

## Supplement F

### Common Duct Insulation Materials

The *Washington State Energy Code (WSEC) Hotline* has received questions about different types and thicknesses of duct insulation. There appears to be some confusion about Table 5-11 of the WSEC which lists the minimum densities, out-of-packages thickness and R-values for different types of duct insulation. Table F-1 shows what the R-values are for varying thicknesses and types of duct insulation in a better layout than Table 5-11. This table also lists the ASTM and UL.

Table F-1

#### R-Values for Common Duct Insulation Materials

Installed R-Value <sup>1</sup> (h.°F sq.ft.)/Btu	Typical Material meeting or exceeding the given R-value <sup>2</sup>
1.9	1/2-inch Mineral fiber duct liner per ASTM C 1071, Type I
	1-inch Mineral fiber duct wrap per ASTM C 1290
3.5	1-inch Mineral fiber duct liner per ASTM C 1071, Types I & II
	1-inch Mineral fiber board per ASTM C 612, Types I & IB
	1-inch Mineral fiber duct board per UL 181
	1-1/2-inch Mineral fiber duct wrap per ASTM C 1290
	1-inch Insulated flex duct per UL 181
6.0	1-1/2-inch Mineral fiber duct liner per ASTM C 1071
	1-1/2-inch Mineral fiber duct board per UL 181
	1-1/2-inch Mineral fiber board per ASTM C 612, Types IA & IB
	2-inch, 2 lb/cu.ft. Mineral fiber duct wrap per ASTM C 1290
	2-1/2-inch, .6 to 1 lb/cu.ft. Mineral fiber duct wrap per ASTM C 1290
	2-1/2-inch Insulated flex duct per UL 181
8.0	2-inch Mineral fiber duct liner per ASTM C 1071, Types I & II
	2-inch Mineral fiber Duct board per UL 181
	2-inch Mineral fiber board per ASTM C 612, Types 612, Types II & IB
	3-inch 3/4 lb/cu.ft. Mineral fiber duct wrap insulation per ASTM C 1290
	3-inch Insulated flex duct per UL 181
10.0	2-1/2-inch Mineral fiber board per ASTM C 612, Types IA & IB

<sup>1</sup> Listed R-values are for the insulation only as determined in accordance with ASTM C 518 at a mean temperature of 75°F at the installed thickness and do not include air film resistance.

<sup>2</sup> Consult with manufacturers for other materials or combinations of insulation thickness or density meeting the required R-value<sup>1</sup>.

• This table is from the User's Manual for ANSI/ASHRAE/IESNA Standard 90.1-2004, p 6-29.2

## Duct Insulation Requirements

The WSEC requires residential ducts be insulated per Table 5-11 in Chapter 5.

*Table F-2*

**Duct Insulation**  
(Table 5-11, WSEC Chapter 5)

Duct Location	Climate Zone	Group R Occupancy Heating or Cooling Ducts
On roof or on exterior of building	1	E and W
	2	D and W
Attic, garage, crawl space, in walls <sup>1</sup> , in floor/ceiling <sup>1</sup>	1	E
	2	E
Within the conditioned space or in heated basements		None Required
In cement slab or in ground		B

**Note:** Where ducts are used for both heating and cooling, the minimum insulation shall be as required for the most restrictive condition.

<sup>1</sup> Insulation may be omitted on that portion of a duct which is located within a wall or floor/ceiling space where both sides of this space are exposed to conditioned air and where this space is not ventilated or otherwise exposed to unconditioned air.

<sup>2</sup> Vapor barriers shall be installed on conditioned air supply ducts in geographic areas where the average of the July, August and September mean dewpoint temperature exceeds 60°F.

**INSULATION TYPES:** Minimum densities and out-of-package thickness.

- A. 0.5-inch 1.5 to 2 lb/cu. ft. duct liner, mineral or glass fiber blanket or equivalent to provide an installed total thermal resistance of at least R-2.
- B. 2-inch 0.60 lb/cu. ft. mineral or glass fiber blanket, 1.5-inch 1.5 to 2 lb/cu. ft. duct liner, mineral or glass fiber blanket. 1.5-inch 3 to 7 lb/cu. ft. mineral or glass fiber board or equivalent to provide an installed total thermal resistance of at least R-5.
- C. 3-inch 0.60 lb/cu. ft. mineral or glass fiber blanket, 2-inch 1.5 to 2 lb/cu. ft. duct liner, mineral or glass fiber blanket. 2-inch 3 to 7 lb/cu. ft. mineral or glass fiber board or equivalent to provide an installed total thermal resistance of at least R-7.
- D. 4-inch 0.60 lb/cu. ft. mineral or glass fiber blanket, 3-inch 1.5 to 2 lb/cu. ft. duct liner, mineral or glass fiber blanket. 3-inch 3 to 7 lb/cu. ft. mineral or glass fiber board or equivalent to provide an installed total thermal resistance of at least R-10.
- E. 3.5-inch 0.60 lb/cu. ft. mineral or glass fiber blanket, 2.5-inch 1.5 to 2 lb/cu. ft. duct liner, mineral or glass fiber board or equivalent to provide an installed total thermal resistance of at least R-8.
- V. Vapor barrier, with perm rating not greater than 0.5 perm, all joints sealed.
- W. Approved weatherproof barrier.