

After recognizing a need for spray polyurethane foam insulation (SPF), one of the first questions prospective customers try to tackle is “what is the difference between open cell and closed cell foam insulation?”

Spray foam insulation typically falls in one of two categories, “open cell” or “closed cell,” and each type is different in structure, where it should be applied, and performance.

Structure

Open cell spray foam is also described as a “low density” or “0.5 lb.” foam, meaning if you cut a piece of open cell foam into one cubic foot (12”x12”x12”), that piece of foam would weigh approximately half of one pound. The microscopic cells within open cell foam are just that—open— which give it a soft, fluffy feeling. We often compare the texture of open cell foam to a sponge or even angel food cake.

Closed cell spray foam, on the other hand, is also called “High density” or “2.0 lb.” or “TRU-2” foam. Can you guess how much one cubic foot of closed cell foam weighs? The tiny cells of High density, 2 lb. foam are closed, and the texture is very firm and rigid. After it has cured, closed cell foam is essentially a very hard plastic.

Application

Generally speaking, open cell foam is better suited for residential applications and Sound Proofing — specifically above grade in exterior walls, roof lines, attic floors, and areas that need soundproofing.

Closed cell spray foam is an incredible product below grade in your basement, crawl space, Exterior walls and pole barns because of its ability to block moisture (see below). You’ll also see closed cell used in commercial and industrial projects, pole barns, metal buildings, and exterior applications.

Moisture Barrier

Open cell spray foam is not a moisture vapor barrier, and will allow moisture to pass.

At a thickness of 1.5”, many closed cell products can provide a moisture barrier to reject bulk water, and its these vapor permeability characteristics that make closed cell products perfect for insulating basement and crawl space walls. It will completely lock out the damp, musty, humid smells most basements have to fight.

R-Value

At Envirofoam Of America, we manufacture our open cell spray polyurethane foam. Envirofoam Low Density has an R-value of 3.85 per inch, and that's pretty standard in the world of open cell products. So, if your home or building is framed on 2'x4' studs you'll have an R-13.5 in your walls. If it's framed on 2'x6' studs you'll have an R-21.18 in your walls.

In closed cell applications, we'll be spraying Envirofoam TRU-2 with an R-value of 7.0 per inch. As mentioned earlier, closed cell is commonly used in basements, crawl spaces Exterior walls and Roof decks. We recommend a minimum of 2" sprayed to crawl space foundation and basement walls for an R-value of 14. For Roof deck application 5-7 inches for a R-Value of R-35 to R-49

Air Barrier

It's important to keep in mind that the main benefit of all spray foam insulations is their air sealing property. It's not all about R-value!

At a minimum of 3.5", most open cell foams are considered air impermeable. Because open cell foam expands at about 100x its liquid state, every crack and crevice are filled creating a very airtight environment, and that's really what you're after in applying spray foam.

Closed cell foam acts in a similar way, expanding roughly 40x its liquid state. It is considered air impermeable at about 1.5" thick.