



PROPOSAL FOR CHANGE – NATIONAL CONSTRUCTION CODE SERIES

{METABOLIC RATES FOR SPECIFICATION JV}

BCA Volume One:	Volume One Specification JV Clause 2 (a) (iii) (A) and (B)
BCA Volume Two:	{N/A}
PCA Volume Three:	{N/A}

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The proposal

1. What is the proposal?

This proposal relates to a modification of the requirements of the existing Specification JV to replace the specified metabolic rate (heat gains from people) figures with a reference to accepted national and international data sources for design metabolic heat rates.

This proposal forms part of a larger project to harmonise the specified default inputs of the three energy modelling protocols in use in Australia.

AIRAH have been working with DCCEE, ABCB, NABERS and GBCA on a project to harmonise the specified default inputs in the energy modelling protocols of NCC JV3, NABERS Energy commitment agreements and Green Star GHG guide. As part of this project it has been agreed that all of the energy modelling protocols could refer to the same data sources for metabolic rate data and that these sources should be representative of the design data currently in use in Australian design offices.

Specification JV currently specifies metabolic rate as 75W sensible / 55W latent regardless of the building class or space use. This PFC proposes that specification JV Clause 2 (a) (iii) (A) should be revised to remove these specified metabolic rate figures in favour of a reference to AIRAH, ASHRAE, and CIBSE data sources for metabolic rates. Sub-clause (B) which sets the extra values for meals should also be removed as these heat gains are incorporated into the referenced data sources.

It should be noted that for comparative modelling schemes such as the NCC JV3 method of comparing the energy performance of the proposed building to the energy performance of the reference DTS building the metabolic values used would not change the compliance result as long as the same metabolic values are used for both buildings/simulations. Clause JV3 (d) (ii) (Z) already



states that the metabolic rates must be the same in the Proposed and DTS Building and no change is proposed in this regard.

This proposal comprises the following changes to JV Clause 2 (a) (iii) (A) and JV Clause 2 (a) (iii) (B):

Existing clauses (deletions in ~~strikeout~~):

(A) from the occupants, at an average rate of 75 W per person ~~sensible heat gain~~ and 55 W per person ~~latent heat gain~~, with the number of people calculated in accordance with **D1.13**; and

(B) from hot meals in a dining room, restaurant or cafe, at a rate of 5 W per person ~~sensible heat gain~~ and 25 W per person ~~latent heat gain~~ with the number of people calculated in accordance with **D1.13**; and

Proposed revised clauses (additions underlined):

(A) from the occupants, at a rate equivalent to the metabolic rate data listed in Table 45 of AIRAH DA09, Table A1 of ANSI/ASHRAE 55, or Table A7.1 of CIBSE Guide A, with the number of people calculated in accordance with **D1.13**; and

(B) from hot meals in a dining room, restaurant or cafe, at a rate equivalent to the metabolic rate data listed in Table 45 of AIRAH DA09, Table A1 of ANSI/ASHRAE 55, or Table A7.1 of CIBSE Guide A, with the number of people calculated in accordance with **D1.13**; and

As an alternative to the modification proposed above JV Clause 2 (a) (iii) (A) and JV Clause 2 (a) (iii) (B) could be modified to require that the JV3 modelling is undertaken using the “same metabolic rates as were used for the design of the building” and the reference to the metabolic rate data sources (AIRAH, ASHRAE, CIBSE) could be included in the ABCB Protocol for Building Energy Analysis Software document. Data sources would then not need to be referred to directly within the NCC or meet the protocol for referenced documents.

The current problem

2. What problem is the proposal designed to solve?
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Currently Spec JV requires that internal heat gains in a building from the occupants be calculated at an average rate of 75 W per person *sensible heat gain* and 55 W per person *latent heat gain*.

These rates are not consistent with design practice for many buildings and when a building is modelled using JV3 the original design needs to be reworked to change the original design metabolic rates to the NCC specified metabolic rates. This represents a lot of unnecessary rework by building designers and energy modellers when using the JV3 method for demonstrating compliance even though the modelling outcome or the comparison result is not changed significantly.

The extent of rework currently required depends on the complexity of the building systems and the energy modelling software used. This proposed



change would only impact buildings with greater than 2500 operating hours per year (refer JV3(d) (i) (E)).

3. What evidence exists to show there is a problem?

Reports from professionals in the building design and energy modelling fields regarding the considerable amount of time and expense involved in reworking building models to comply with the current specification JV requirements.

This issue was discussed at the recent 12th International Building Performance Simulation Association (IBPSA) conference held in Sydney in November 2011. At a special workshop convened to discuss this and other issues relating to the harmonisation of building energy modelling requirements there was widespread agreement that harmonising default metabolic rates would be of benefit to the industry.

The objective

4. How will the proposal solve the problem?

This proposal, if accepted, will reduce the need for the building model to be changed (i.e. the loads recalculated) to incorporate the specific figures listed in the NCC JV specification.

This proposal means that metabolic rate values that are used by the designer in the building/space heat load calculations for plant sizing, can also be used in the energy simulation. These values can then also be used in the NABERS or GreenStar modelling as required or applicable.

5. What alternatives to the proposal (regulatory and non-regulatory) have been considered and why are they not recommended?

In developing this proposal AIRAH have considered several alternative options:

- Option 1: Retain the current NCC/BCA JV3 specification and apply these metabolic rate values to all other energy modelling protocols.
- Option 2 Require all energy modelling protocols to reference a single published data source.
- Option 3 Require all energy modelling protocols to reference all data sources currently in use in Australian design offices.
- Option 4 Develop a new metabolic rate schedule for use in the energy modelling protocols.

Of the four options considered only option 3 achieved the harmonisation project objective of reducing unnecessary rework by building designers/modellers.

The impacts



6. Who will be affected by the proposal?

Building designers and energy simulators.

HVAC design consultants and contractors.

The proposal will reduce the amount of potential rework required for a JV3 analysis and should provide a time and cost saving for building modellers and design engineers

7. In what way and to what extent will they be affected by the proposal?

The proposal will not affect the outcome of JV3 modelling results.

This change would only impact buildings with greater than 2500 operating hours per year as JV3(d) (i) (E) allows for actual profiles for the building, including internal heat gains for people, to be used buildings with operating hours less than this.

The proposal will facilitate the harmonisation of the three energy modelling protocols of NCC, NABERS and GreenStar which has been identified as providing a net benefit to industry.

The benefits of the proposal to harmonise default metabolic rates include improved consistency between energy modelling protocols, better industry understanding of the requirements and reduced costs of energy modelling.

There should be less rework (cost and time) involved when buildings are being modelled in accordance with verification method JV3. This should result in lower modelling/compliance costs and more accurate energy modelling outcomes due to increased industry understanding of the requirements.

There are no additional costs to industry created from implementing this proposal. Building designers/simulators should not need to purchase new standards as a result of this proposal because they will have access to the data source that they already use for metabolic rates in their designs.

Consultation

8. Who has been consulted and what are their views?

An industry workshop was held in conjunction with the IBPSA conference in November 2011. There was widespread industry support expressed for the harmonisation of the treatment of human metabolic rate default data within the three main energy modelling protocols of NCC JV3, NABERS and GreenStar.

DCCEE, ABCB, GBCA, and NABERS administrators have all participated in the energy modelling harmonisation project. The technical group responsible for the harmonisation project have reviewed and supported this proposal to harmonise default metabolic rates across the three modelling protocols.

Both GBCA and NABERS administrators have agreed to modify their energy modelling protocols to align with this harmonisation proposal.



AIRAH members have been canvassed and provided wide support for the proposal.

The industry has been consulted and has confirmed that all of the three proposed data sources for metabolic rate data are in current use in Australian design offices, with the AIRAH DA09 data being the most common source used.