

7 : MECHANICAL SERVICES

Thermal insulation of central heating water piping and ductwork

Aim

The aim of this technical solution is to provide guidance on the thermal insulation requirements of the Building Code of Australia.

Background

The 2005 edition of the Building Code of Australia (BCA) references acceptable construction practice for the thermal insulation of central heating water pipework and ductwork in class 1 buildings (housing).

The Plumbing Regulations 1998 are in the process of being revised and energy efficiency in buildings will be vitally important in the future. The Plumbing Code of Australia (PCA) will be referenced in the new regulations. There is some overlap between the PCA and the BCA. Any overlap will be progressively reduced as each document is revised. The issue of thermal insulation is an example of this overlap. Whilst a review is undertaken the requirements of the BCA will be enforced by building regulation. This will apply to new class 1 buildings only.

The following tables from the BCA reference climate zones. Victoria is predominantly zones 6 and 7 and a small alpine area of zone 8.

Central heating water piping

Central heating water *piping* that is not within a *conditioned* space must be thermally insulated to achieve the minimum *Total R-Value*.

Central Heating Water Piping — Minimum Thermal Insulation

Piping to be insulated	Minimum Total R-Values for each climate zone		
	1, 2, 3 and 5	4, 6 and 7	8
1. Internal piping			
(a) All flow and return <i>piping</i> that is — (i) within an unventilated wall space; or (ii) within an internal floor between storeys; or (iii) between ceiling insulation and a ceiling.	0.2	0.2	0.2
(b) All hot water <i>piping</i> encased within a concrete floor slab (except that which is part of a floor heating system).			
2. Piping located within a ventilated wall space, an enclosed building sub-floor or a roof space			
(a) All flow and return <i>piping</i> . (b) Cold water supply <i>piping</i> — within 500 mm of the connection to the central water heating system. (c) Relief valve <i>piping</i> — within 500 mm of the connection to the central water heating system	0.3	0.45	0.6
3. Piping located outside the building or in an unenclosed building sub-floor or roof space			
(a) All flow and return <i>piping</i> . (b) Cold water supply <i>piping</i> — within 500 mm of the connection to the central water heating system. (c) Relief valve <i>piping</i> — within 500 mm of the connection to the central water heating system.	0.3	0.6	0.6

Continued over.../



7 : MECHANICAL SERVICES

Thermal insulation of central heating water piping and ductwork cont.

Explanatory information:

1. The insulation levels in the table opposite are typical examples of materials that can be used to insulate central heating water *piping*. Other methods are available for meeting the *Total R-Values*.
2. *Piping* within a timber member, such as that passing through a wall stud, is considered to have sufficient insulation for the purposes.

Insulation	Total R-Value
9 mm of closed cell polymer	0.2
13 mm of closed cell polymer	0.3
19 mm of closed cell polymer	0.45
25 mm of closed cell polymer	0.6

Heating and cooling ductwork

- (a) Heating and cooling ductwork and fittings must —
- (i) be thermally insulated to achieve the minimum *Total R-Value* in the relevant *climate zone*; and
 - (ii) use thermal insulation material in accordance with AS/NZS 4859.1;
 - (iii) be sealed against air loss.

Heating and Cooling Ductwork — Minimum Thermal Insulation

Location and element		Minimum Total R-Value for ductwork for each climate zone			
		Evaporative cooling	Heating system or Refrigerated cooling system		
			All climate zones	1, 3, 4, 6	2 and 5
1. Under enclosed suspended floors	Ductwork	0.6	1.0	1.0	1.5
2. Roof spaces	Metal heating fittings	0.1	0.1	0.1	0.1
3. External to the building	Ductwork	0.6	1.5	1.0	1.5
4. Under open suspended floors					

Explanatory information:

1. Insulation for refrigerated cooling ductwork should have a vapour barrier to prevent possible damage by condensation.
2. The insulation levels in the table opposite are typical examples of materials that can be used to insulate ductwork and fittings. Other methods are available for meeting the *Total R-Values*.
3. The addition of foil backing to the insulation and plastic protective sheeting is not considered to change the *Total R-Values* in the following table unless supported by appropriate documentary evidence.
4. Any flexible ductwork used for the transfer of products, initiating from a heat source that contains a flame, must also have the fire hazard properties.

Insulation	Total R-Value
4 mm closed cell polymer	R0.1
8 mm polyurethane spray	R0.1
40 mm polyester fibre insulation (250 g/m ²)	R0.6
70 mm polyester fibre insulation (450 g/m ²)	R1.0
90 mm polyester fibre insulation (800 g/m ²)	R1.5
25 mm mineral wool or fibreglass insulation (480 g/m ²)	R0.6
38 mm mineral wool or fibreglass insulation (560 g/m ²)	R1.0
50 mm mineral wool or fibreglass insulation (840 g/m ²)	R1.5