UNDERFLOOR REFLECTIVE FOIL

Reflective foil insulation products are commonly labelled with a component R-value. This does not signify performance, and should not be confused with the R-values for bulk insulation products.

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Although reflective foil insulation products (sometimes called reflective foil laminates or RFLs) do not have any thermal resistance, they can reduce the heat transfer through a building component by reducing the amount of heat that transfers across an airspace by radiation. It is common practice to refer to an equivalent R-value for a component containing an RFL.

R-value confusion

An amendment to AS/NZS 4859.1: 2002 *Materials for the thermal insulation of buildings* included the addition of Appendix K. The stated purpose of this appendix is '…R-values of building construction, which include reflective or non-reflective air spaces for the purpose of labelling insulation products.' The qualifier 'labelling' is important here.

The building industry is familiar with R-values as they apply to bulk insulation products (which don't rely on adjacent airspace for thermal performance) and to building components such as walls or ceilings (such as the R-values from the BRANZ *House insulation guide).* The 'labelling R-value' referred to in NZS 4859.1 is not the same as the R-value from the BRANZ *House insulation guide.* The labelling R-value does not necessarily take into account factors that may have a significant impact on thermal performance, such as dust, moisture, ventilation, and the inherently dynamic nature of heat transfer through a structure containing a reflective airspace.

Label R-value not actual performance

The labelling of reflective insulation products with a component R-value is intended only as a guide for comparing various choices of reflective insulation product. This label R-value should not be taken as signifying its actual performance.

For example, Appendix L2 of AS/NZS 4859.1 provides a calculation for the R-value of draped foil under a suspended timber floor. The result, for the particular set of assumptions used, of R2.3 is significantly above the R-value of R1.5 given in the *House insulation guide* for the same system.

Why the difference? One is a theoretical calculation based on assumptions and

the other is based on empirical field measurements conducted by BRANZ in the 1980s. Unfortunately Australia does not have a standard to help with simple calculations of thermal resistance. Therefore NZS 4214: 2006 *Methods of determining the total thermal resistance of parts of buildings* is sometimes used in types of calculation for which it was not intended. The R-values given in NZS 4214 for reflective and non-reflective air spaces are for ideal air spaces. These R-values should be used with the knowledge that most air spaces are not 'ideal' and therefore the R-values for air spaces are likely to be over-estimations.

Common BRANZ helpline questions

Q Why the need for perforations in foil draped over floor joists?

A The perforations enable water to drain out if the floor becomes wet during construction. They also improve the drying rate of the floor framing.

Q Are perforations necessary in retrofit underfloor foil?

A Strictly speaking no, because the floor framing should have long since dried to its equilibrium moisture content. But water may still leak through the floor if sinks or appliances overflow, so it may still be useful to have the perforations.

Q Does underfloor foil act as a vapour barrier?

A Not if it has perforations. Even without the perforations and with all joins taped, water vapour will still find a way through or around the foil. It can restrict the vapour transfer but it won't entirely stop it.

Q Why does polythene on the ground under a suspended floor work as a vapour barrier but foil doesn't?

A Because the polythene is at ground level, it lowers the vapour pressure in the subfloor space. Since moisture transfer through any gaps increases as the vapour pressure increases, the polythene is effective as a vapour barrier but foil alone is not.

Q Will a heavyweight underfloor foil do both jobs?

A No, a heavyweight foil may be more durable but it won't reduce the vapour transfer. It's not about moisture diffusion through the foil but rather air transfer around the edges or through gaps where plumbing or wiring penetrate the foil.