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XPSA
EXTRUDED POLYSTYRENE FOAM ASSOCIATION

Polystyrene-based

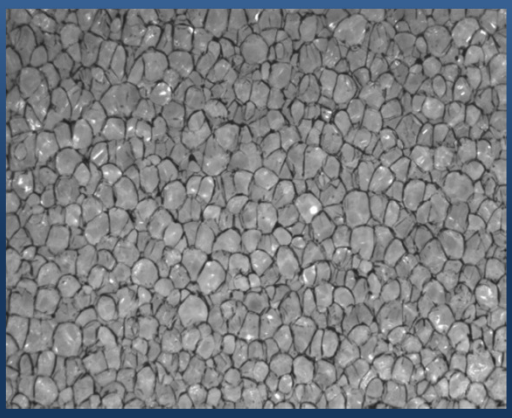
INSULATION BOARD PRODUCTS

SIMILAR BUT VERY DIFFERENT

- DIFFERENT CONSTRUCTION
- DIFFERENT PROPERTIES
- DIFFERENT PERFORMANCE
- DIFFERENT SUITABILITY FOR APPLICATIONS

XPS

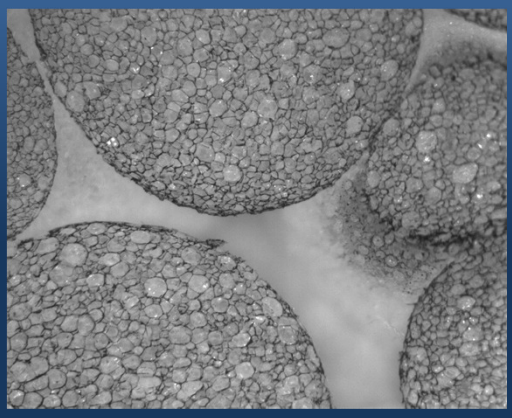
EXTRUDED POLYSTYRENE FOAM INSULATION



XPS – Closed Cell
(25x)

EPS

EXPANDED POLYSTYRENE FOAM INSULATION



EPS - *Beadboard*
(25x)

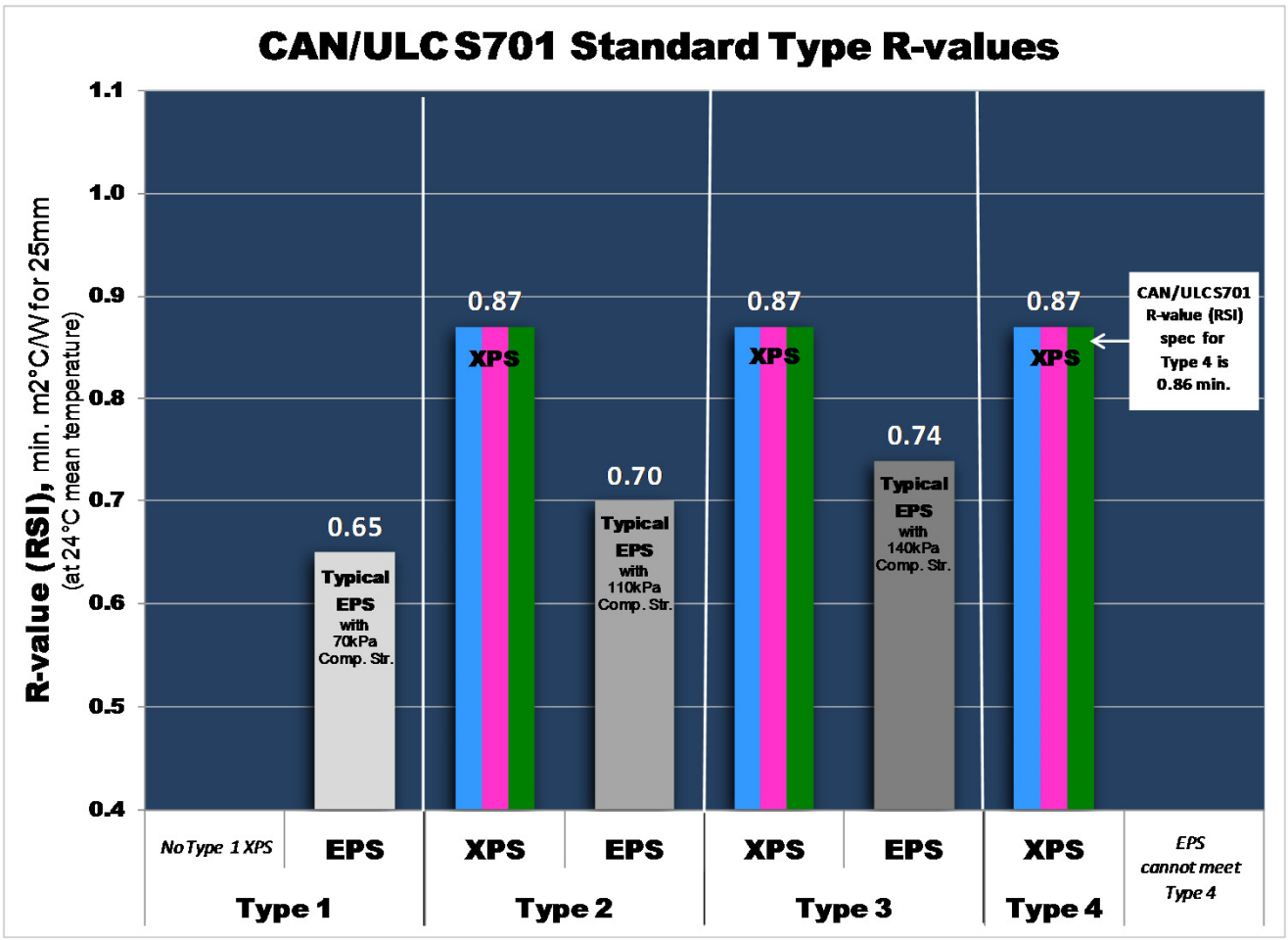
Extruded polystyrene foam insulation (XPS) is a high-performance, closed-cell rigid insulation. XPS products are manufactured in proprietary processes that melt plastic resin and additives into a molten material that is extruded through a die where it expands and cools into a uniform closed-cell rigid foam insulation board with no voids or pathways for moisture to enter. This makes XPS insulation inherently moisture resistant.

Expanded polystyrene foam insulation (EPS) is made with small foam beads that are placed in a mold. These beads are exposed to steam while in the mold which causes the beads to expand and stick together. This method of manufacture can result in interconnected voids between the beads which potentially can provide pathways for water to penetrate into the insulation. This makes EPS insulation susceptible to absorbing available moisture, which will degrade thermal performance.

R-Value

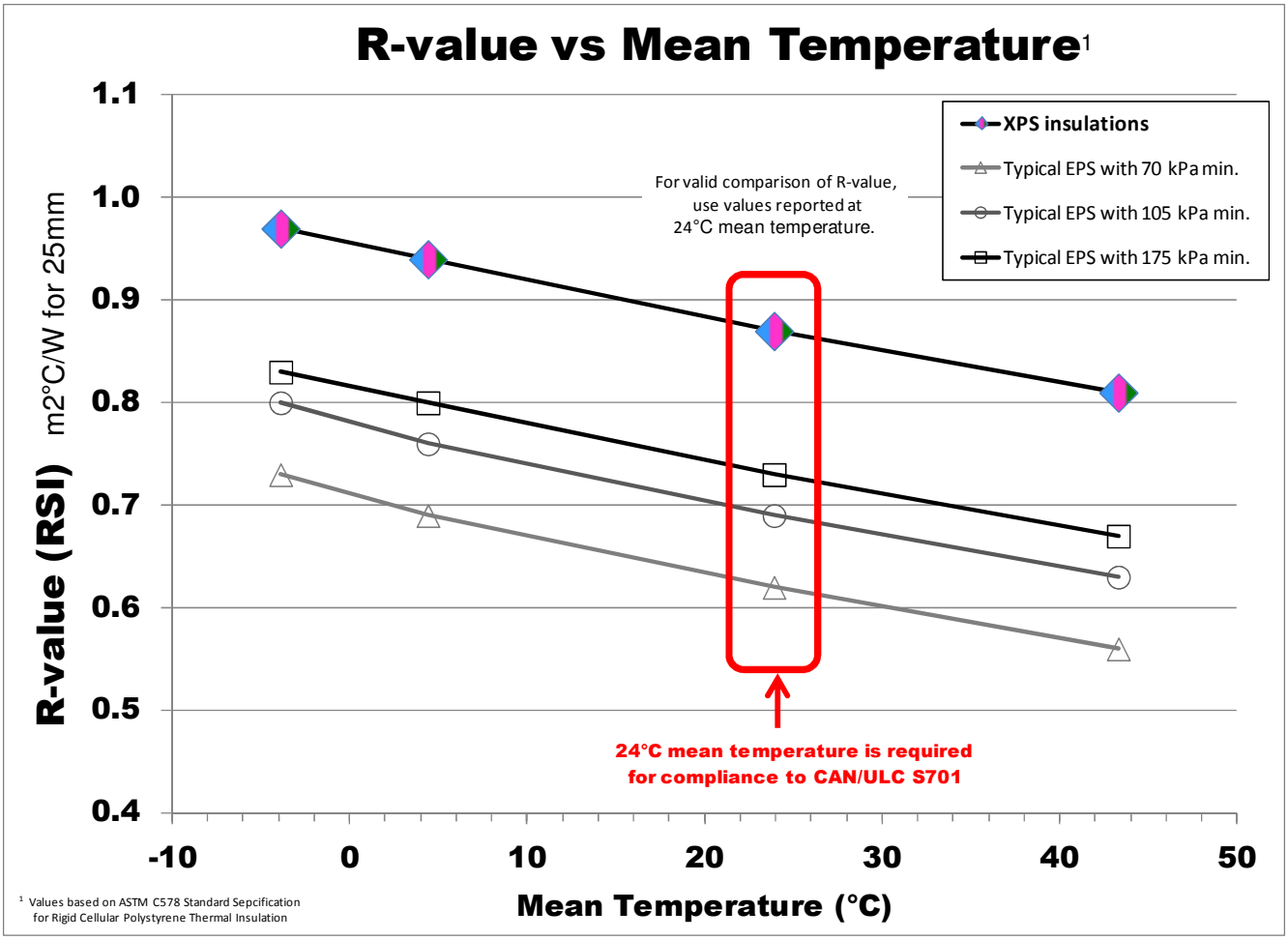
- R-Value is a measure of thermal resistance: insulating power. Higher R-value means higher energy savings.
- Foam insulation board is valuable in buildings because it provides highly-desirable long-lasting R-value per inch of thickness along with other properties. The R-value of most insulations increase as the mean temperature of the test conditions decrease.

R-value is a Critical Consideration when Selecting an Insulation



R-Value

Compare R-values at the Same Mean Temperature



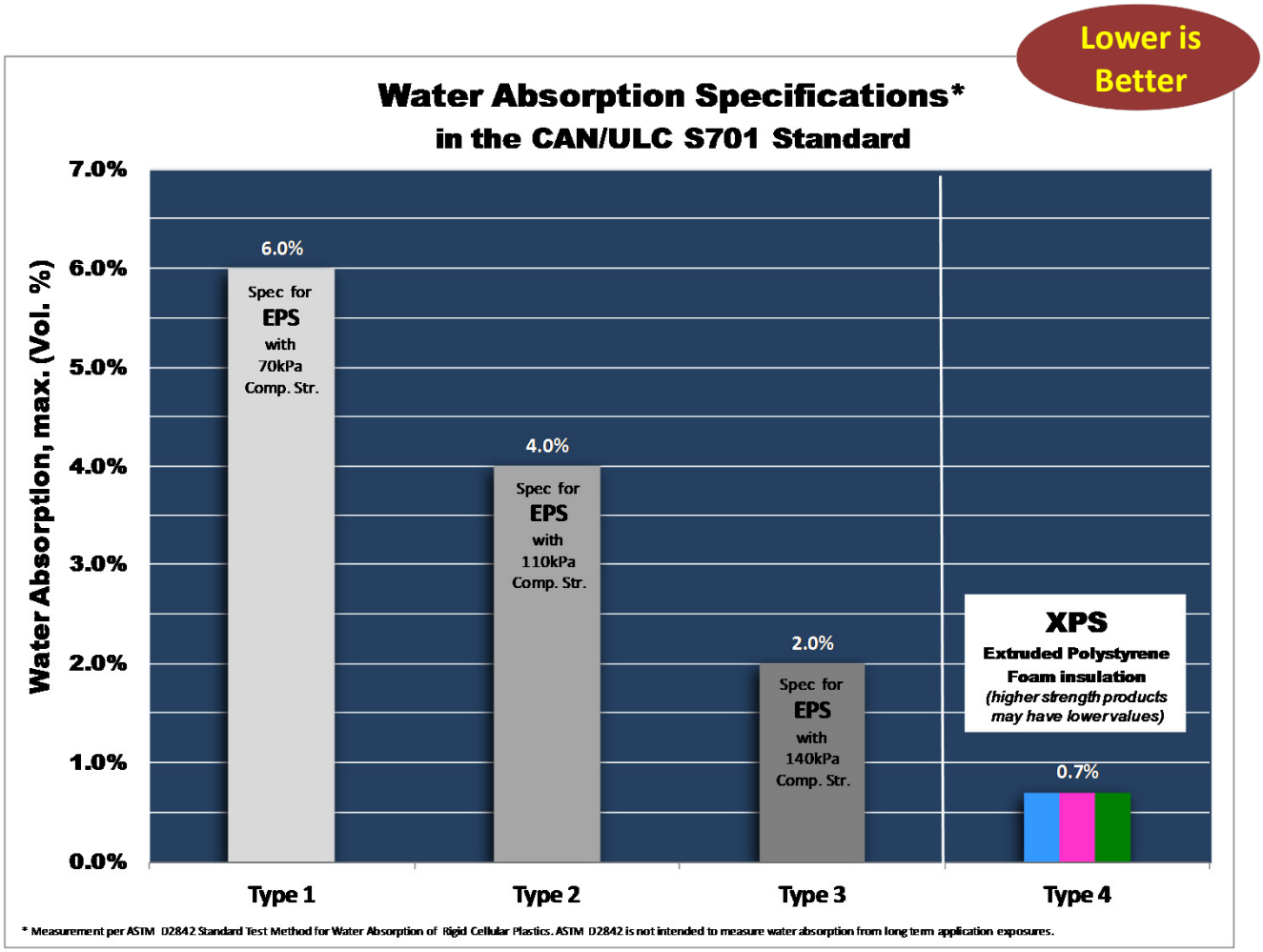
R-value at different temperatures are not comparable

- **The R-value of most insulations increase as the mean temperature of the test conditions decrease.**
- **The CAN/ULC S701 Standard requires R-value to be measured at 24°C mean temperature.**
- **R-value performance claims of insulation products should be compared at the same Mean Temperature.**

Moisture Resistance

- Moisture degrades R-value because it is a good conductor of heat

Moisture Resistance is an Important Consideration when Selecting an Insulation

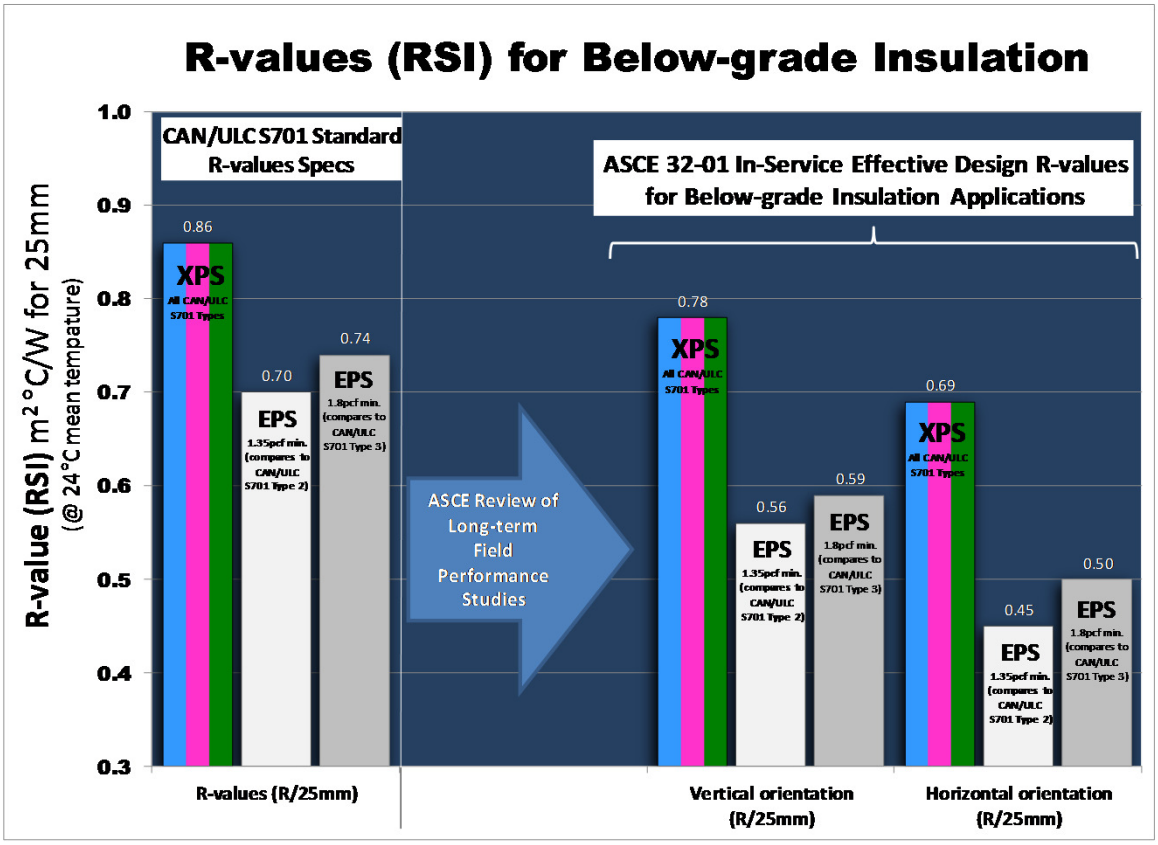


Thermal Performance

Effective R-value is Critical in Designing For Insulation in Below-grade Applications

Retention of R-values After Long-Term Exposure in Below-Grade Applications
(ASCE 32-01 values as a % of CAN/ULC S701 R-values)

	Vertical orientation Below-grade	Horizontal orientation Below-grade
XPS (Represented in CAN/ULC S701 Types 2, 3, and 4)	**90%**	**80-81%**
EPS (Represented by CAN/ULC S701 Type 2 and Type 3)	**80%**	**65-67%**



Effective Below-Grade In-service R-values, based on Field Performance Studies of Below-Grade Insulation

The American Society of Civil Engineers (ASCE) has established effective design R-values for rigid polystyrene foam insulations used in below-grade applications through the development of ASCE 32-01. Additional technical details are published: "Below-Ground Performance of Rigid Polystyrene Foam Insulation: Review of Effective Thermal Resistivity Values Used in ASCE Standard 32-01 – Design and Construction of Frost Protected Shallow Foundations," J. Crandell, *Journal of Cold Regions Engineering,* June 2010. 24:35-53

Compressive Strength

- Critical for load-bearing applications:
  - Under Slabs
  - Plaza Decks
  - Garden Roofs
  - Roads
- Related to durability and resistance to physical damage

Choosing the right Compressive Strength is an Important Consideration when Selecting an Insulation