

# RENSHADE and DOUBLE GLAZING

We have heard vague, unwritten and unauthenticated claims that some glass companies say that radiation must be permitted to pass unimpeded through double glazing. Otherwise the warranty may be in question. We conclude that this can only mean that the entire assembly is going to increase in temperature and shatter and break at some point in time.

Firstly, Wren Industries manufactures RENSHADE & Concertina FOIL BATTS. Both products have an identical lamination process, namely double-sided foil to kraft paper, laminated by extremely thin polyethylene to both sides, making the product flexible, highly durable with very long life, 100% waterproof, and intended for internal use and not externally exposed to weather. Over 20 years there are no reports or any damage to single or double glazing.

## Airspaces

Foil functions thermally only with adjoining airspaces, and does so remarkably well. Vertical foil works best with 15-20mm (or greater) width spaces, and horizontal or sloping foils 50-100mm air spacings. Should direct contact occur to another object, heat transfer occurs via conduction, eg put your hand on foil wrapped cooked chicken, you feel 100% conducted heat, but pull your hand away the outer surface is emitting or re-radiating very little. The true miracle of aluminium foil is low emissivity – eg think of sun umbrellas and tents now more frequently lined internally with woven aluminium, for human comfort and survival.

When direct sunlight strikes either single or double-glazing, intense radiation will be swiftly transmitted into the building, but much less so for double-glazing only if it is effectively shaded or blocked from radiation.

RENSHADE has a perforation punched hole ratio of 10%, this means that 90% surface area is functioning aluminium, and we have made our best guess that either side of RENSHADE (with airspaces) is stopping about 85% of radiant heat flow (ie  $90 - 10\% = 87$ ), either by high reflection or low emission.

## Reflectivity

All aluminium foil used for thermal insulation, roll form or segmented products (not to be confused with coated aluminium for food preservation), have surfaces which reflect 97% of all “incident” or incoming radiation, ie the foil surface facing the heat source, be that direct external radiation, or ambient shade temperature which then is “conducting” through the glass.

## Emissivity

Foil surfaces facing in the opposite direction to the radiant heat source, emit or re-radiate as little as 3% of all incident heat striking the foil insulation product. So for perforated RENSHADE fitted onto interior glass surfaces, extremely low levels of total radiation are transmitted (re-radiated) into the rooms of the house, roughly 15%. Same science applies under transparent roofing, and it would not matter much if the top reflective surface was slowly nullified by dust or leaf cover – low emission goes on for ever. Vertical foils are never impaired by dust.

If a foil surface is impeded in its thermal function by being in very close contact to internal glass surfaces (eg say less than 5mm), incoming radiant heat is known to “jump the airspace”, so reflectivity doesn’t get much of a chance.

Wren has not got to the bottom of this issue, but my own feeling is that most the heat energy (eg 40-70degC), will transmit through the assembly, hit the RENSHADE foil and be reflected back outside, because invariably there will be a 5-10mm varying width airspace formed between the RENSHADE and the internal glass surface, more so with RENSHADE suspended blinds.

Technically, if the RENSHADE made 100% continuous contact with the internal double glazed pane (which is impossible), then the question arises, if about 85% of incoming heat is halted (ie 15% transmitted into the room), where does the massive incoming radiation actually go? What is the structural risk on the glazing assembly?

## Conclusion

We just don't think any real problem will happen. The temperature between the glazing panes is going to be very hot anyhow, so what's wrong with a bit more. Nonetheless, Wren is in no position to give any structural warranty to double glazing, and are relying on common sense that the double glazed assembly would be manufactured to suit Australian high radiation levels.

Alternatively, a guaranteed safe approach for double glazing would be to fix RENSHADE to outside glass surfaces (noting it is 100% waterproof), or suspend RENSHADE externally on hooks, and additionally protected by a weather proof see-through retractable blind or awning.

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January 2018

\*This DATA SHEET to be read in conjunction with FOIL BATT FACTS-13 (physics diagram)

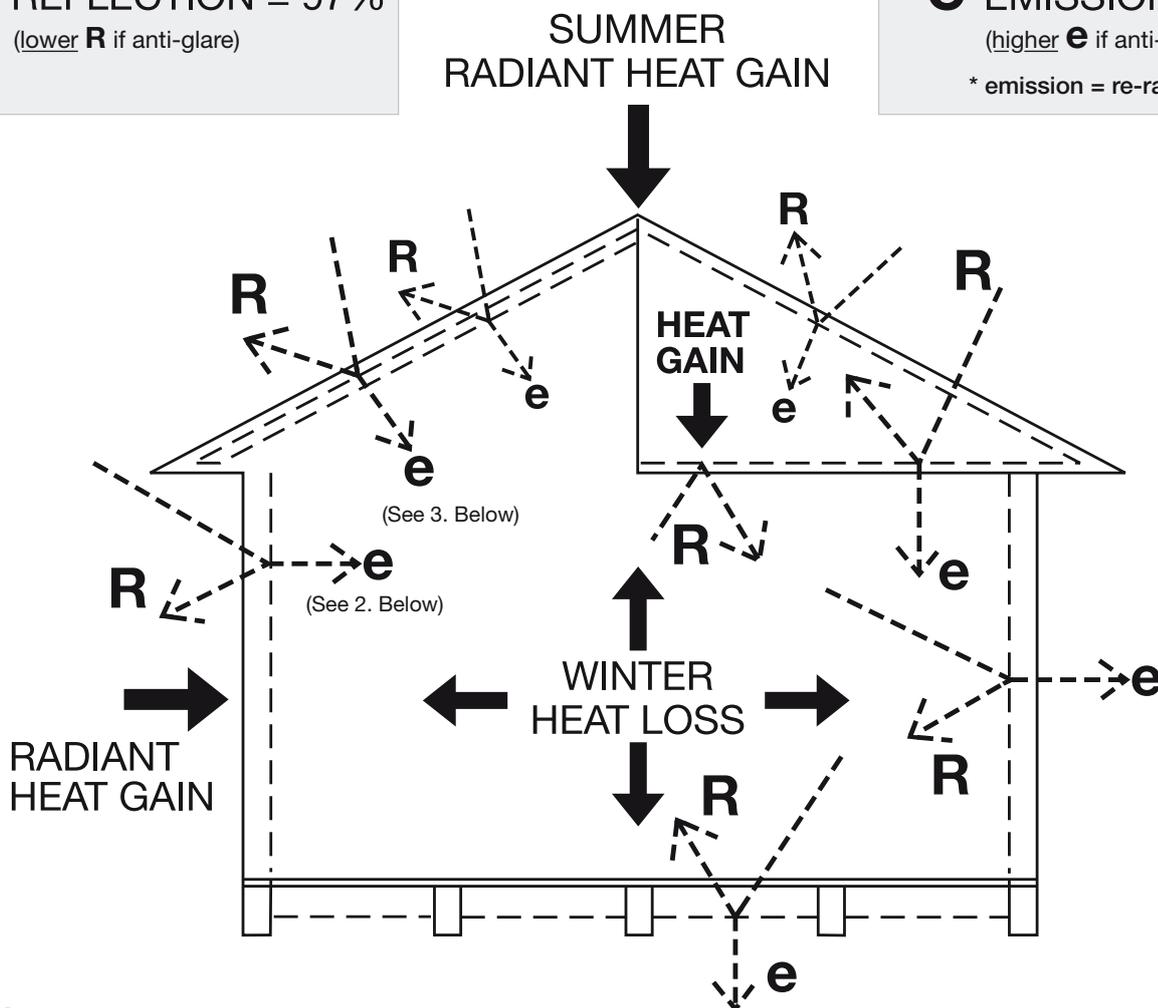
## RADIATION RESISTANCE CAPABILITIES OF DOUBLE-SIDED ALUMINIUM FOIL INSULATION MATERIALS

\* CONDITIONAL ON EXISTENCE OF ADJOINING AIRSPACES

EXPRESSED AS "REFLECTION" AND "EMISSION"

**R** REFLECTION = 97%  
(lower **R** if anti-glare)

**e** EMISSION = 3%  
(higher **e** if anti-glare)  
\* emission = re-radiation



**NOTES:**

- 1). CONCERTINA FOIL BATTS, being double-sided foil: REFLECTION and EMISSION functioning in all positions.
- 2). Single-sided (anti-glare) roll foil: REFLECTION or EMISSION is functioning, but not both.  
Walls: in summer, only low emission occurring, but will cease if R1.5-2.5 batts press against foil.  
CONCERTINA FOIL BATTS replace fibre wall batts and allow house wrap foil to function.
- 3). Sloping ceilings: in hot climates, two foil radiant barriers needed eg. roll foil + CONCERTINA FOIL BATT