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## LOW CHARGE PRESSURE RECEIVER SYSTEMS

### How to Calculate a U-value?

#### What is a U-value?

The U-value assesses the rate of heat loss / gain through all the thicknesses of the combined elements that make up a building component such as a wall, floor or roof. It is measured in units of  $W/m^2.K$  (Watts per metre squared Kelvin). It is a way of measuring the insulating properties of the building element. The lower the U-value, the better insulated the building element is. So a wall with a low U-value should prevent heat loss / gain better than a wall with a high U-value.

#### Why do we use U-Values?

The use of U-values allows for the comparison of different build-ups for applications, so the insulating properties of a solid wall could be compared to that of a cavity wall for example or allows the comparison of two different types of insulation at different thicknesses.

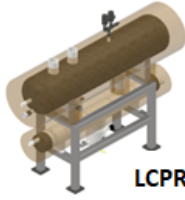
It is the most accurate way of measuring the insulating properties of the application or material and Building Regulations/Standards specifies U-values which must be achieved when building or refurbishing a building.

Without knowing the U-value of a wall or a floor or roof, you won't know how energy efficient the whole building will be.

Before you start any building work you should calculate the U-value as part of the design process, to make sure that meets or is lower than that specified by Building Regulations/Standards.

#### How do We Calculate a U-Value

To calculate a U-Value you must start with the R-Value or resistivity of the elements that make up the building element you are trying to calculate the U-Value for. The R-Value refers to a material's ability to resist heat transfer at a certain thickness – the higher the better when looking for an insulation material. It is measured in  $m^2.K/W$ . The R-Value is calculated as  $R = l/\lambda$  where  $l$  = the thickness of the material in metres and  $\lambda$  (lambda) is the thermal conductivity of the material in  $W/m.K$ .



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### **U-value formula**

U Value is the reciprocal of all resistances of the materials found in the building element. To calculate the U-Value of the building element, the R-Value of all the different components that make up that element will be considered.

U-Value =  $1/(\text{Sum of all R-Value})$

U-Value (of building element) =  $1 / (R_{so} + R_{si} + R_1 + R_2 \dots)$

where  $R_{so}$  is the fixed external resistance,  $R_{si}$  is the fixed internal resistance and  $R_1$ ,  $R_2$  etc. are resistivity of all elements within the application, including that of cavities within the construction.

This is the basic formula, and by using this you could work out the U-Value for a particular application. However, there are also other factors which need to be considered including thermal bridging factors of fixings or stud work.

### **How to Achieve these U-values?**

Different insulation materials will require a different thickness based on their thermal conductivity.