stated based upon LTTR testing in accordance with CAN/ULC-S770.
4. **EnerSpan** insulation RSI (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 thermal resistance throughout the life of the product.
5. Water absorption % by volume for EPS and XPS insulation types in the tables are determined using a laboratory test method that involves submersion under a 50 mm (2”) 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 25-mm (1-inch) thick insulation with natural skins intact. Lower values will result for thicker materials and for laminated product.
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 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 & XPS Insulation CAN/ULC-S701.1 Types Compressive Resistance 210 kPa (30 psi) or Less | | | | |
|---|---------------------|---------------------|---------------------|---------------------|
| CAN/ULC-S701.1 Type No. | 1 | 2 | 3 | 4 |
| Insulation Type | EnerSpan | EnerSpan HD | XPS | XPS |
| Compressive resistance Minimum, kPa (psi) | 70 (10) | 110 (16) | 170 (25) | 210 (30) |
| Thermal resistance Minimum per 25 mm (inch), m ² ·°C/W (ft ² ·hr·°F/BTU) | 0.82 (4.7) | 0.82 (4.7) | 0.82 (4.7) | 0.82 (4.7) |
| Long Term Thermal Resistance Minimum per 50 mm (2-inch), m ² ·°C/W (ft ² ·hr·°F/BTU) | LTTR Not Applicable | LTTR Not Applicable | LTTR Not Applicable | LTTR Not Applicable |
| RSI (R-value) warranty Minimum % of Original | See Note 4 | See Note 4 | See Note 4 | See Note 4 |
| Water vapour permeance Maximum, ng/Pa·s·m ² (Perm) | 300 (5.0) | 200 (3.5) | 130 (2.3) | 130 (2.3) |
| Dimensional stability Maximum % linear change | 1.5 | 1.5 | 1.5 | 1.5 |
| Flexural strength Minimum, kPa (psi) | 170 (25) | 240 (35) | 300 (44) | 350 (50) |
| Water absorption Maximum % by volume | 4.0 | 3.0 | 2.0 | 2.0 |
| Standard Dimensions, mm (in.) | | | | |
| Length | 2440 (96) | 2440 (96) | 2440 (96) | 2440 (96) |
| Width | 1220 (48) | 1220 (48) | 1220 (48) | 1220 (48) |
| Available Thickness – Minimum and Maximum, mm (in.) | | | | |
| Minimum | 12.7 mm (½) | 12.7 (½) | 12.7 (½) | 12.7 (½) |
| Maximum | 1220 (48) | 1220 (48) | 101.6 (4) | 101.6 (4) |