FOIL BATT FACTS No. 2
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CONCERTINA FOIL BATTS™ THE RADIANT HEAT BARRIER

INSULATION MATERIAL THERMAL TESTING:

PRINCIPAL DIFFERENCES BETWEEN ALUMINIUM FOIL AND BULK INSULATIONS

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Federal regulatory thermal performance measures for buildings should be based on products that have proven in-situ performance. Under Australia's summer sunshine, the temperature of building envelopes rise as they absorb solar radiation, particularly metal roofing which can reach temperatures from 60°C to over 90°C during calm conditions, depending on their surface colour. Heat transfer from hot external surfaces, across airspaces to the interior of buildings, is principally by infrared radiation. As the principal source of heat gain into buildings, in warm climates, radiant heat gain creates the need for indoor cooling, by airflow from breezes or fans, evaporative coolers or refrigerative airconditioning. The latter, consumes significant amounts of electrical energy. Greenhouse gas emission reduction is focussed on reducing the burning of fossil fuel to generate electricity.

As proven, in the past, by international studies, and known by all authorities, the low emissivity of aluminium foil materials (typically 0.03) facing an airspace, reduces radiant heat transfer by around 97%. In warm climates, these radiant barriers significantly reduce the costs of cooling building interiors. Established testing of resistive bulk insulation materials using a Heat Flow Meter, involves moderate temperatures up to 33°C, but does not address radiant heat transfer.

Authorities should be pro-actively constructing energy codes that require testing of all insulation materials to be used in Australian buildings take account of radiant heat transfer.

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ASSESSMENT OF REFLECTIVE INSULATIONS FOR RESIDENTIAL AND COMMERCIAL APPLICATIONS

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NOTE:
USA uses imperial R-values.
Australia uses metric R-values.

ISSUES IDENTIFIED BY THE INSULATION COMMUNITY

EXTRACT: Pages 27, 28

One facet of the current assessment involved discussion of the properties and use of reflective insulations with the thermal insulation community. Information was obtained from those listed in Appendix A, specialists working on other types of insulation, and researchers having no direct affiliation with a commercial interest. The following discussion reflects the concerns of various segments of the industry.

The most repeated comment about reflective insulation is the uncertainty about the correct R-value to associate with a given product. Reflective insulation manufacturers argue that guarded hot box[2] measurements are not valid for their product because of parallel path heat flow, bridging effects, and the fact that the tested configuration seldom matches the use configuration. Concerns, for example, are expressed about moisture formation in testing configurations which may not be representative of true performance.

The reflective insulation producers argue that field test data should be used to evaluate their product. The mass-type insulations are tested and sold on the basis of a material property and then are used in a building where the system R-value is invariably less than the property value because of heat transfer parallel to the insulation.

Fairey[20] has recently obtained performance data for an assembly in which a single foil reflective insulation was installed about 24cm (9.5 in.) below the roof decking in a test building. The attic below the roof contained R-19 mineral fiber batts installed on the floor of the attic. The heat flow was down for the observations published. The effective R-value for a series of resistances from the bottom side of the roof to the top side of the ceiling increased from 3.33 K.m^2/W (18.9°F•ft^2•h/Btu) to 6.89 K.m^2/W (39.1°F•ft^2•h/Btu) as a result of foil insulation. The data indicates that installation of low emittance foil below the roof improves the performance of the batt insulation by reducing the radiative component of heat transfer to the surface and interior of the batt. Insulation systems tha combined fibrous thermal insulation and metallized film were developed by NASA for space applications.[21] The NASA objective was to reduce insulation weight but retain the thermal barrier. The use of combinations of insulating materials in building applications will no doubt receive continued attention.