THERMAL INSULATION ASSOCIATION OF CANADA 57TH ANNUAL CONFERENCE MONTREAL, QC

Raising the Awareness of Mechanical Insulation 2019 Updates







Let's start with:

- No touch screens to fiddle with.
- Starts working the moment it's installed.
- No moving parts to wear out.
- Operates quietly and efficiently.
- Stays hidden, for the most part.
- Lasts for the lifetime of the building.
- Environmentally responsible.



	Tab	le 5.2.2.4.	
L	eakag	e Classes,	CL
Forming	Part of	Sentence	5.2.2.4.(2)

	Maximum Operating Static Pressure, Pa				
Shape of Duct	< 500	500-1000	> 1000		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	C _L , L/s per m ²				
Rectangular	0.81	0.41	0.20		
Round	0.41	0.20	0.10		

5.2.2.5. Duct and Plenum Insulation

 Except as provided in Sentences (3) to (6), all air-handling ducts, plenums and run-outs forming part of a heating, ventilating, or air-conditioning system shall be thermally insulated in accordance with Table 5.2.2.5.



Table 5.2.2.5. Insulation of Ducts Forming Part of Sentences 5.2.2.5.(1) and (2)

Temperature Difference,(1) °C	Minimum Thermal Resis- tance of Ducts and Plenums, m ^{2.} °C/W	Minimum Thermal Resistance of Run-outs, ⁽²⁾ m ^{2, °} C/W
< 5	0	0
5 to 22	0.58	0.58
> 22	0.88	0.58

Notes to Table 5.2.2.5 .:

(1) Refers to the temperature difference at design conditions between the space within which the duct is located and the design temperature of the air carried by the duct. Where a duct is used for both heating and cooling purposes, the larger temperature difference shall be used.

(2) Refers to ducts not exceeding 3 m in length that connect to terminal grilles or diffusers.

3) Exhaust ducts, return ducts and plenums located within conditioned space need not comply with Sentence (1).

4) Ducts and *plenums* located within *conditioned space* in a *dwelling unit* and serving only that *dwelling unit* need not comply with Sentence (1).

5) Except for relief and outside air ducts and except as provided in Sentence (6), all air-handling ducts and plenums forming part of a heating, ventilating, or air-conditioning system that are located outside the *building envelope* shall be insulated to the same level as required for walls in Subsection 3.2.2.

6) Factory-installed plenums and ducts provided as part of equipment tested and rated in accordance with Article 5.2.12.1. need not comply with Sentences (1) and (5), provided they are insulated to a thermal resistance not less than 0.58 m^{2-C}/W.

7) Insulation material required in Sentence (1) shall be installed in accordance with good practice. (See Note A-5.2.2.5.(7) and 5.2.5.3.(7).)

NOTE: 8) Manufactured insulation thicknesses shall not be altered.

5.2.2.6. Protection of Duct Insulation

 Insulation on cold-air supply ducts shall be provided with vapour barrier protection to prevent condensation, where the surface temperature of the duct is below the dew point of the air surrounding the duct.



Division B





8) The insulation thickness used to determine compliance with Table 5.2.5.3. shall be the thickness of the insulation after installation. (See Note A-5.2.2.5.(2), 5.2.5.3.(8) and 6.2.3.1.(6).)

Table 5.2.5.3. Minimum Thickness of Piping Insulation Forming Part of Sentences 5.2.5.3.(1), (3) to (5), and (8)

Type of System	Design Operating Temperature Range, °C	Thermal Conductivity of Insulation		Nominal Pipe Diameter, mm (inches)				
		Conductivity	Mean Rating Temperature,	$\begin{array}{l} \text{Runouts}^{(1)} \\ \leq 51 \ (2) \end{array}$	≤ 25.4 (1)	32 to 51 (1¼ to 2)	64 to 102 (2½ to 4)	≥ 127 (5)
		mange, winn O	°C	Mi	nímum Thickr	kness of Piping Insulation, mm		m ·
Heating Systems (Steam, Steam Condensate and Hot Water)	> 177	0.046-0.049	121	38.1	114	127	127	127
	Systems 122–177	0.042-0.045	93	38.1	76.2	101.6	114	114
	94-121	0.039-0.043	65	38.1	63.5	63.5	76.2	76.2
	61-93	0.036-0.042	52	25.4	38.1	50.8	50.8	50.8
	41-60	0.035-0.040	38	25.4	25.4	38.1	38.1	38.1
Cooling Systems (Chilled Water, Brine and Refrigerant)	4-16	0.030-0.039	24	25.4	25.4	25.4	25.4	25.4
	< 4	0.030-0.039	24	25.4	25.4	38.1	38.1	38.1

Notes to Table 5.2.5.3 .:

(1) Refers to runouts to individual terminal units not exceeding 3.7 m in length.

5.2.5.4. Protection of Piping Insulation

1) Insulation on piping conveying chilled fluid shall be provided with vapour barrier protection to prevent condensation, where the surface temperature of the pipe is below the dew point of the air.

2) Piping insulation installed in areas where it may be subject to mechanical damage or weathering shall be protected.

5.2.6. **Pumping System Design**

5.2.6.1. Application

1) Except as provided in Article 5.2.6.3., this Subsection applies to HVAC pumping systems with a total pump system motor nameplate power of 7.5 kW or greater determined in accordance with Sentence (2).

2) For the purposes of this Subsection, the total pump system motor nameplate power shall be the sum of the nameplate power of all pumps required to operate at design conditions to supply thermal energy to an HVAC system, equipment or appliance, or to a conditioned space.

5.2.6.2. **Variable-Flow Pumping Systems**

1) Except as provided in Sentence (2), HVAC pumping systems that serve control valves designed to modulate or to open and close in steps as a function of load shall be

a) designed for variable fluid flow, and

b) capable of reducing system flow to 50% or less of design flow. (See Note A-5.2.6.2.(1).)

2) Sentence (1) does not apply to systems

a) in which a minimum flow greater than 50% of the design flow is required for the proper operation of primary equipment serving the system, such as chillers and boilers.



NECB-2015

5.2.2.5. Duct and Plenum Insulation

2) The insulation thickness used to determine compliance with Table 5.2.2.5. shall be the thickness of the insulation after installation.

■8) Manufactured insulation thickness shall not be altered.

5.2.5.3. Piping Insulation

8) The insulation thickness used to determine compliance with Table 5.2.5.3. shall be the thickness of the insulation after installation.



NECB-2015 clarifies this...





The not-so-fine print

Installed R-values

	Labe Thicl	led kness	Installed "R"**		Out-of-Packag	je "R"	
Туре	in	mm	(hr•ft²•°F)/Btu m²•°C/W		(hr•ft²•°F)/Btu	m ² •°C/W	
Type 75 - 0.75 pcf (12kg/m ³)							
75	11⁄2	38	4.2	0.74	5.2	0.92	
	2	51	5.6	0.99	6.9	1.22	
	2 <i>1</i> ∕₅	56	6.0	1.08	7.5	1.33	
	3	76	8.3	1.46	10.3	1.81	
Type 100 - 1.00 pcf (16kg/m ³)							
100	11⁄2	38	4.5	0.79	5.6	0.99	
	2	51	6.0	1.06	7.4	1.30	
Type 150 - 1.5 pcf (24kg/m ³)							
150	11⁄2	38	4.7	0.83	6.0	1.06	
	2	51	6.3	1.11	8.0	1.41	

**Installed R-value calculated with a material thickness compressed to a maximum of 25% following recommended duct wrap stretch-outs.



Full thickness all around...



Equivalent R-values

Rigid Board Insulation (2.25 pcf) – assume k-factor 0.23
R-value <u>per inch</u> is 4.35.

Duct Wrap – Installed Equivalent R-value

Buy 0.75 pcf 1 1/2":
Installed thickness 1 1/8"
Installed R-value 4.2
Buy 1.00 pcf 1 ½":
Installed thickness 1 1/8"
Installed R-value 4.5
Buy 1.50 pcf 1 ½":
Installed thickness 1 1/8"
Installed R-value 4.5



What is showing up in specifications

□Flexible or blanket insulation is not acceptable.

Image: A Minimum insulation thickness and insulating values shall be in accordance with National Energy Code for Buildings of Canada 2015 or as per the schedule in this Section, whichever is most stringent.

Prequalification

□NECB-2015 Table 5.2.2.5 "Insulation of Ducts"

□Ball valve stem extensions.



Federal/Provincial Code Harmonization (NRCan Reference)

- The Canadian industry is welcoming harmonized building codes in an effort to make doing business across the country easier.
- Canadian Building and Trades Union (CBTU) advocating for code harmonization and labour mobility.



Provincial/Territorial Energy Code References

ASHRAE 90.1-2010

BC & ON

□NECB-2015

□NS

□NECB-2011

AB & MB



What's wrong with this picture?





What's wrong with this picture?



















Unqualified contractor!





Unqualified contractor!





What to do?

Specifications

Prequalify contractors.

Recognized trade school certification.

□Apprenticeship program.

Supervision

Red Seal

BCICA "QAP".



What's in the pipeline...

□Net-zero energy:

An energy-efficient building where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy.

□Zero carbon:

A highly energy efficient building that produces on-site, or procures enough carbon-free renewable energy to meet building operations energy consumption annually.



We're bringing other topics to the table:

- Legionella
- Personnel protection
- Corrosion
- Mould growth
- Wasting water
- Building operating costs
- O&M involvement



The Money Machine for 2019

- Trade Associations 12 memberships
- □Trade Shows 5
- □Lunch and Learn Presentations 4
- Meetings & Networking Events 26
- □Articles 5
- Federal & Provincial Energy Codes 2



Thank you

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