

1. Which one of the following buildings is, until 2017, required to be designed to conform to Supplementary Standard SB-10?
    - a) A 600 m<sup>2</sup> building area mushroom growing facility;
    - b) A 50 m<sup>2</sup> building area retail store;
    - c) A 500 m<sup>2</sup> building area luxury bungalow;
    - d) A 50 m<sup>2</sup> building area metal foundry.
- 

2. Which one of the following is NOT an allowed OBC Part 9 occupancy?
    - a) *Mercantile occupancy*;
    - b) *Care occupancy*;
    - c) *Residential occupancy*;
    - d) *Medium hazard industrial occupancy*.
- 

3. Which exact edition of the NRCan “Energide for New Houses” is applicable if compliance with Clause 12.2.1.1.(3)(a) is selected?
    - a) Current edition;
    - b) First edition;
    - c) 2004 edition;
    - d) 2005 edition.
- 

4. Describe the search process for finding the OBC applicable edition of CAN/ULC- S112, “Fire Test of Fire-Damper Assemblies”?

Answer: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

OBC Reference: \_\_\_\_\_

**STOP**

**Residential occupancy** means an occupancy in which sleeping accommodation is provided to residents who are not harboured for the purpose of receiving special care or treatment and are not involuntarily detained.

**Return duct** means a duct for conveying air from a space being heated, ventilated or air-conditioned back to the heating, ventilating or *air-conditioning appliance*.

**Self-service storage building** means a *building* that is used to provide individual storage spaces to the public and that is open to the public only for those purposes.

**Service room** means a room provided in a *building* to contain equipment associated with *building services*.

**Service space** means space provided in a *building* to facilitate or conceal the installation of building service facilities such as chutes, ducts, pipes, shafts or wires.

**Space heater** means a *space-heating appliance* for heating the room or space within which it is located, without the use of ducts.

**Space-heating appliance** means an *appliance*,

- a) that is intended to supply heat directly to a room or space, such as a *space heater*, fireplace and *unit heater*, or
- b) that is intended to supply heat to rooms or spaces of a *building* through a heating system such as a central *furnace* or *boiler*.

**Storey** means that portion of a *building* which is situated between the top of any floor and the top of the floor next above it, and if there is no floor above it, that portion between the top of such floor and the ceiling above it.

**Stove** means an *appliance* intended for cooking or space heating or both.

**EXAMPLE QUESTION**

What is the 2.5% January outside design condition temperature for a building located in Alliston Ontario?

- a) -23°C;
- b) -26°C;
- c) -25°C;
- d) 29°C.

**TABLE 2-2**

Location	Design Temperature				Degree Days Below 18°C
	January		July 2.5 %		
	2.5 %, °C	1 %, °C	Dry, °C	Wet, °C	
Ailsa Craig	-17	-19	30	23	4 000
Ajax	-20	-22	30	23	4 000
Alexandria	-24	-26	30	23	4 600
<b>Alliston</b>	<b>-23</b>	<b>-25</b>	<b>29</b>	<b>23</b>	<b>4 400</b>
Almonte	-26	-28	30	23	4 850
Column 1	2	3	4	5	6

**Exercise #2-1**

For each of the following questions review the presented text and use the applicable OBC references to select the correct answer using the multiple-choice method.

1. What is the value for Degree Days Below 18 °C for Beaverton, Ontario?
  - a) 4 300;
  - b) 5 400;
  - c) 950;
  - d) 4 100.

2. What is the minimum indoor air temperature required for movie theatres?
    - a) 22 °C;
    - b) 20 °C;
    - c) 18 °C;
    - d) To good engineering practice.
- 
3. What edition of the ASHRAE HVAC Systems and Equipment is applicable for conformance to the 2012 OBC?
    - a) 2004;
    - b) 2010;
    - c) 2006;
    - d) 2012.
- 

## STOP

### INSTALLATION STANDARDS – ALL BUILDINGS

Installation standards are described in Article 6.2.1.4.

#### Earth Energy Systems

The design and installation of earth energy systems, where such systems use groundwater, submerged heat exchangers or ground heat exchangers, are to conform to CAN/CSA-C448.2, "Design and Installation of Earth Energy Systems for Residential and Other Small Buildings" when the system serves:

- single *dwelling units*, or
- *buildings where the conditioned space* is not more than 1 400 m<sup>2</sup>.

Where the heated floor space area is more than 1 400 m<sup>2</sup>, the design and installation of earth energy systems (such as ground and water source heat pumps) is to conform to CAN/CSA-C448.1, "Design and Installation of Earth Energy Systems for Commercial and Institutional Buildings".

#### Solid Fuel-Burning Appliances

The design and installation of all solid fuel-burning *appliances* is to conform to:

- CAN/CSA-B365, “Installation Code for Solid Fuel-Burning Appliances and Equipment” and,
- the manufacturer’s installation instructions.

Solid fuel-burning appliances for central heating systems must also conform to CAN/CSA-B366.1, “Solid Fuel-Fired Central Heating Appliances”.

### Hydronic Heating Systems

Sentence 6.2.1.4.(6) states that the design and installation of hydronic heating systems shall conform to CAN/CSA-B214, “Installation Code for Hydronic Heating Systems”, or other good engineering practice.

### Fireplaces – All Buildings

Fireplaces are to conform to the requirements of OBC Section 9.22. Fireplaces.

### Heat Recovery Ventilators – All Buildings

Heat recovery ventilators with rated capacities of not less than 25 L/s and not more than 200 L/s are to be installed in accordance with Article 9.32.3.11. with the following exception:

Where *electric space heating*, other than forced-air electric heating system, is provided in *buildings of residential occupancy* (within the scope of Part 9), the mechanical ventilation system must include heat recovery ventilators designed to provide a heat recovery efficiency the greater of:

- the minimum rated efficiency required by the *Green Energy Act, 2009*, or
- a minimum 55% sensible heat recovery efficiency when tested to the low temperature thermal and ventilation performance test method set out in CAN/CSA-C439, “Test for Rating the Performance of Heat/Energy- Recovery Ventilators”, at a Station 1 test temperature of  $-25^{\circ}\text{C}$  at an air flow not less than 30 L/s.

Where a heat recovery ventilator is installed to conform to OBC 9.32.3 Mechanical Ventilation (self-contained system serving one *dwelling unit* – see Module 6), it is required to have a minimum 55% sensible heat recovery efficiency when tested to the conditions described above.

Heat recovery ventilators with rated capacities equal to or greater than 200 L/s are to be installed in accordance with good engineering practice.

**STOP**

**EXAMPLE QUESTION**

Which of the following earth energy systems must conform to CAN/CSA-C448.1, "Design and Installation of Earth Energy Systems for Commercial and Institutional Buildings"?

- a) A school with a floor area of 1200 m<sup>2</sup>;
  - b) Single family residence, 400 m<sup>2</sup>;
  - c) Office building with a floor area of 1800 m<sup>2</sup>;
  - d) Strip mall, 13 tenants, 100 m<sup>2</sup> heated floor area each.
- 

**Exercise #2-2**

For each of the following questions review the presented text and use the applicable OBC references to select the correct answer using the multiple-choice method.

1. The installation of solid fuel-burning appliances for central heating systems is specifically required to comply with CAN/CSA-B365 and which of the following?
    - a) Good engineering practice;
    - b) Part 9 OBC;
    - c) The manufacturer's installation instructions;
    - d) CAN/CSA-B214.

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  2. Fireplaces are to conform to?:
    - a) CAN/CSA-B365;
    - b) OBC Section 9.22;
    - c) OBC Part 11;
    - d) Minimum 55% sensible heat recovery efficiency.
-

3. In which of the following *buildings* may a 50 L/s heat recovery ventilator be subject to the minimum rated efficiency required by the *Green Energy Act*?
    - a) Single-family home, electric baseboard heating;
    - b) Single-family home, forced-air electric heating;
    - c) Dentist office, under 600 m<sup>2</sup> area, baseboard electric heating;
    - d) Single family home, forced air gas heating.
- 
4. To which of the following requirements would a residence equipped with a wood furnace for central heating conform?
    - a) CAN/CSA-B365;
    - b) CAN/CSA-B366.1;
    - c) CAN/CSA-B365 and CAN/CSA-B366.1;
    - d) CSA-364

**STOP**

**INSTALLATION – ALL BUILDINGS**

**GENERAL REQUIREMENTS**

Article 6.2.1.8. requires that equipment requiring periodic maintenance and forming part of a heating, ventilating or *air-conditioning* system is to be installed with provision for access for inspection, maintenance, repair and cleaning.

Mechanical equipment must be protected with *guards* to prevent injury to persons.

Equipment forming part of a heating or *air-conditioning* system that may be adversely affected by freezing temperatures is to be protected from freezing.

**EXPANSION, CONTRACTION AND SYSTEM PRESSURE**

Heating and cooling systems are to be designed to allow for expansion and contraction of heat transfer fluid and to maintain system pressure within the rated working pressure limits of all components of the system.

1. What characteristic of asbestos prevents its use in locations where it could enter the air supply or return system?
  - a) Combustibility;
  - b) Air transportable fibres;
  - c) Brittleness;
  - d) Low strength.

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2. Heating, ventilating or *air-conditioning* equipment requiring periodic maintenance is to be provided with which one of the following?
  - a) Internal lighting;
  - b) Lockable doors;
  - c) Access;
  - d) Easily cleaned components.

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3. Which of the following diameters of *noncombustible* tubing for pneumatic controls may be used in buildings required to be of *noncombustible construction*?
  - a) 10 mm;
  - b) 100 mm;
  - c) 11 mm;
  - d) all diameters.

## STOP

### REQUIRED VENTILATION – ALL BUILDINGS

Subsection 6.2.2. deals with ventilation in general. Generally, all *buildings* are to be ventilated. The rates at which outdoor air is supplied to *buildings* by ventilation systems are to be not less than the rates required by ASHRAE Standard 62.1, "Ventilation for Acceptable Indoor Air Quality", except for *storage garages* and *repair garages*, which have separate requirements.

Self-contained mechanical ventilation systems, that serve only one *dwelling unit*, are considered to satisfy the OBC for required



**Exercise #2-4**

For each of the following questions review the presented text and use the applicable OBC references to select the correct answer using the multiple-choice method.

1. Which of the following rooms and spaces are NOT required to conform to the outdoor air rates published by ASHRAE Standard 62.1?
    - a) Apartments with central washroom exhaust;
    - b) Department store less than 600 m<sup>2</sup> area;
    - c) A self-contained hotel *suite*;
    - d) Vehicle *repair garage* greater than 600 m<sup>2</sup> area.
- 

2. Which of the following buildings can be ventilated by natural ventilation alone?
    - a) A house of 160 m<sup>2</sup> area, *occupant load* of 4 persons;
    - b) A warehouse of 1600 m<sup>2</sup> area *occupant load* of 4 persons;
    - c) An artist's apartment containing large openable windows in the building envelope;
    - d) A self-contained *dwelling unit*.
- 

**STOP**

The OBC provides exclusions for *buildings* (9.36.2.1.) used as seasonal recreational *buildings*, in particular to this module, thermal insulation, vapour barrier and air-barrier construction need not be provided. However, where any of these are provided in the *building*, they are to comply with the full requirements of Part 9 OBC.

This module does not apply to insulation and sealing of heating and ventilating ducts.

### **Low Permeance Sheathing – Water Vapour & Air**

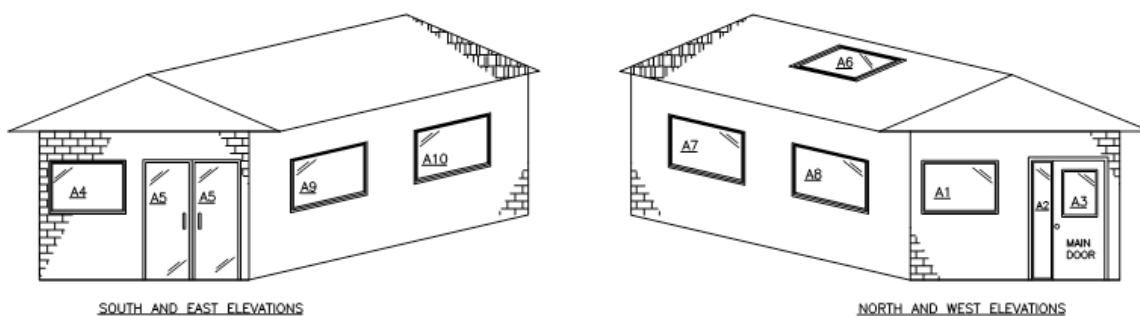
As per Article 9.25.5.1., any sheet or panel type material with an air leakage characteristic less than  $0.1 \text{ L}/(\text{s} \cdot \text{m}^2)$  at 75 Pa and water vapour permeance less than  $60 \text{ ng}/(\text{Pa} \cdot \text{s} \cdot \text{m}^2)$  can be considered "low-permeance" against the passage of water vapour and air. The use of the material must be intended where the interior space will not result in high moisture generation. As per Article 9.25.5.2. the position of these low permeance materials incorporated in a *building* assembly design to meet the minimum insulation value required by the OBC, it is to be installed

- on the warm face of the assembly, thereby preventing condensation of water vapour in the assembly,
- at a location where the ratio between the total thermal resistance of all materials outboard of its innermost low permeance surface and the total thermal resistance of all materials inboard of that surface is not less than required in Table 9.25.5.2., (the ratio ensures that the low permeance surface is close enough to the warm face of the assembly to prevent condensation of water vapour in the assembly), or
- outboard of an air space that is vented to the outdoors and, for walls, drained. Any condensation will be drained out of the wall assembly. The air space must be a minimum of 10 mm deep behind the cladding, over the full height and width of the wall.

See Figure 5-1.

Glazing in main entrance doors and adjacent sidelights need not be calculated in the gross area above.

In Figure 5-3, the gross areas of A1, A4, A5, A6, A7, A8, A9 and A10 would be used. Areas A2, A3, as a main entrance door, would be not be used. The peripheral wall area would include all of the exposing area of the north and south elevations, along with the east and west elevations, not including the roof area.



**FIGURE 5-3**

Where a house has a sloping grade, the exposed portion of the walls must have the required insulation values. For example, a house with a basement must follow the required insulation RSI values for any portion of an exterior wall that separates indoor from outdoor spaces.

- The basement wall containing the door opening, and
- Any basement wall that has an exposed wall area above the ground level exceeding 50% of that basement wall area.

Where an enclosed unheated space is separated from a heated space by glazing, the unheated enclosure may be considered to provide a thermal resistance of RSI 0.16

RSI-Values listed in the Tables are minimum values for the thermal insulation component only and are expressed in  $(m^2.K)/W$ . U-Values are the overall coefficient of heat transfer expressed in  $W/(m^2.K)$  and are specified in Articles 2.1.1.2., 2.1.1.3. and 2.1.1.10.

### Thermal Performance Reduction

SB-12 addresses the thermal performance of above grade walls, windows or basement walls when specific compliance packages are utilized to achieve the energy efficiency of the building. Where the thermal performance of these building components is reduced, only one of those building components is permitted to be reduced.

## VAPOUR BARRIERS

### Required Barrier to Vapour Diffusion

As per Article 9.25.4.1., thermally insulated wall, ceiling and floor assemblies are to be constructed with a vapour barrier sufficient to prevent condensation in wall spaces, floor spaces, and *attic or roof spaces*.

### Vapour Barrier Materials

Article 9.25.4.2. states the required properties of vapour barrier materials. The basic requirement is that *vapour barriers* are to have a permeance not greater than  $60 \text{ ng}/(\text{Pa} \cdot \text{s} \cdot \text{m}^2)$ , measured in accordance with ASTM E96/E96M, "Water Vapor Transmission of Materials"

Where the intended use of the interior space will result in high moisture generation, the assembly must be designed under Part 5.

### Polyethylene

Where polyethylene is installed as a high resistance *vapour barrier* it is to conform to CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet for Use in Building Construction".

### Other Than Polyethylene

Membrane-type *vapour barriers* other than polyethylene are to conform to CAN/CSA-51.33-M, "Vapour Barrier, Sheet, and Excluding Polyethylene, for Use in Building Construction".

### Coatings

Where a coating is applied to gypsum board to function as the *vapour barrier*, the permeance of the coating is to be determined in accordance with CAN/CGSB-1.501-M, "Method for Permeance of Coated Wallboard".

### Insulations

Where insulation functions as the vapour barrier, the the insulation must be sufficiently thick so as to meet the requirement Sentence 9.25.4.2.(1), which is to have a permeance not greater than  $60 \text{ ng}/(\text{Pa} \cdot \text{s} \cdot \text{m}^2)$ , measured in accordance with ASTM E96/E96M, "Water Vapor Transmission of Materials"

than the values listed in Table 9.32.3.10.A. and provided with a vapour barrier.

**Table 9.32.3.10.A**  
**Insulation of Ducts Carrying Outdoor Air**  
**Forming Part of Sentence 9.32.3.10.(4)**

Outside Winter Design Temperature as per Supplementary Standard SB-1 <sup>(1)</sup> , °C	Minimum Thermal Resistance, RSI
-7 to -11	0.5
-12 to -17	0.9
-18 to -24	1.2
-25 to -29	1.4
-30 to -34	1.8
-35 and colder	2.1
Column 1	2

**Note to Table 9.32.3.10.A:**

<sup>(1)</sup> The outside winter design temperatures are to be those listed for the January 2.5 per cent values.

**Kitchen Duct Arrangement and Accessories**

A kitchen *exhaust duct* not equipped with a filter at the inlet end is to be designed and installed so that the entire duct can be cleaned.

Ductwork for cooking appliance exhaust fans are to be equipped with a grease filter at the intake.

Ductwork for cooking appliance exhaust fans is to be of *noncombustible*, corrosion-resistant material and is to lead directly to the outdoors without connection to other exhaust fans or ducts.

**Duct Support and Sealing**

All ductwork is to be permanently supported or clipped to prevent sagging, excessive movement and vibration.

All ducting connected to supply and exhaust fans is to be constructed so as to inhibit air leakage at joints.

**Rectangular Duct**

Where rectangular duct is used in place of round duct, it is to be selected according to Table 9.32.3.10.B.



## INTRODUCTION

This module covers design and installation requirements for HVAC systems in OBC Part 9 *buildings*. Particular focus is given to the concepts of indoor and outdoor design temperatures and to carbon monoxide alarm requirements.

## OBJECTIVES

Upon completion of this module, participants will:

- Determine various design and installation requirements;
- Know and understand the standards for solid fuel burning appliances;
- Communicate the concept of required heating systems;
- State the requirements for indoor design temperatures;
- Determine information in outdoor design temperatures tables;
- Know and understand the OBC requirements dealing with carbon monoxide.

## STOP

## HEATING AND AIR-CONDITIONING

### Design and Installation Requirements

The design and installation of central heating systems including requirements for combustion air, are to conform to the requirements in both Part 6 OBC and to Section 9.33. Heating and Air-Conditioning.

If you read Sentence 9.33.1.1.(2) you will see that the design and installation of *air-conditioning* systems are to conform to Part 6 OBC only. This is the only requirement in Section 9.33. that addresses air-conditioning.

Repairs or component replacements that change the capacity or extent of safety of an existing heating, ventilating or *air-conditioning* system and that alter the method of operation are to conform to the OBC as per Sentence 9.33.1.1.(3).

### Solid Fuel-Burning Appliances

The design and installation of solid-fuel burning *stoves*, *cooktops* and *space heaters*, including the requirements for combustion air, are to conform to CAN/CSA-B365, "Installation Code for Solid-Fuel Burning Appliances and Equipment".

Solid fuel-burning *stoves, furnaces* and hydronic heating systems designed to burn solid fuels, other than coal, shall conform to the particulate emission limits of,

- a) CSA B415.1, "Performance Testing of Solid-Fuel-Burning Heating Appliances", or
- b) the "Standards of Performance for New Residential Wood Heaters", set out in Subpart AAA of Part 60 of Title 40 of the Code of Federal Regulations, published by the United States Environmental Protection Agency, as it read on November 1, 2013.

### Structural Movement

Just as water heaters are required to be secured to the structure to resist overturning or displacement in an earthquake, the same is required for heating and air-conditioning equipment that has fuel or power connections. Sentence 9.33.1.3.(1) requires that heating and air-conditioning equipment be secured for locations where the spectral response acceleration,  $S_a(0.2)$ , is greater than 0.55. This value can be determined from Supplementary Standard SB-1 (discussed below under Outdoor Design Temperature).

### Required Heating Systems – Residential

Residential *buildings* intended for use in the winter months on a continuing basis are to be equipped with heating facilities conforming to Section 9.33 Heating and Air-Conditioning.

### Equipment Sizing

The heating system capacity must be based on the heating load calculated in accordance with Sentence 6.2.1.1.(1). Where a cooling system is installed it must have its capacity based on the cooling load calculated to Sentence 6.2.1.1.(1) and Sentence 9.33.2.2.(3). The heating and cooling capacities must be determined in accordance with the requirements of CAN/CSA-F280, "Determining the Required Capacity of Residential Space Heating and Cooling Appliances".

### INDOOR DESIGN TEMPERATURES

At the outside design temperature, required heating facilities are to be capable of maintaining an indoor air temperature of not less than

- 22°C in all living spaces,
- 22°C in unfinished *basements*, and
- 15°C in heated crawl spaces.

The OBC provides exclusions in Article 9.36.2.1. for cottages, which are *buildings* used or intended to be used as seasonal recreational *buildings*. With respect to heating and air-conditioning, where these systems are provided they do not need to meet the minimum indoor design temperatures of Article 9.33.3.1. It is important to note however, that where heating and/or air-conditioning systems are provided in a cottage, they are to otherwise comply with the full requirements of Part 9 OBC unless specifically exempted. For example, a woodstove installed in a cottage will be required to conform to CAN/CSA-B365, "Installation Code for Solid-Fuel-Burning Appliances and Equipment".

### **OUTDOOR DESIGN TEMPERATURES**

The outdoor conditions to be used in designing heating, ventilating and *air-conditioning* systems are to be the appropriate values for the location as set out in MMAH Supplementary Standard SB-1, "Climatic and Seismic Data", using 2.5 per cent design temperature criteria.

An example page from Supplementary Standard SB-1 is given.



- 
3. Which one of the following solid-fuel burning devices does NOT required conformance to the CAN/CSA-B365, "Installation Code for Solid-Fuel Burning Appliances and Equipment"?
- a) *Cooktop;*
  - b) *Masonry fireplace;*
  - c) *Stove;*
  - d) *Space heater.*
- 
4. Would a gas-fired furnace in a house in Ottawa be required to be secured to the structure?
- a) Yes, because the  $S_a$  is greater than 0.55;
  - b) Yes, because the  $S_a$  is less than 0.55;
  - c) No, because the  $S_a$  is greater than 0.55;
  - d) No, because the  $S_a$  is less than 0.55.
- 
5. What is the heating degree day value for Campbellford, Ontario?
- a) 4 550;
  - b) 4 150;
  - c) 4 280;
  - d) 850.
- 

## STOP

### CARBON MONOXIDE ALARMS

The OBC requirements for carbon monoxide alarms apply to every *building* that contains a *residential occupancy* and contains a *fuel-burning appliance* or a *storage garage*. The requirements for carbon monoxide alarms are in Subsection 9.33.4.

#### Location of Carbon Monoxide Alarms

Where a *fuel-burning appliance* is installed in a *suite of residential occupancy (such as a house or an apartment)*, a carbon monoxide alarm is to be installed adjacent to each sleeping area in the *suite*.

However, *construction* in respect of a *hotel*, a Group B, Division 3 occupancy or a retirement home regulated under the *Retirement Homes Act, 2010* that is a Group C occupancy may be carried out as a basic renovation only if the *construction* will be in conformance with the Fire Code made under the *Fire Protection and Prevention Act, 1997*.

### **Extensive Renovation**

Extensive renovation is where existing interior walls or ceilings or floor assemblies or roof assemblies are substantially removed in an existing *building* and new interior walls, ceilings, or floor assemblies are installed in the *building*. Structural and fire-resistance elements are then to be constructed in compliance with the requirements of the other Parts of the Code.

### **COMPLIANCE ALTERNATIVES**

A *compliance alternative* shown in Tables 11.5.1.1.A., 11.5.1.1.B., 11.5.1.1.C., 11.5.1.1.D/E. or 11.5.1.1.F. may be substituted for a requirement contained in Part 3, 4, 5, 6, 7 or 8 of the OBC where the *chief building official* is satisfied that compliance with the requirement is impracticable because

- of structural or *construction* difficulties, or
- it is detrimental to the preservation of a *heritage building*.

The letter designation of these tables matches with the occupancy classifications. For this course HVAC – HOUSE, you should take a look at Table 11.5.1.1.C. since this applies to residential occupancies.

Of most interest to this course, Compliance Alternatives in any of the tables A through F, may be substituted for a requirement contained in Part 9 OBC *without* satisfying the *chief building official* that compliance with the requirement is impracticable.

### **STOP**

### Exercise #8-3

For each of the following questions review the presented text and use the applicable OBC references to select the correct answer using the multiple choice method.

The OBC text for 9.33.1.2. forming part of the requirements of Section 9.33., reads as follows:

#### 9.33.1.2. Solid Fuel-Burning Appliances

**(1)** The design, construction and installation, including the provision of combustible air, of solid-fuel burning appliances and equipment, including *stoves*, *cooktops* and *space heaters*, shall conform to CAN/CSA-B365-, "Installation Code for Solid-Fuel Burning Appliances and Equipment"

**(2)** Solid fuel-burning *stoves*, *furnaces* and hydronic heating systems designed to burn solid fuels, other than coal, shall conform to the particulate emission limits of,

(a) CSA B415.1, "Performance Testing of Solid-Fuel-Burning Heating Appliances", or

(b) the "Standards of Performance for New Residential Wood Heaters", set out in Subpart AAA of Part 60 of Title 40 of the Code of Federal Regulations, published by the United States Environmental Protection Agency, as it read on November 1, 2013

*Compliance Alternative C196* in Table 11.5.1.1.C. lists the following alternative:

Sound, used or antique *appliances* are acceptable, provided that:

(a) visual examination shows no excessive weakening by corrosion or other damage,

(b) no structural parts are missing,

(c) no cracks are present in the components intended to support the *appliance* or enclose the fire, and

(d) loading and ash removal door latches and hinges hold the door closed.