Flexible Ducting for Heating, Cooling and Ventilation

AIM
The aim of this technical solution sheet is to outline the requirements of AS 4254-2012 Ductwork for air-handling systems in buildings Part 1: Flexible duct as a result of the 2012 amendments to the standard and to assist practitioners in determining the correct minimum insulation R-value for ductwork installed in buildings to which the Building Code of Australia (BCA) applies.

PLUMBING REGULATIONS 2008
The Plumbing Code of Australia (PCA) is adopted by and forms part of the Plumbing Regulations 2008. Part E1 of the PCA specifies both the objectives and performance requirements related to the installation of heating, ventilation and air-conditioning systems. The Deemed-to-Satisfy provisions include both the BCA and AS 4254-2012 Ductwork for air-handling systems in buildings Part 1: Flexible duct and AS 4254 Ductwork for air-handling systems in buildings Part 2: Rigid duct.

BACKGROUND
The BCA sets out the minimum R-value of insulation required for ductwork taking into account both the intended climate zone and the type of system to be installed. AS 4254 was amended and republished in 2012 into two parts AS 4254-2012 Part 1: Flexible duct and Part 2: Rigid duct. The major changes to AS 4254.1 are as follows:

- Flexible Duct Compliance Report Summary has been modified and become mandatory. (Normative Appendix A)
- Mandatory requirements for labelling of ductwork have been included
- Improved installation requirements, including details on hanger supports and load distribution systems
- Prescribes the maximum distance of 12 meters of any diameter duct in any given duct run between air terminal devices.

Q: How do I determine the correct insulation R-value of duct work for a residential building?
A: The National Construction Code Series Volume Two- Building Code of Australia- Class 1 and 10a buildings set out the minimum R-value that the ductwork must achieve. (see Table 1) To establish the correct ductwork insulation R-value required, you will need to establish both the type of system to be installed and the climate zone the installation will take place. (See Figure 1)

Q: How do I provide adequate support for flexible ductwork?
A: Flexible ductwork is to be supported in accordance with AS 4254.1 Section 2 Clause 2.5.3 Hangers support and load distribution systems including the following:

- Hangers shall be adequately attached to the building structure.
- Support spacing’s shall not be greater than 1500mm apart and shall not have greater
than 40mm/m of sag per support spacing. (See Figure 2)
• The hanger or saddle in contact with the flexible duct shall be a minimum width of 25mm. A semi-rigid, fire resistant, load-distributing support material a minimum width of 75mm, shall be in contact with the flexible duct for at least a quarter of its circumference. (See Figure 3)
• Air terminal devices and branch take offs shall be independently supported
• Flexible duct work installed in sub-floor situations shall be supported such that no part of the flexible duct is in contact with the ground. (See Figure 4)

Q: Does flexible ductwork require labelling?
A: As of 1 May 2013 AS 4254.1-2012 is referenced in the PCA and mandates the labelling of flexible ductwork. Labelling Shall:

• be repeated along the total length of the ductwork at 1000mm intervals;
• be legible for the flexible duct’s service life; and have characters at least 10mm high.

The labelling shall include the following:
• Name of manufacturer
• Compliance with AS 4254.1-2012
• The R-value of the flexible duct (see Figure 5)

Q: Are there any installation requirements when flexible duct work changes direction?
A: Flexible duct work shall extend straight for 100mm from the connection to an air terminal device prior to any change of direction. (see Figure 6 a)
Flexible duct work shall be installed with a minimum bend radius to flexible duct diameter of 1 to 1. (see Figure 6 b)
TABLE 1 - MINIMUM MATERIAL R-VALUE DUCTWORK

<table>
<thead>
<tr>
<th>Ductwork Element</th>
<th>Heating-only system or cooling-only system including an evaporative cooling system</th>
<th>Combined heating and refrigerated cooling system</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1, 2, 3, 4, 5, 6 and 7</td>
<td>1, 2, 3, 4, 5, 6 and 7 2 and 5 8</td>
</tr>
<tr>
<td>Ductwork</td>
<td>8</td>
<td>1.5 (see note) 1.0 1.5</td>
</tr>
<tr>
<td>Fittings</td>
<td>1.0 1.5</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Note:
The minimum material R-Value required for ductwork may be reduced by 0.5 for combined heating and refrigerated cooling systems in climate zones 1, 2, 3, 4, 6 and 7 if the ducts are:

(a) under a suspended floor with an enclosed perimeter; or
(b) in a roof space that has insulation of not less than R0.5 directly beneath the roofing.

FIGURE 2 - FLEXIBLE DUCT SUPPORT SPACING’S

[Diagram showing flexible duct support spacing with maximum sag and support spacing dimensions.]
FIGURE 3 - EXAMPLE HANGING SADDLE AND LOAD DISTRIBUTION SUPPORT SYSTEM

Sub Floor Space

Ground Level

Air Space

Timber Floor

FIGURE 4 - EXAMPLE OF CLEARANCE SUB-FLOOR

Sub Floor Space

Ground Level

Air Space

Timber Floor
FIGURE 5 - FLEXIBLE DUCT LABELLING

Insulated flexible duct

FIGURE 6 - FLEXIBLE DUCT CHANGES IN DIRECTION

(a) Supports before and after sharp bends

(b) 1 x D