DIFFERENCES BETWEEN XPS AND EPS

The U-Value does not reflect all the information about the insulation performance of a building.

Also the air leakage rate (n50) has an important influence on the insulation performance.

The completely uniform and closed cell structure of XPS is very compact. The U-Value does not take into account the internal convection of the building, **which increases as the temperature difference increases**. Internal convection does not exist in the XPS structure.

The closed, fully uniform cell structure effectively retains pure air, which acts as a cell gas, whose U-Value (λ) is 0.027 W/(m K). The U-Value (λ) of XPS is 0.035 W/(m K).

Due to its closed and uniform cell structure, air currents cannot weaken its insulating capacity and it can therefore also be used as a windbreak.

1.- INSULATION PERFORMANCE. "R" VALUE:

In terms of insulation performance, XPS offers better efficiency than EPS. XPS has a closed and dense cell structure, which allows it to have a higher thermal resistance and a **better ability to prevent heat transfer**.

Since the U-Value of air weakens as it cools, t**he insulating performance of XPS improves as the temperature drops. In fact, the insulation performance of XPS is at its best when it is really cold**.

Another advantage of XPS insulation is its high thermal efficiency. Due to its closed-cell structure, air is trapped in the material, which helps reduce heat transfer. This means that XPS insulation can help reduce energy costs in cold and very hot climates.

XPS insulation has several advantages compared to other insulation materials. Firstly, it is highly resistant to water and humidity, making it ideal for use in geographic areas with high humidity levels.

Depending on the climatic region where we live, expanded polystyrene panels may be more than enough, or if we live in a very cold or hot area, we may need XPS panels, which offer a better level of performance.

EPS, on the other hand, has the ability to increase strength, but only when thermal conductivity is low or non-existent, which is often the case when the space is sealed.

Thermal performance is improved with the use of XPS, which is able to help keep the cold out while providing excellent resistance to thermal transfer.

Property	XPS	EPS
Cell structure	Closed cells	Open cells
Humidity resistance	High	Low
Load bearing capacity	High	Low
Compressive strength	High	Low
Weight	Light	Light
Ease of installation	Easy	Easy
Price	More expensive	Less expensive

As can be seen in the table, XPS has a more closed cell structure and a **greater ability to withstand loads and resist humidity**.

Consideration should be given to the climate zone in which your project is located. If you are in an area with high humidity, an outdoor exposure, XPS may be more suitable due to its humidity resistance.

If you are in an area with a more temperate climate, EPS may be sufficient for your insulation needs.

In addition, you should consider your budget and the cost of the material. In general, XPS is more expensive than EPS due to its higher density and strength.

The choice between XPS or EPS will depend on the specific needs of your project and your budget. If your project requires a high level of humidity and compression resistance, XPS is a more suitable option.

2.- HUMIDITY:

XPS is known for its high humidity resistance and higher thermal insulation capacity compared to EPS. This is due to its closed cell structure and higher density. XPS is also stiffer, which can make it easier to install in applications that require a stronger material. However, due to its higher density, XPS is more expensive compared to EPS.

XPS has no water absorption and maintains its insulating capacity also in humid environments, which is a very important feature for insulators in severe frost conditions.

EPS, on the other hand, is a more economical material. Its open cell structure allows for greater flexibility to different shapes. EPS is ideal for applications where high-water resistance is not required, such as interior walls.

Since water cannot penetrate the XPS, according to CE marking and European standards, the insulation in permafrost has an even better U-Value (0.034 - 0.036) than in a dry room (0.035 - 0.037).

In summary, XPS insulation has several advantages compared to other insulation materials. Firstly, it is highly resistant to water and humidity, which makes it ideal for use in areas with high humidity levels.

3.- WIND INSULATION:

A structure with XPS as the only thermal insulation does not require an additional windbreak. The closed cell confirmation prevents the wind from passing through the material, which is not the case with EPS.

4.- ACOUSTIC:

XPS also offers good sound insulation capabilities. Its compact cellular structure aids sound insulation by rebounding the sound wave.

5.- AGE OF THE MATERIAL:

In addition, XPS tends to have a better retention of its R-value (thermal resistance indicator) over time, which means that its insulating effectiveness remains more stable over time compared to EPS. The cellular gas of XPS is air, and therefore its insulating ability does not weaken over time.

Thanks to its compact structure, XPS insulation does not suffer from harmful draughts or a weakening of its thermal transmittance, i.e. it does not age over time, as the cellular gas is air.

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