ASTM C578 Comparison (EPS vs. XPS)

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ASTM C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation is a consensus based material standard that governs rigid polystyrene insulation Types and physical properties. While expanded polystyrene (EPS) and extruded polystyrene (XPS) are both polystyrene products, they are classified as different Types due to only manufacturing processes.

The ASTM C578 Types for both EPS and XPS are displayed in Table 1 below. These Types are used to designate compressive strength, and are measured by pounds per square inch (psi).

Table 1: ASTM Type Comparison for EPS and XPS

Compressive Strength	XPS ASTM Type	EPS ASTM Type
10 psi	NA	Type I
15 psi	Type X	Type II
25 psi	Type IV	Type IX
40 psi	Type VI	Type XIV
60 psi	Type VII	Type XV
100 psi	Type V	NA

EPS and XPS also differ in several performance aspects of interest to building designers:

- XPS attains higher initial thermal resistance via gasses in cells, known to decrease over time (lower Long Term Thermal Resistance (LTTR), measured by ASTM C1303)
- EPS can attain higher thermal resistance by incorporating graphite, which will not decrease over time
- XPS water vapor permeance is below 1 perm at thickness greater than 1-1/2", which necessitates various interior vapor retarder and exterior insulation requirements to meet code and allow for building durability EPS water vapor permeance exceeds 1 perm in almost all application thicknesses
- EPS is available as a 10 psi Type with 40% less material than a 15 psi XPS. In many applications such as brick cavity wall, where low-compressive products such as spray foam or mineral wool are used, a 10 psi EPS provides another tool for the designer to reduce cost and environmental impact

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