

Attention: Ron Pulido
Project Manager - Committee BD58
Standards Australia
GPO BOX 476
SYDNEY NSW 2001

cc

Bronwyn Evans - CEO Standards Australia

Rod Sims – Chairman ACCC, Australian Competition and Consumer Affairs

Paul Sterling – ADMA, Aust' Ductwork Manufacturers Alliance Graeme Doreian - Building Energy Consultant

RE: Catastrophic failure of cooling ductwork insulation: AS 4254.1–2012 & AS/NZS 4859.1–2002/2006

Dear Ron,

I wish to bring a matter of urgency to Standards Committee BD58 “Thermal performance and insulation of dwellings”. This committee comprises Industry and Government representatives.

I am informed from AFIA (the independent foil association) that at BD58’s “Working Group” meeting February 16, 2016, there will be discussions regarding “Projects” and “Revisions” planned for:

AS 3999-2015 “Bulk thermal insulation – Installation”, and

AS/NZS 4859.1-2002(Amdt-1 2006)“Materials for the thermal insulation of Buildings. Part-1: General criteria and technical provisions”.

These “Projects”, I believe, are necessary to make both Standards operable for adoption in regulatory performance standards in new residential buildings for further reducing energy consumption and greenhouse gas emissions.

These regulatory processes will flow from an Industry agreed single rating framework for residential buildings, that is integrated with relevant standards, and consistently applied all jurisdictions. Refer 2016 ASBEC report:

<http://www.asbec.asn.au/wordpress/wp-content/uploads/2016/01/160119-ASBEC-National-Framework-for-Residential-Ratings-Policy-Platform.pdf>

It is intended this will lead “towards mandatory disclosure of ratings disclosure at point of sale and lease, including a repository of rating information (compliance and performance) for rating reuse....”

The “Projects” discussed at the BD58 meeting must I believe, discuss the serious subject regarding catastrophic thermal performance failure prevalent in airconditioning ductwork insulation, within hot residential roof spaces. How can a house disclose truth about building energy performance if there are failings in cooling systems that depend on the insulation of ductwork, and that of the ceiling?

Residential heating and cooling ductwork must conform to AS 4254.1-2012 “Ductwork for air-handling systems in buildings, Part 1: Flexible duct”. Responsibility for 4254.1 is Standards Committee ME-062 “Ventilation and Air Conditioning”.

Enclosed here is a brief extract copy from 4254.1. The thermal test method for ductwork insulation component is cross referenced to AS/NZS 4859.1-2002(Amdt-1 2006). The PREFACE influences much of this letter.

AS 4254.1 PREFACE

.....The current NCC requires different thermal ratings for insulation used on flexible duct, depending on the climatic zone and the application it is installed into. This, in conjunction with the increased energy efficiency for new constructions, along with rising costs of energy is driving the requirement for more efficient flexible duct systems.

It is my firm contention that an overwhelming case now exists that the thermal resistance (R-value) test method within AS/NZS 4859.1 can no longer be referenced for fibrous insulations surrounding flexible cooling ductwork in residential roof spaces. I have no objection to it being referenced for ducted winter heating, but not ducted cooling, particularly ducted refrigerative cooling residing in high intensity radiation environments.

“Steady State” thermal testing

This USA test method known as “Steady State” is embedded in AS/NZS 4859.1. This test is inadequate when cooling ductwork, with fibrous insulation, is subjected to the intense roof space radiation, common in Australia.

In short, the chilled air is rapidly cooked and then discharged from the ceiling ducts into the dwelling. Airconditioning systems sometimes run continuously and cannot achieve or maintain their thermostat settings.

And when the roof space temperature is too great, there is a safety switch that turns the airconditioning system off, otherwise it could overheat and possibly create a fire risk.

Customer case stories

I have over the years, received many stories from disgruntled home owners complaining about this problem and will list just two case stories here to support my position. Client letters enclosed, 2006 & 2016.

I have a client who lives in a Mirvac housing estate in Heatherton in Melbourne. A two storey house with black tile roof with no foil sarking and R3.5 fibre batt ceiling insulation. He had moved into the house in August 2003, and by October became aware of high levels of heat upstairs and difficulty in sleeping.

In November 2003, the client installed a Lennox central airconditioning system, and did not get much improvement in the second level. The installer company came to the property and recorded a starting temperature of 9degC. The chilled air traversed through ductwork insulated with fibrous insulation, within the hot roof space, and exited the upper storey ceiling registers at 19degC, a gain of 10degC.

The client complained for two years, then finally gave up in December 2005, and thought about the insulation.

Firstly, he fitted two roof fans and achieved a 2 degC drop in temperature upstairs. Then after speaking with myself from Wren Industries, he fitted two reflective foil radiant heat barriers, between the roof rafters and around the ductwork itself. The exit temperature from the ceiling registers then became 12degC, a 7degC reduction.

In the client's own words "Now my airconditioner is starting to work properly and it can more easily maintain thermostat settings of 24-26 degC, and will have much lower running costs".

On January 19, 2016, was the resolution of an identical case story from the same Mirvac housing estate, with a house that had no roof foil sarking and R3.5 batts in the ceiling. The owner had purchased his house in 2015, which already had a central ducted airconditioning system and two split systems. This time however, after the same remedial foil insulations were installed, the result was that the airconditioning was switched off.

The client has informed me that "several other residents of the estate have reported similar cooling problems. The estate is apparently *known* for having this issue amongst past and current residents. Nor, to my understanding is this by any means an isolated case particular to this estate".

At this point, it is obvious to ask what does Standards Australia and the Australian Building Codes Board say about such case stories? Nothing. Government funded reports exist since 2013, indicating a correlation between increased levels of insulation R-values specified in regulations, and increased energy costs from cooling. When people hear R-values they think of fibre batt insulation, and that "thicker must be better".

Common stories abound, where heat suffering complainants are commonly advised "to add more bulk insulation to the ceiling". What is needed, is reducing radiation impact on fibrous ductwork and ceiling insulation, not adding more bulk, which is rather like putting on two heavy woolen overcoats during hot weather. Bulk insulations delay the transfer of heat, but are typically overwhelmed by radiation and become heat saturated.

Failings in Standards

When determining thermal resistance of bulk insulation materials by "Steady State", radiation effects have never been addressed correctly, and this includes cooling ductwork fibrous insulation. The test is for conducted heat positioned between 33 & 13degC temperature plates for the duration of 4 hours, averaging 23deg. This limited laboratory test, designed originally for northern hemisphere winter dominated climates, has little relevance to long duration hot roof space environments of 50-70 degC , as commonly found across virtually all of Australia.

Note that 2015 was the hottest summer on record. <http://mobile.abc.net.au/news/2015-11-25/2015-set-to-be-hottest-on-record-wmo-says/6974530>

The need for "in-situ" accountability is described in AS/NZS 4859.1, is unambiguous in its intentions.

Clause 1.2 APPLICATION

This Standard is applicable to the full range of climatic and environmental conditions that exist under normal conditions. It is intended for use by regulatory and specifying authorities, insulation manufacturers, developers, architects, builders, building engineers, property managers and commercial and residential building owners.

Clause 2.3.1 General

...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 2.3.3.3 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 sold in New Zealand. For accurate thermal design purposes, thermal resistance should be determined at the appropriate operating temperatures.

Unfortunately Clause 2.3.1 is in direct conflict with the "Steady State" test method, expressed in Clause 2.3.3.3. What is more relevant to the Australian climate is changing-state "Dynamic" testing for hot climates, where in-situ building performance and high temperature control tests would help address this issue.

Cooling ductwork is located in very hot roof spaces. By referencing 4859.1 in 4254.1, Standards Australia has exposed itself by ignoring proper scientific analysis. It is simply not good enough for BD58 to possibly reply by saying that it is up the Ductwork Standard to select the appropriate thermal test method for ductwork.

If the Standards Ductwork Committee ME-062, wanted to have an alternative thermal test method for the ductwork insulation, would Industry inside Committee BD58 accept this?

In 2015, I was informed that Clause 2.3.1 was going to be altered by Committee BD58. The obvious question, is BD58 going to enhance or diminish the significance of this clause? The consequent impact on the Ductwork Standard 4254.1 is highly relevant. Currently 4254.1 references the flawed 4859.1 thermal test method, so what is going to happen in the future?

2010 Senate Inquiry - Home Insulation Program

The 4254.1 PREFACE speaks about climate applicability for ductwork, and resonates with parts of the substantial technical Recommendations 6-11 of the "2010 Senate Inquiry-Home Insulation Program"

http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Completed_inquiries/2008-10/eehp/report/b01

Recommendation 6:

The government should establish a dedicated and industry independent program to research insulation systems and help develop efficient and effective insulation policy.

Recommendation 9:

Standards Australia consider responding publicly and in detail to the scientific criticisms of AS/NZS4859.1, and if necessary undertake an independent review of the standard.

Recommendation 10:

(part only)The Australian Building Codes Board should consider...responding publicly and in detail to the concerns raised in this inquiry, and any related issues raised in submissions to the recent consultation, about the treatment of insulation in the energy efficiency requirements of the Building Code of Australia.

Recommendation 11:

(part only) proceed with the necessary research and changes to standards required to provide clarity around the efficiency of different forms of insulation for different climates: and review industry standards and workplace practices to ensure high quality standards across all jurisdictions and rebuild public confidence in the sector.

The words stated above are highly relevant to the content of this letter today. There has never been a thermal test program to determine the effectiveness of insulations for the relevant climates of Australia. Standards Australia and the ABCB never made any public response to Recommendations 6-11 of the Senate Inquiry.

Public Confidence

To rebuild public confidence, the case to change the thermal test method for cooling ductwork, at the very least, is surely beyond dispute. But where is the independence in thermal testing based on “installed performance” in buildings?

Why hasn't the ABCB insisted on “in-situ” installed thermal performance validation of all insulation materials, including ductwork? How can Governments rely on Standards if either the Government or Standards Australia ignores the public interest?

Where is the voice of the public on Australian Standards, in light of the ductwork failures raised here, in addition to the Senate Inquiry recommendations 6-11? It is silent.

Over the past few months, I have written to the “Public Advocate” representative on Committee BD58, the Consumers Federation of Australia, about cooling ductwork failure, and received no response or reaction. I would have thought continuous rises in household energy bills would make it imperative for the Public Advocate to ensure Standards are produced that can be relied on, and that realist environmental effects are accounted for in the assessment of installed thermal resistance (R-value) of all building materials and insulation materials, which includes flexible cooling ductwork.

The current extensive revision process of insulation standards (4200, 3999, 4859.1), refuses to address many basic scientific principles, such as the Law of Fluid Dynamics & the Law of Diminishing Returns, two Laws that are fundamental to “Total” installed thermal performance.

There is no Total R-value Standard in Australia. There is for NZ, but not one for Australia. The need for “Total” installed performance is most graphically illustrated with cooling ductwork insulation, rather than relying solely on a laboratory 4 hour test at low temperature of just the fibrous material alone.

Industry Standards must be reviewed to rebuild public confidence in thermal efficiency of buildings. The public must be protected. Currently the public is stranded in ignorance of the facts.

Greenhouse and Energy Minimum Standards 2012 (GEMS)

In 2012 the Federal Government passed The Greenhouse and Energy Minimum Standards Act 2012. This is an Act ‘to promote the development and adoption of appliances that use less energy and produce fewer greenhouse gases, and for related purposes’. It also has the power to override Standards and/or address any inconsistencies in or between Standards.

Quotes below from Government information document regarding GEMS 2012.

The Greenhouse and Energy Minimum Standards Bill 2012 will address the inconsistencies that have arisen in the E3 Program while simultaneously enabling expansion of the Program to drive even greater energy efficiency, in line with Australia’s commitments and environmental goals.

*The Bill will deliver a national and expanded E3 Program **that enables Australian governments to regulate:***

- i) all electrical product types;*
- ii) products that use forms of energy other than electricity (e.g. gas or diesel);*
- iii) **products that affect energy consumption of other products, such as insulation, window glass and air conditioner ducting;***

Clause 11: GEMS products, GEMS determinations and product classes

21. Products that use energy may include products powered by gas or electricity or some other energy source, such as diesel. Products that affect the amount of energy used by another product model do not use energy themselves but will affect the energy consumption of other products, directly or indirectly. Examples might include insulation, window glass or **ducting as these products will affect the amount of energy used by heating and cooling systems.**

During protracted heat waves, such as in January 2009 which killed 347 people in Victoria, it is commonly known that more people are at risk of dying from heat related stress, particularly older people and the sick. They must be protected with cost effective cooling during hot periods as they cannot afford excessive electricity bills or are physically unable to leave their homes.

In the event Standards Committee BD58 is unable to address the issues outlined herewith, and in particular the issue of creating an alternative thermal test method for the measuring of heat flow for fibrous insulation based on basic scientific protocols to meet more realistic 'on site' conditions, an approach will be made to the GEMS Regulator seeking assistance to override the decisions made by BD58.

This letter details these inconsistencies with the insulation clearly failing to protect cooled air traversing through ductwork in hot Australian roof spaces. This is an issue which must be addressed, now.

Productivity Report 2006 into Standards Australia

Pg 139, Recommendation 8.2:

*The Australian Government should participate on Standard Australia's governance bodies and on technical committees developing Australian Standards to the extent necessary **to ensure the standards will serve the public interest and not inhibit competition.***

The Australian Building Codes Board is represented on the two Standards Committees, BD58 (for AS/NZS 4859.1) & ME-062 (for AS 4254.1). The ABCB and the Standards Committees are currently not serving the public interest, in relation to the performance of cooling ductwork.

BD58 submission to the ABCB for mandatory reflective foil insulation in roof spaces

In 2013, a BD58 project was created for mandatory reflective insulation in all residential roofing, for a range of benefits including thermal performance. It was intended to be sent to the ABCB for them to consider for adoption in the NCC - Building Code of Australia.

I believe AFIA lodged a submission on this project to BD58. The AFIA submission was heavily supported in writing by Paul Sterling, Chairman of the Australian Ductwork Manufacturers Alliance (ADMA), correspondence enclosed here. The ADMA's letter October 2013 addressed to Tim Renouf supporting reflective foil for roofs, was on-forwarded to AFIA's BD58 representative (at that time) Keith Anderson, and is profoundly relevant to the email letter I am sending today to Standards Committee BD58.

The ADMA is aware of the widespread use of foil insulation in Australia since 1953, and in particular the ground breaking historic research work of RFL foil sarkings retrofitted to tile roofs in Sydney in 1968-69 during summer (enclosed here), which revealed significant thermal benefit to occupants, as well as protecting ducted airconditioning in roof spaces. This research work has been totally ignored in the formulation of the building energy efficiency provisions in the NCC-BCA regulations dating from 2003.

I do not know the status of this 2013 BD58 foil project, if it has stalled or been shelved. I am not concerned about the three year NCC adoption cycle; I am concerned that radiant heat control in roofs is imperative, and must be addressed by BD58 and the ABCB, without further delay.

Conclusion

It is essential that the public and national interest is represented transparently on Committee BD58. On the ductwork matter alone, Standards Australia must do the right thing and override Industry obstructions and institute an independent thermal testing program for cooling ductwork without delay.

Under no circumstances should CSIRO or any University be given the task of independently advising on a new testing program. They have all failed for over 20 years to address the issue of high temperature effects on buildings, and are beholden and hostage to government funding and invariably do the bidding of government, even if that means avoiding correct scientific procedure. It must be remembered that CSIRO is a government department within the jurisdiction of the Minister for Industry, Innovation & Science.

RFL reflective foil radiant barrier insulations (in many configurations) need to be mandatory in all residential roofs of Australia, for heat flow down resistance benefits, for new housing and for existing housing where feasible. The protection of cooling ductwork against radiation is beyond dispute.

There will be a steady increase of very angry residents when they find out that Industry has not acted correctly when formulating Standards, and that vital technical testing has been impeded.

It will only make matters even worse, if the ABCB representative on BD58 does not take an active and urgent interest in this issue, as they are duty bound to ensure the public interest is represented.

I am expressing my convictions firmly in writing today because I do not have faith in the process of Public Comment phase in Standards development, when no response is ever given to those who submit comments, just as what happened with a colleague of mine Graeme Doreian, Building Energy Consultant, who gave evidence to the 2014 Royal Commission – Home Insulation Program. Graeme gave warnings to Committee BD58 on 3999 matters in 2014-2015, which were ignored and dismissed, as you would be well aware.

Additionally, there ought to be two Public Comment Phases possible. One at the commencement, and one during the process of the creation or review of Standards. I am making my criticisms now at the commencement of the revision of AS/NZS 4859.1, because it would be too late to have any effect at the conventional end stage. Put more simply, after the horse has bolted.

In the bigger picture, the public are being told to believe in Standards which is good, but not if the Committee or representatives on Committees are making mistakes, or not taking into account all the relevant details.

From an ACCC perspective, are the public being deceived in that when they buy airconditioning for their house it is expected to do the job of cooling? If it fails because ducting is not insulated correctly (read as works), and the reason it fails is because Standards endorses Industry controlled recommendations that have flawed testing, then surely it can be argued this is a case for the ACCC to protect the consumer. And the 2012 GEMS legislation has the power for “The Minister” to override Standards if necessary.

It beggars belief that 63 years later after the introduction of aluminium foil insulation to Australia in 1953, and with pressures from ever rising energy bills for consumers, that Standards Australia still have not enacted independent controlled thermal testing for building fabrics and cooling appliances including ductwork, to determine the right insulation products for the climatic environment.

Building energy efficiency regulations are meant to be “evidence-based”, and reference reliable insulation Standards which account for all anticipated environmental effects, and high temperature radiation is central.

Numerous politicians, federal and state, are aware of many issues affecting residential building energy efficiency, including what is outlined in this letter. The federal Minister for Small Business, which includes Consumer Affairs and the ACCC, is aware, as is the Minister for the Environment.

Please note that I cannot condense this information to two A4 pages, as was requested of Graeme Doreian's warnings regarding AS 3999.

Thank you for your time in this matter, and look forward to your earliest response prior to the February 16, 2016 meeting, as these issues are relevant to that meeting.

Regards,

Tim Renouf
Wren Industries P/L
139 Herald St, Cheltenham VIC 3192
*Manufacturers - CONCERTINA FOIL BATTS & RENSHADE
tel: 03 9532-5855 fax: 03 9532-5854 mob:0417-310523
www.concertinafoilbatts.com info@concertinafoilbatts.com
Member AFIA - Aluminium Foil Insulation Assoc. Inc (Vic1998)
www.afia.com.au (AFIA Secretary 1996-2010)