

# Understanding Section J 2010 BCA

Gary MacFarlane – CMG Contracting

On behalf of

TICA – The Insulation Contractors Association



# Introduction

- Materials
  - Including Types, Availability and Thicknesses
  - Thickness Calculations for Chilled Water Piping
- Costing
  - A comparison between 2009 and 2010 of the Aero Development Mascot
- Compliance Issues
  - Installation
  - Material Limitations
  - Thickness Issues

# Materials

- Types – Piping Insulation
  - Glasswool – Sectional Pipe Insulation (SPI)
  - Polystyrene
  - Polyethylene
  - Armaflex
- Glasswool SPI
  - Chilled and Heating Water Applications
  - Imported
  - Pipe sizes up to 200NB Steel Pipe in limited quantities
  - Insulation thicknesses 25mm, 38mm and 50mm
  - Pipe sizes over 200NB and thicknesses over 50mm require a 6 to 8 week lead time

# Materials

- Polystyrene
  - Chilled Water Application
  - Manufactured by most contractors from locally purchased block
  - Any size and thickness
  - 1 to 2 day lead time depending on quantities
- Polyethylene
  - Chilled and Heating Water Applications
  - Imported
  - Pipe sizes up to 250 NB Steel Pipe in limited quantities
  - Insulation thicknesses 25mm, 38mm and 50mm
  - Pipe sizes over 150 NB and thicknesses over 50mm require a 6 to 8 week lead time

# Materials

- Armaflex
  - Chilled and Heating Water Application
  - Manufactured in Australia and Imported
  - Pipe sizes up to 100NB Steel
  - Pipe sizes over 100NB Steel lagged using flat sheet
  - Lead time dependent on stock levels
  - 4 week lead time if no stock
  - Similar Thermal Conductivity to polystyrene therefore similar insulation thicknesses

# Thickness Calculations

- R-Value for Piping Insulation
  - Calculated using AS4859.1 Clause 2.3.3.8 by apply the following formula

AMDT  
No. 1  
DEC  
2006

## Clause 2.3.3.8 (new)

*Insert* Clause 2.3.3.8 (new) as follows:

### *2.3.3.8 Alternative method for calculation of R-value for pipe insulation*

As an alternative to test method ASTM C335, the Material R-value of preformed pipe insulation may be calculated as follows.

The thermal conductivity shall be measured in accordance with Clause 2.3.3 on a planar section of insulation of the same specification as that of the preformed pipe section. The following formula shall then be applied to determine the Material R-value of the pre-formed dimensions:

$$R = (r_2 \log_e(r_2/r_1))/k$$

where

$R$  = Material R-value of the preformed pipe insulation section

$r_1$  = inner radius of the pipe insulation

$r_2$  = outer radius of the pipe insulation

$k$  = thermal conductivity of the insulation in planar form

# Thickness Calculations

- Thickness in the Planer and using AS4859.1 Clause 2.3.3.8
  - R-Value for CHW Piping in the Planer
    - Ambient Air Temp of 24deg C,
    - CHW Temp of 6 deg C
    - Mean Temp of 15 deg C =  $\text{Ambient} + \text{CHW Temp} / 2$
    - Thermal Conductivity of Class Polystyrene at 15 deg C =  $.0394 \text{ w/mK}$
    - R-Value @ 50mm thick insulation =  $0.05 / 0.0394 = R1.269$
  - Using AS4859.1 – Spreadsheet in Handout
    - R-1.81

# Costing

- Basis of Costing and Assumptions
  - Aero Development – Mascot
  - 79 CHW and HHW FCU's over 8 Floors – all piping foil faced
  - Enclosed roof top plant room – all piping metal sheathed
  - Insulation thicknesses based on AS4859.1 Clause 2.3.3.8



# Costing

## BCA 2009

- CHW cost to FCU's -  
\$88,890.00
- HHW cost to FCU's -  
\$53,031.00
- CHW to Plant Room -  
\$58,854.00
- HHW to Plant Room –  
\$23,568.00
- **TOTAL COST OF PIPING  
INSULATION -  
\$224,344.00**

## BCA 2010

- CHW cost to FCU's -  
\$97,636.00
- HHW cost to FCU's -  
\$59,540.00
- CHW to Plant Room -  
\$67,719.00
- HHW to Plant Room –  
\$22,862.00
- **TOTAL COST OF PIPING  
INSULATION -  
\$247,757.00**

# Costing

- The introduction of the 2010 BCA has added an additional \$23,413.00 or 10.44% costs to the overall project.
- If the Planer calculation for CHW had been used then all CHW piping insulation would have been 63mm thick (BCA 2009) and 88mm (BCA 2010) adding a total of 31% to the insulation value.
- A breakdown of the costing with Unit Rates and R-Values is in the handout.

# Compliance Issues

- Installation – BCA 2009
  - Higher R Values means thicker materials which means less space to apply insulation in and around FCU's, AHU's, Pumps etc
  - CHW insulation 38mm, HHW insulation 25mm
  - No space to properly install HHW



# Compliance Issues

- BCA 2009
- Insulation Issues
  - Shows insulation overlap
  - Insufficient clearance between HHW, CHW pipe and slab
  - Does not allow compliant installation
  - Possible condensation issue on CHW
  - HHW insulation thickness 25mm (yellow)
  - CHW insulation thickness 50mm (white)



# Compliance Issues

- BCA 2010
- Insulation Issues
  - Shows insulation overlap greater than 2009
  - Insufficient clearance between HHW, CHW pipe and slab
  - Does not allow compliant installation
  - Possible condensation issue on CHW
  - HHW insulation thickness 38mm (yellow)
  - CHW insulation thickness 50mm (white)



# Summary

- Specified materials are only available in limited sizes, thicknesses and quantities
- Calculate insulation thicknesses for piping using AS4859.1 Clause 2.3.3.8
- Cost of insulation approximately 10.5% higher in 2010 than 2009 – applies to duct and pipe

# Summary

- Confusion as to which BCA year to price
- On site installation difficult because:
  - Communication of insulation thicknesses between mechanical contractors, plumbers and insulation contractors not always the same
  - Limited space available
  - Equipment has not been updated to cater for thicker insulation