Dow Building & Construction

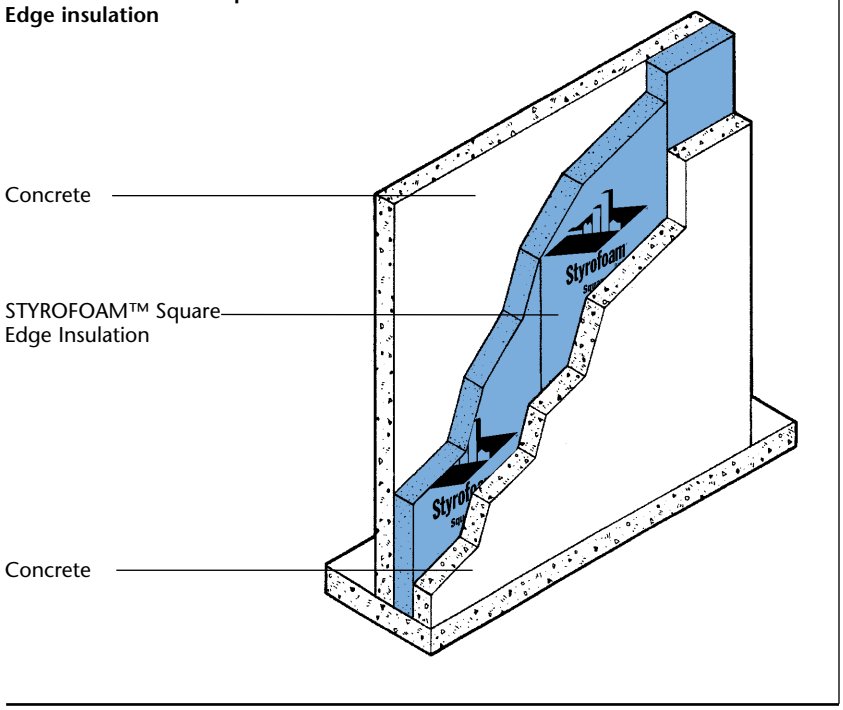
STYROFOAM™ EXTRUDED POLYSTYRENE INSULATION

Precast Sandwich Panel Applications

Concrete is a strong and highly durable material and a good choice in both commercial and multistory residential applications. However, precast concrete panel walls can absorb moisture from rain and vapor drive. Condensation buildup can reduce the effectiveness of the insulation and may cause other problems, including mold and mildew.

In precast sandwich wall construction, STYROFOAM™ extruded polystyrene insulation combines superior insulating capabilities and dew point control with the additional strength of concrete. A closed-cell, rigid plastic foam manufactured exclusively by The Dow Chemical Company, STYROFOAM insulation provides dependable and predictable performance, even in severe moisture environments. STYROFOAM Square Edge extruded polystyrene insulation is especially well-suited for use in precast concrete walls.

Precast sandwich panel wall with STYROFOAM™ Square Edge insulation



Precast Wall Assemblies

Precast concrete panels provide thermal mass, which can store considerable amounts of thermal energy. STYROFOAM™ Square Edge extruded polystyrene insulation isolates the thermal mass provided by the concrete panels, minimizing building interior temperature fluctuations under outside temperature swings. This reduces energy consumption in hot and cold climates. For example, a 7" thick slab of concrete has the same R-value as a pane of glass (R-1.5). A 2" thick layer of STYROFOAM Square Edge insulation, R-10, increases the total thermal value of the precast sandwich panel to R-11.5, almost eight times the value without it (Figure 1).

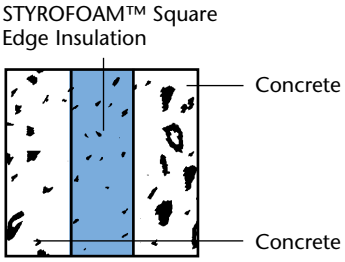


Figure 1:
7" of concrete: R-1.5
2" of STYROFOAM Square Edge insulation: R-10
Combined: R-11.5

Buildings that incorporate precast sandwich panels made with STYROFOAM™ Square Edge insulation will perform more efficiently over time because of the insulation's superior long-term thermal performance and unparalleled moisture control qualities.

Why STYROFOAM™ Square Edge Extruded Polystyrene Insulation?

Precast concrete wall manufacturers recognize STYROFOAM™ Square Edge extruded polystyrene insulation as the premier insulation for this application.

STYROFOAM Square Edge insulation is ASTM C578 Type IV extruded polystyrene insulation with smooth, high-density skins that make it virtually moisture resistant. It has no facings that are susceptible to corrosion or delamination. Plus, STYROFOAM Square Edge insulation offers superior economical long-term thermal performance under the harsh conditions of freeze-thaw cycling, a common phenomenon exhibited in precast concrete panels in cold climates.

Boards of STYROFOAM extruded polystyrene insulation are lightweight and easy to handle, cut and install. To form precast concrete walls, concrete is poured on both sides of the foam and the finished panel is held together structurally with connectors.

TABLE 1

Physical Properties of STYROFOAM™ Extruded Polystyrene Insulation

Property and Test Method	Value
Thermal resistance, ASTM C518(1), C177, Aged R-value per inch, $ft^2 \cdot h \cdot {}^\circ F/Btu$	
@ 75°F mean temp.	5.0
@ 40°F mean temp.	5.4
@ 25°F mean temp.	5.6
Compressive Strength(2), ASTM D1621, psi, min.	25
Flexural Strength, ASTM C203, psi, min.	50
Water Absorption, ASTM D2842, % by volume, max.	0.9
Water Absorption, ASTM C272, % by volume, max.	0.1
Water Vapor Permeance(3), ASTM E96, perm., max.	1.6
Coefficient of Linear Thermal Expansion, ASTM D696, $in/in \cdot {}^\circ F$	3.5×10^{-5}
Maximum Use Temperature, °F	165

(1) Values are consistent with the criteria of ASTM C578 and the requirements of the FTC R-value rule (16 CFR Part 460). R means resistance to heat flow. The higher the R-value, the greater the insulating power.
(2) Vertical compressive strength is measured at 10 percent deformation or at yield, whichever occurs first. Since STYROFOAM™ extruded polystyrene insulations are visco-elastic materials, adequate design safety factors should be used to prevent long-term creep and fatigue deformation.
(3) Based on 1" thickness.

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