EPS insulation is well-suited for below-grade applications thanks to its moisture resistant properties and stable R-values.

Much ado about Below-Grade Insulation

By David Stassi

While nutrient, microbe-filled soil has its rightful place in agriculture, pottery and medicine, it is not an insulator. Other insulating products are better suited for foundation walls and beneath floor slabs. The International Energy Conservation Code agrees, requiring the use of continuous insulation (ci) for below-grade walls in climate zones 4 through 6, which encompass Washington State. This isn't surprising since a lack of insulation on below-grade foundations, crawlspaces and under slabs accounts for up to 25% of a building's total energy loss (EPS Industry Alliance).

Though many builders and developers still might be tempted to utilize soil for void fill purposes, out of sight shouldn't be out of mind, especially if the material isn't insulating. Instead, these construction professionals should seek out the best ci solution. For those used to working with rigid foam insulation to provide ci, expanded polystyrene (EPS) is an increasingly popular material. It can improve below-grade moisture and thermal performance, while reducing energy consumption costs.

Improve performance.

One of the main advantages of installing below-grade rigid foam insulating products is their ability to help structures stay dry, which EPS excels at over the long-term.

While all rigid-foam insulations absorb moisture to some extent, EPS releases it much faster than extruded polystyrene (XPS). In a 15-year side-by-side comparison of EPS and XPS moisture content, independent testing agency Stork Twin City Testing found EPS to be four times drier than XPS when the insulations were removed from a Minnesota building foundation. After 30 days of drying time, that number had jumped. EPS was 22% drier, demonstrating the material's ability to quickly return to a dry state.

EPS' ability to expel moisture quickly benefits thermal performance since damp insulation is much less effective at blocking the flow of heat. Consider how much harder it is to stay warm in a wet shirt than a dry shirt. This concept is evident in the Stork Twin City Testing 15-year in-situ evaluation discussed above. The testing agency found EPS retained 94% of its specified R-value, whereas the XPS only retained 52% of its R-value when wetted. Therefore, insulations that retain high moisture volumes can lose up to half of their insulating R-value, negatively impacting thermal performance.

Builders and developers use below-grade insulation in a range of applications, from under slab and radiant heated floors to perimeter insulation and drainage boards.

Below-grade insulation is important for energy efficiency in damp, cooler climates like Washington.

Reduce energy consumption costs.

Construction professionals also look to below-grade EPS insulation to reduce their impact on the environment while bringing down home and business owners' energy costs. By insulating properly below-grade, builders can reduce thermal bridging, which occurs when a poor insulating material allows an easy pathway for energy to escape. By simply insulating the exterior slabs in slab-on-grade buildings, the U.S. Department of Energy estimates a 10 to 20% reduction in winter heating bills.

Likewise, EPS' chemical make-up lends itself to energy savings. Unlike XPS, which uses blowing agents that diffuse out over time, EPS insulation consists of tiny cells within a polymer that trap air. No air is lost during its time in service, translating to preserved energy and fossil fuels. No thermal drift also means savings that pass onto home and business owners.

Move the foundation out of the dirt.

So remember, when selecting a ci solution for below-grade applications in the Puget Sound, take moisture absorption and thermal performance into account. EPS below-grade insulation makes for a more comfortable and energy-saving building. ■

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