EEHP Melbourne 17/2/10: tabled by Mr Renouf (Wren Industries)

FAILURE IN INSULATION STANDARD

AS/NZS 4859.1 (2002) Amendment 1(2006)
"Materials for Thermal Insulation of Buildings" - EXTRACTS

CLAUSE 2.3.1 THERMAL RESISTANCE - General page 9

Thermal resistance of insulation materials may be highly dependent on boundary conditions and other environmental factors encountered in buildings and common insulation delivery systems. Thermal resistance (material, system or total) refers to the in-situ or in-service condition. It is the intent of the methods and procedures contained in this Standard that the measured and/or declared thermal resistance shall reflect as accurately as possible the performance encountered in buildings.

CLAUSE 2.3.3.2 TEST PROTOCOL page 11

The test methods listed in Table 2.1 and computations shall be performed for appropriate environmental and installation conditions. All factors, that are known to affect the installed thermal resistance, shall be taken into account and stated, including –
(a) temperatures that affect heat flow, including the hot and cold surfaces of the insulation material or assembly and other relevant temperatures;
(b) air flows around the insulation material or assembly that influence heat flow, including ventilation effects and convection within airspaces or within insulation materials;
(c) radiant energy level, including effects due to adjacent hot or cold surfaces and radiation penetration through insulation materials (or assemblies) that have some transparency to infra-red frequencies;
(d) dimensions and orientation of structures and materials;
(e) infra-red reflectance of surfaces; and
(f) moisture content in service.

CLAUSE 2.3.3.3 *Mean temperatures*

For comparison of bulk products, thermal resistance shall be determined at a standard mean temperature of 23 +- 1degC for products sold in Australia and 15 +- 1degC for products sold in New Zealand.
For accurate thermal design purposes, thermal resistance should be determined at the appropriate operating temperatures. Where testing laboratories are, for technical reasons, unable to measure at the appropriate mean temperature, thermal resistance shall be determined by extrapolation of measurements performed at a minimum of two other mean temperatures.

------------------------- end of extracts -----------------------

External Commentary – by AFIA Aluminium Foil Insulation Assoc. (Inc.Vic1998) www.afia.com.au
(as at 3 Feb 2010)

Bulk fibrous insulations have a European/North American "standardised" **Material R-value** (resistance to the flow of heat) measured in a *steady-state* **Heat Flow Meter** between hot and cold contact plates set at 33 & 13 degC, where the mean (average) temperature is 23 deg. **ie 33+13 = 46div2= 23 degC. The duration of the test is four hours.
If the material thickness is doubled, then the R-value is doubled.

It is an established scientific fact that when mean(average) temperature increases for any insulation , the R-value (thermal resistance) falls. However in reality, all insulations have *variable* R-values – claimed *guaranteed R-values* for bulk insulations are only valid for the standardized test conditions (33/13degC). Bulk insulations are not tested for in-situ effects of high temperature radiation, as what typically occurs across Australia in roof spaces of approx 50-70 degrees.

AS/NZS 4859.1 requires the assessment of radiant energy in hot climates, and a testing proposal exists in Australia at University-SA for this to happen. The Standard is contradictory and requires major Revision. The federal government needs to instruct and fund if necessary a full revision of the Standard, <u>in the public and national interest</u>.

THERMAL PERFORMANCE COMPARISON BETWEEN FIBREGLASS BATTS AND REFLECTIVE FOIL INSULATION IN CEILINGS IN QUEENSLAND HOUSES – 1981

GENERAL OVERVIEW by Tim Renouf – Wren Industries *SECRETARY OF AFIA – ALUMINIUM FOIL INSULATION ASSOCIATION

Examination of Research Project

Thermal Performance of Housing Units in Queensland - Phase 1: a study by the Department of Architecture and Building, University of Melbourne. AHRC Report 58, 1981.

Research Funding: The Australian Housing Research Council (AHRC).

Research Team: A. Coldicutt (Team Leader), T. Isaacs, T. Williamson, S. Coldicutt, E. Coldicutt, F. Moschini. The Project Committee included a member of CSIRO Division of Building Research.

The 1981 Australian Housing Research Council federally funded research report examined the thermal performance of ceiling insulation in housing units across Queensland. Four locations were selected: Brisbane, Rockhampton, Townsville, Longreach. Two types of ceiling insulation were compared:

(i) **75mm fibreglass** directly on the ceiling, and

(ii) **a single layer of reflective foil insulation** across the top of ceiling joists with a reflective airspace beneath.

The Report (275 pages in total) explicitly concluded that only foil insulation should be used.

The central reason was that fibrous insulations had a greater resistance to heat flow up than foils, causing houses to stay hotter longer by trapping heat in the often difficult to ventilate 'stagnant heat zone' between the top of door heads and ceilings. Foil, on the other hand, stopped heat penetration successfully during the day and released accumulated heat beneath the ceiling during night time because of the foil's inherently lower resistance to heat flow up compared to bulk insulation.

Conclusion

In warm to hot climates where winter heating is very low or non-existent, houses using foil insulations combined with natural ventilation can reduce or avoid the costs of airconditioning.

SPECIAL NOTE: The Building Code of Australia (BCA) Building Energy Efficiency Provisions (2007), **takes no account of the implications of the 1981 Report** – implications being that bulk insulations should not be used in ceilings of houses, in dominant hot climates of Australia.

External commentary by Prof. Richard Aynsley (not part of the 1981 report):

"Horizontal reflective foil airspaces in roofs have the unique characteristic of having a greater resistance to heat flow down than up. They act as one-way values for summer heat flow, restricting daytime heat gain while facilitating night time heat loss. This is important because indoor discomfort in the evening which inhibits sleep can be very debilitating".

"If energy efficiency regulations, as a matter of convenience, ignore the beneficial effects of horizontal reflective airspaces in roofs of houses in warm climates, then the situation could be actionable under trade practices legislation. Ignoring these effects would be detrimental to a wide range of aluminium foil insulation products and favour bulk insulation products in spite of the demonstrable consumer benefits of reflective insulation in Australia's warm climates."

Richard Aynsley: B.Arch (Hons I), MS (Arch Eng), PhD, Member ASHRAE

Former UNESCO Professor of Tropical Architecture, James Cook University, QLD

Dean, College of Technology, Southern Polytechnic State University, Marietta GA, USA

*Quotation date: August 2000

achieving R values & best insulation performance

The total insulation value of typical construction is a combination of:

- the inherent R value of the materials the building element is made from;
- the R value of the added insulation; and
- the impact of combining these materials.

Depending on how insulation is added to building elements, thermal bridging can occur and this will result in degradation of the overall R value. For example, if R2.0 batts were placed within a conventionally framed wall of 90mm pine, the bridging effect of the pine would mean that only about R1.7 was added to the overall R value of the wall. Where possible, it is preferable to select insulation techniques which minimise thermal bridging.

With ceilings the following should be noted:

1. For non-pitched roofs, thermal bridging will result in a lesser actual performance than the nominated R value of the insulation material installed, eg to achieve an overall R value of R2.0 insulation material of R2.5 may be needed.

2. For pitched roofs, the result will depend on the optimisation of installation eg with R2.5 bulk insulation between trusses an overall R2.2 results and by adding foil under the roof, bulk insulation of R2.0 can be used to achieve R 2.2.

3. In hot climates the R value of bulk insulation directly under roof cover may be reduced by up to 40% of the advertised value.

Detailed analysis should be undertaken to ensure that the required R value can be achieved and maintained.

Quality control of insulation performance

To be effective, insulation must be installed correctly or most of the benefits will be lost.

To ensure insulation works effectively, particular attention needs to be given to the following:

1. Keep the insulation at its manufactured thickness – do not compress.

2. Insulate right to corners and other difficult spots to get to, extend it at least 50mm beyond the inside face of walls, and avoid gaps.

3. Keep it dry and away from hot flues and exhaust fans, and don't put over or near recessed lights or low-voltage transformers.

4. Keep the density and depth of the insulation consistent.

5. Loose fill insulation in drafty ceiling spaces should be avoided.

6. Reflective foil should be installed with a still-air gap of at least 30mm next to the reflective surface. Tape up any holes, tears or joins in the foil.

Quality control on installing insulation is crucial to achieving the required performance, and even more important if the R value required is mandatory.

INSTRUCTIONS FOR EASY INSTALLATION IN WALLS AND CEILINGS

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WHAT YOU NEED

Ceiling Batts

R3.5

Material R-value R3.5m²K/W

Size:	Batts 1160mm x 430mm
Contents:	16 Glasswool Batts
Area:	8.0m²/pack
Coverage:	9.0m²/pack (installed approx)
Product Code:	201350

Fletcher Insulation (NSW) Pty Ltd
ABN: 72 001 175 355

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This pack complies with AS/NZS 4859.1 for a net weight of 11.0kg, a total area of 8.0m² and a mean thickness of 165mm

The contents of this pack may vary within the allowable limits prescribed in AS/NZS 4859.1

DO-IT-YOURSELF HOME INSULATION

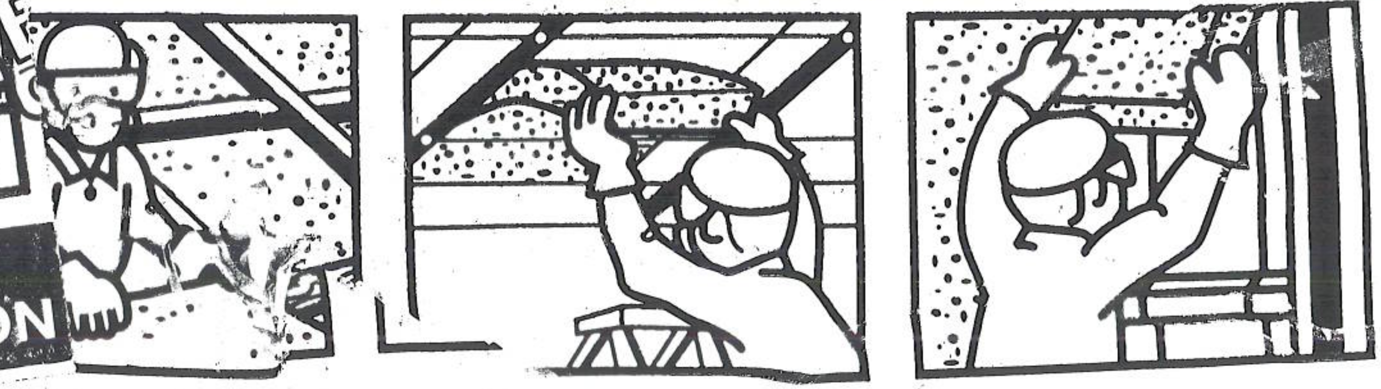
…o ceiling joists)

…sed spaces)

…verhead)

PRODUCT PERFORMANCE

- After unpacking, the product is designed to achieve its nominal stabilised thickness within 24 hours of installation.
- The performance of this product may be reduced if stored for too long in its compression packaging.
- The total R-value depends on installation and may be greate or less than the R-value of the product.
- The material R-value represented on this pack was determined at a mean temp. of 23°C as per AS/NZS 4859.1.
- The material R-value is independent of heat flow direction (the same R-value is achieved in summer and winter conditions.



THI…

Check [illegible]ance between studs before installing your Fat Batts. Measure from the centre of one timber stud/ceiling joist to the next. For 450mm spacing use 430mm wide batts for 600mm spacing use 580mm batts. Note: 430mm wide Fat Batts for Ceilings are perforated and can be torn in half and turned sideways to fit 600mm joist spacings.

CEILINGS

…s.

- Lay Fat Batts between ceiling joi[illegible]nsure
- Butt Fat Batts closely together tc [illegible] there are no gaps left at joints. [illegible]a is
- Continue until the entire ceiling a[illegible]n of covered, and extending a minimulate. 50mm onto the external wall top to fit
- Cut Fat Batts to the required sizeje pipes around vents, exhaust fans and fi[illegible] allowing a space of at least 25m[illegible]

Raked Ceilings

- In the case of raked [illegible] the Fat Batts should be inst[illegible] to fixing the plasterboard.
- Fat Batts should be supported by string or twine running at right angles to the ceiling joists so they remain in place until the plasterboard is installed.

WALLS

- Where string/twine is used, 2 lengths of twine should be fixed between each set of studs from the top to the bottom, ru[illegible]nning parallel with the studs and evenly spa[illegible]ced.

Fibre Cement or Weatherboard Cladding

- A breathable foil or building paper must be used so as not to cause moisture build…

For further information: Refer to the Material Safety Datasheet for this product, which is available on our website www.insulco.com.au or from Fletcher Insulation (NSW) Pty Ltd
600 Woodstock Avenue, Rooty Hill NSW 2766 Ph: 02 9677 4444 Fax: 02 9832 3043

Herald Sun heraldsun.com.au THURSDAY, JANUARY 21, 2010

REVEALED: How you could pay an extra 400 per cent to stay cool in summer

POWER JOLT

Antonia Magee

SWELTERING Victorians could see their electricity bills soar more than four-fold in four years.

Documents seen by the *Herald Sun* reveal energy distribution company SP AusNet has asked the Australian Energy Regulator to allow it to introduce the increases.

If power retailers passed on the costs, consumers in northern and eastern Victoria and parts of Melbourne could end up paying 42c per kilowatt hour in peak summer periods.

SP AusNet's existing summer peak rate is 8c per kilowatt hour.

If given the go-ahead, the charges would apply from 2011 to people with the new SmartMeters.

The State Government-approved meters, which can communicate wirelessly with power companies, are designed to reduce energy costs and help households and businesses manage power use.

SP AusNet outlined its tariff changes in its December 17 proposal to the energy regulator.

An SP AusNet spokesman said yesterday it hoped the proposed tariff changes would encourage consumers to use less power and give manufacturers an incentive to produce more efficient products.

It would not put more money in the company's pockets, he said.

But consumer groups said if the price rises were allowed they would hit hardest those Victorians who could least afford it.

Victorian Council of Social Service chief Cath Smith said they were the ones who were most often at home, using electricity during periods of peak power usage.

"VCOSS is concerned that with the introduction of time-of-use pricing, people who are at home during the day — like parents with young children, older people, people with a disability and the unemployed — will be facing much higher electricity bills," she said.

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Opposition energy spokesman Michael O'Brien said the price rise was a result of the Brumby Government's mismanagement of energy, and SP AusNet was just the messenger.

"People should be shooting the people responsible for the message: the Brumby Government," Mr O'Brien said.

But Energy Minister Peter Batchelor said the Government would not stand for severe price rises.

"The Government will continue to stand up for Victorian families and will make it clear to the AER that these price rises are totally unacceptable and unjustified," Mr Batchelor said.

Yesterday it also emerged that some people were being billed for SmartMeters that had not yet been installed. AER spokesman Lin Enright said the State Government had given the go-ahead for energy companies to charge for SmartMeters, even though they'd only been installed in a small proportion of households.

Ms Enright said the charges were like a "lay-by". Victoria was so far the only state to be charging for the meters in this way.

But Mr Batchelor said the decision was the energy watchdog's.

"AER had determined private electricity distributors should spread the costs of SmartMeters across all customers, to save Victorian families significant upfront costs," Mr Batchelor said.