INTRODUCTION

In this module the requirements for energy efficiency in buildings is examined with particular attention to the Supplementary Standard to the OBC, SB-10, Energy Efficiency Requirements.

OBJECTIVES

Upon completion of this module participants will be able to:

- Determine which *building* uses are covered;
- Understand the impact of SB-10.

STOP

ENERGY EFFICIENCY BEFORE JANUARY 1, 2017

Applies to the design and construction of buildings for which a permit has been applied for before January 1, 2017.

As per Article 12.2.1.1. of the Building Code, the energy efficiency of all *buildings* shall conform to

- Division 1 and 2 or 4 of MMAH Supplementary Standard SB-10, "Energy Efficiency Requirements".

Except for:

- *buildings* of *residential occupancy* within the scope of Part 9,
- farm buildings,
- a building that does not use electrical power or fossil fuel,
- *buildings* intended primarily for processing such as manufacturing, commercial, or industrial, and
- a seasonal recreational building

A test to determine which building rooms and spaces are covered by the requirements of 12.2.1.1. is human comfort. Buildings and rooms and spaces that have building services with a primary purpose of providing human comfort in the room and space are covered by the Building Code Article 9.1.1.9. and Sections 9.36 and 9.38.

ENERGY EFFICIENCY AFTER DECEMBER 31, 2016

Article 12.2.1.2. applies to the design and construction of buildings for which a permit has been applied after December 31, 2016.

As per Article 12.2.1.2. of the Building Code, the energy efficiency of all *buildings* shall;

- be designed to exceed by not less than 13% the energy efficiency levels required by Sentence 12.2.1.1.(2), or
- conform to Division 1 and Division 3 or 5 of MMAH Supplementary Standard SB-10, "Energy Efficiency Requirements".

STOP

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 or search and record method.

1. The energy efficiency of all buildings must comply with;
   a) Division 1 and 2 of MMAH SB-10
   b) Division 1 and 2 or 4 of MMAH SB-12
   c) Division 1 and 2 or 4 of MMAH SB-10
   d) Division 4 of MMAH SB-10

OBC Reference: _____

2. Which building is exempt from the requirements of MMAH SB-10?
   a) Solar Powered Building
   b) Building of mixed use of office and residential not within the scope of Part 9
   c) An office building
   d) Residential building not within the scope of Part 9

OBC Reference: _____

STOP

ENERGY EFFICIENCY DESIGN – SUPPLEMENTARY STANDARD SB-10

Division 2 – Chapter 1

Article 1.1.2.1. of Division 2, Chapter 1 of Supplementary Standard SB-10 requires the energy efficiency of all buildings to be designed to meet of the following requirements;

- Exceed by not less than 25% the energy efficiency levels attained by conforming to the 1997 MNECB,

- Exceed by not less than 5% the energy efficiency levels attained by conforming to ANSI/ASHRAE/IES 90.1 (this option cannot be used if the building is using electric space heating; however the requirements of this option may be met by conforming to the corresponding requirements of Chapter 2 of Division 2, SB-10)
- Achieve the energy efficiency levels attained by conforming to ANSI/ASHRAE/IES 90.1 and Chapter 2, or
- Achieve the energy efficiency levels attained by conforming to the 2011 NECB and Chapter 3

Division 2 outlines the modification mentioned above. These modifications enhance the building envelope provisions of ANSI/ ASHRAE/IES 90.1 – 2010, "Energy Standard for Buildings Except Low-Rise Residential Buildings" and enables the use of Canadian testing procedures for HVAC and service water equipment.

Carbon Dioxide Equivalents and Peak Electric Demand

In accordance with Articles 1.1.2.2 and 1.1.2.3., the carbon dioxide equivalents and peak electric demand, respectively, of a building required to comply with Article 1.1.2.1. must not exceed the level established by;

- Sections 5 to 10 of ANSI/ASHRAE/IES 90.1 and Chapter 2, or
- Parts 1 to 7 of the 2011 NECB and Chapter 3.

Application of ANSI/ASHRAE/IES 90.1, 1997 MNECB and 2011 NECB

Certain buildings are exempted from the application of ANSI/ ASHRAE/IES 90.1, 1997 MNECB and 2011 NECB, carbon dioxide equivalents and peak electric demand;

- A building or part of a building of residential occupancy that is within the scope of Part 9 of Division B of the Building Code,
- A heritage building,
- Structures such as construction trailers, tents and air-supported structures,
- A building or part of a building where the environmental condition within the building is governed by the process operation of the building or permanent openings to the outdoors or to unconditioned environments,
- A building or part of a building where it can be shown that meeting the requirements of Article 1.1.2.1. does not conserve any energy,

- Equipment or processes that use energy for manufacturing, industrial and commercial purposes, and
- Buildings containing occupancies listed in Table 1.2.1.1.

In addition, the following buildings or parts of buildings need not to comply with the envelope requirements;

- Any building space which uses energy for space conditioning at a rate less than 12 W/m² under peak conditions,
- Warehouses and storage rooms where the design indoor temperature does not exceed 10°C,
- Except conditioned spaces of buildings exposed to unheated storage garages and unheated storage rooms, unheated storage garages and unheated storage rooms, and
- Where a part of a single enclosed space is heated.

Chapter 2 and Chapter 3

Chapter 2 contains additional requirements and changes to ANSI/ASHRAE/IES 90.1 and applies where compliance with energy efficiency requirements is achieved in accordance with Claus 1.1.2.1.(1)(c). Where compliance with energy efficiency requirements is achieved in accordance with Clause 1.1.2.1.(1)(b) energy efficiency of the building or part of the building is permitted to conform to the respective requirements of Chapter 2 in lieu of the corresponding requirements in ANSI/ASHRAE/IES 90.1.

STOP

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 or search and record method.

1. Summarize the intent or purpose of Division 2 of SB-10.

Answer: _____

_____

_____

OBC Reference: _____

2. Read through Section 1.2 of Division 2 of SB-10 and summarize the exemption bases for certain buildings.

Answer: _____

_____

_____

OBC Reference: _____

3. Which one of the following arrangements and conditions describe a building envelope that is required to conform to OBC 12.2.1.1. and Standard 90.1 if the permit is applied in 2014?

   a) Peak energy rate 32 W/m², building area of 1000 m², chicken hatchery;

   b) Peak energy rate 10 W/m², building area of 1000 m², office;

   c) Peak energy rate 10 W/m², building area of 1000 m², warehouse, indoor design temp 10°C;

   d) Peak energy rate 15 W/m², building area of 10 m², retail shop.

Answer: _____

_____

_____

OBC Reference: _____

STOP

SB-10 ENERGY EFFICIENCY REQUIRMENTS - CONTENT

The supplementary standard contains 5 Divisions, as follows:

- Division 1 addresses general requirements
- Division 2 applies to construction for which a permit has been applied for before January 1, 2017
- Division 3 applies to construction for which a permit has been applied for after December 31, 2016
- Division 2 and 3 also describe limitations on peak electric demand and annual carbon dioxide emissions

- Division 4 contains simplified energy efficiency requirements for the construction of certain non-residential buildings with the scope of Part 9 of OBC for which a permit has been applied for before January 1, 2017
- Division 5 contains simplified energy efficiency requirements for the construction of certain non-residential buildings within the scope of Part 9 of the OBC for which a permit has been applied for after December 31, 2016

The following is a summary of the information contained in the Divisions of SB-10.

DIVISION 1:

General

Section 1.1 General provides for the application of Supplementary Standard SB-10. SB-10 applies to the energy efficiency design and construction of buildings required to comply with Sentences 12.2.1.1.(2) and 12.2.1.2.(2) and Subsections 12.2.2. and 12.2.3. of Division B of the Building Code.

The energy efficiency of existing buildings shall comply with

- Part 10 of the Building Code with respect o change of use, or
- Part 11 of the Building Code for renovation

Other provisions in Division 1 include;

- Internal cross references
- Terms and abbreviations
- Referenced documents and organizations

The compliance paths for new and existing buildings are clarified. New buildings and additions to existing buildings are to comply with either Sections 5 to 10 or Section 11. Change of use of existing buildings is to comply with Part 10, while renovations to existing buildings are to comply with Part 11 of the OBC.

DIVISION 2 – CHAPTER 1

Energy Efficiency Design Before January 1, 2017
General

Chapter 1 of Division 2 provides for the energy efficiency design of buildings, carbon dioxide equivalents and peak electric demand.

This Division contains the exceptions for the application of ANSI/ASHRAE/IES 90.1, 1997 MNECB and 2011 NECB to certain types of buildings and their use.

DIVISION 2 – CHAPTER 2

Additional Requirements to ANSI/ASHRAE/IES 90.1
Changes and Additional Requirements

Chapter 2 of Division 2 contains additional requirements and changes to ANSI/ASHRAE/IES 90.1 and applies where compliance with energy efficiency requirements is achieved in accordance with Clause 1.1.2.1.(1)(c).

Where compliance with energy efficiency requirements is achieved in accordance with Clause 1.1.2.1.(1)(b), energy efficiency of the building or part of the building is permitted to conform to the respective requirements of Chapter 2 in lieu of the corresponding requirements in ANSI/ASHRAE/IES 90.1.

Chapter 2 of Division 2 contains the following Articles;

- 1.1.1.2. Section 4 "Administration and Compliance" of ANSI/ASHRAE/IES 90.1
- 1.1.1.3. Climatic Zones
- 1.1.1.4. Section 5 "Building Envelope" of ANSI/ASHRAE/IES 90.1
- 1.1.1.5. Heating Ventilation and Air Conditioning Equipment – Test Procedures
- 1.1.1.6. Service Water Heating Equipment – Test Procedures
- 1.1.1.7. Power, Lighting and Other Equipment
- 1.1.1.8. Energy Cost Method

DIVISION 2 – CHAPTER 3

Additional Requirements to the 2011 NECB Changes and Additional Requirements

The energy efficiency of the building is required to conform to Chapter 3 where compliance with energy efficiency requirements is achieved in accordance with Clause 1.1.2.1.(1)(d) of Chapter 1.

Division 2, Chapter 3 contains the following Articles

- 1.1.1.2. Division A, Part 1 "Compliance of the 2011 NECB
- 1.1.1.3. Division A, Part 2 "Objectives" and Part 3 "Functional Statements" of the 2011 NECB
- 1.1.1.4. Division B, "Acceptable Solutions" of the 2011 NECB
- 1.1.1.5. Division C, "Administrative Provisions" of the 2011 NECB
- 1.1.1.6. Enhancements to Division B, Part 3 "Building Envelope" of the 2011 NECB

STOP

DIVISION 3

Division 3 contains the requirements for the design and construction of buildings for which a permit has been applied for after December 31, 2016. The energy efficiency design of the buildings is required to meet one of the following two requirements;

- Be designed to exceed by not less than 13% the energy efficiency levels required by Sentence 12.2.1.1.(2)of Division B of the Building Code.
- Achieve the energy efficiency levels attained by conforming to ANSI/ASHRAE/IES Standard 90.1 – 2010

Division 3 outlines the modifications mentioned above. These modifications enhance the building envelope, mechanical equipment, lighting and heat recovery provisions of ANSI/ASHRAE/IES Standard 90.1 – 2010.

DIVISION 3 - CHAPTER 1

This chapter 1 contains the application, energy efficiency design requirements and exemptions to ANSI/ASHRAE/IES Standard 90.1 – 2010. It also contains climatic zones applicable to Ontario locations.

DIVISION 3 – CHAPTER 2

Additional Requirements to ANSI/ASHERAE/IES 90.1 Changes and Additional Requirements

The energy efficiency of the building must conform to this chapter where compliance with energy efficiency requirments is achieved in accordance with Clause 1.1.2.1.(1)(a) of Chapter 1.

Division 3, Chapter 2 contains the following Articles;

- 1.1.1.2. Section 4 "Administration and Compliance" of ANSI/ ASHRAE/IES Standard 90.1
- 1.1.1.3. Climatic Zones
- 1.1.1.4. Section 5 "Building Envelope" of ANSI/ASHRAE/IES Standard 90.1
- 1.1.1.5. Heating Ventilation and Air Conditioning Equipment – Test Procedure
- 1.1.1.6. HVAC and Service Water Heating Equipment – Minimum Equipment Efficiency
- 1.1.1.7. HVAC – Exhaust Air Energy Recovery
- 1.1.1.8. Service Water Heating Equipment – Test Procedures
- 1.1.1.9. Power, Lighting and Other Equipment
- 1.1.1.10. Lighting Power Allowance
- 1.1.1.11. Other Equipment
- 1.1.1.12. Energy Cost Method

DIVISION 4

Division 4 contains the requirements for the design and construction of buildings of non-residential occupancy within the scope of Part 9, for which a permit has been applied for before January 1, 2017.

Division 4 applies to the energy efficiency of buildings or parts of buildings where the building

- Is within the scope of Part 9 of Division B of the Building Code
- Does not contain a residential occupancy
- Does not use electric space heating, and
- Is intended for occupancy on a continuing basis during the winter months.

Where the ratio of the gross area of fenestration to the gross area of the exterior wall measured from grade to the top of the most upper ceiling exceeds 40% or the ratio of the gross skylight areas to gross ceiling area exceeds 5%, the building envelope shall comply with Article 1.1.2.1. of Chapter 1 of Division 2.

Buildings are exempt from compliance with this Division 4 where they meet the exemption described in Article 1.2.1.1. of Chapter 1 of Division 2.

Division 4 contains the following Articles;

- 1.1.1.2. Building Envelope Requirements
- 1.1.1.3. Air Infiltration
- 1.1.1.4. Heating, Ventilating and Air-Conditioning
- 1.1.1.5. Ducts, Plenums and Piping
- 1.1.1.6. Service Water Heating
- 1.1.1.7. Lighting
- 1.1.1.8. Interior Lighting
- 1.1.1.9. Interior Lighting Controls
- 1.1.1.10. Exterior Lighting
- 1.1.1.11. Exterior Lighting Controls
- 1.1.1.12. Electric Motors

DIVISION 5

Division 5 contains the requirements for the design and construction of buildings of non-residential occupancy within the scope of Part 9, for which a permit has been applied for after December 31, 2016.

Division 5 applies to the energy efficiency of buildings or parts of buildings where the building;

- Is within the scope of Part 9 of Division B of the Building Code
- Does not contain a residential occupancy
- Does not use electric space heating, and
- Is intended for occupancy on a continuing basis during the winter months.

Where the ratio of the gross area of fenestration to the gross area of the exterior wall measured from grade to the top of the most upper ceiling exceeds 40% or the ratio of the gross skylight areas to gross ceiling area exceeds 5%, the building envelope shall comply with Article 1.1.2.1. of Chapter 1 of Division 2.

Buildings are exempt from compliance with this Division 5 where they meet the exemption described in Article 1.2.1.1. of Chapter 1 of Division 2.

Division 5 contains the following Articles;

- 1.1.1.2. Building Envelope Requirements
- 1.1.1.3. Air Infiltration
- 1.1.1.4. Heating, Ventilating and Air-Conditioning
- 1.1.1.5. Ducts, Plenums and Piping
- 1.1.1.6. Service Water Heating
- 1.1.1.7. Lighting
- 1.1.1.8. Interior Lighting
- 1.1.1.9. Interior Lighting Controls
- 1.1.1.10. Exterior Lighting
- 1.1.1.11. Exterior Lighting Controls
- 1.1.1.12. Electric Motors

STOP

Exercise #2-3

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 or search and record method.

1. Unless otherwise specified in MMAH SB-10 the documents referenced in SB-10 include all amendments, revisions and supplements effective to;
   a) The latest edition
   b) May 18, 2011
   c) January 1, 2014
   d) As designated in Table 1.3.1.2.

OBC Reference: _____

2. The energy efficiency of existing buildings is;
   a) Exempt from compliance with MMAH SB-10
   b) Required to comply with MMAH SB-12
   c) Not required to comply with Part 11 of the Building Code
   d) Must comply with Part 10 or Part 11 where the building is within the scope of Part 3 of the Building Code
   e) Required to comply with Part 10 or Part 11 of the Building Code

OBC Reference: _____

3. The energy efficiency of residential buildings are exempt from compliance with ANSI/ASHRAE/IES 90.1, 1997 MNECB and 2011 NECB when;
   a) They are within the scope of Part 3 of the Building Code
   b) Their design conforms to Division 4 of MMAH SB-10
   c) Their design conforms to Division 1 and 2 or 4 of MMAH SB-10
   d) Their design conforms to Division 4 of MMAH SB-10

OBC Reference: _____

4. The air barrier materials are considered in compliance with Section 5.4.3.1.3. of ANSI/ASHRAE/IES 90.1 if the material;

   a) Meets the air barrier requirements of MMAH SB-12

   b) Complies with CAN/ULC – S741

   c) Has an air leakage not greater than 0.02 L/(s•m²)

   d) None of the above

OBC Reference: _____

5. A health club has a heated outdoor pool. Which one of the following initiatives, as per ANSI/ASHRAE/IES 90.1, will exempt the health club from providing a pool cover for the pool?

   a) Limit use to 60% of club operating hours

   b) Maintain a pool temperature of not greater than 60°F

   c) 60% of pool heating energy obtained from on-site heat recovery process

   d) No initiative required as lap pools are excluded

OBC Reference: _____

6. Where there is a conflict in the requirements between the 2011 NECB and the Building Code, which of the following prevails?

   a) The Building Code and Division 2

   b) The Building Code

   c) Division 2 and then the Building Code requirements

   d) Division 2

OBC Reference: _____

7. The energy efficiency of a 2 storey office building that is 500 m² in building area and heated with a forced air gas roof top unit must comply with which Division of MMAH?

   a) Division 1 and 2

   b) Division 3 and 4 when the ratio of fenestration of gross exterior wall exceeds 40%

   c) Division 5

   d) Division 4

OBC Reference: _____

More information regarding the methods of calculation can be found in the User's Manual for ASHRAE Standard 90.1.Equipment Test Procedures

STOP

There are some exemptions from these requirements.

STOP
EXERCISE #8-1

For each of the following questions review the presented text and use the applicable OBC references to formulate and record the correct answer.

1. A high building must be designed to control or limit the movement of smoke from a fire below the lowest exit storey and;
   a) Penetrating an exit
   b) Into an elevator shaft
   c) Into upper storeys
   d) To an underground parking garage.

OBC Reference: _____

4. High buildings are that are not sprinklered must be designed to limit the danger to firefighters from exposure to smoke in accordance with;
   a) the applicable NFPA standard
   b) the Ontario Fire Code
   c) Supplementary Standard SB-4
   d) The applicable SMACNA manuals for smoke pressurization

OBC Reference: _____

STOP

CONNECTED BUILDINGS

Article 3.2.6.3 requires interior connections between buildings, such as through a firewall or walkway, to be designed to limit smoke movement between the buildings if one, or both, of the buildings is classified as a high building.

A common means of compliance is described in MMAH Supplementary Standard SB-4, Measure N.

ELEVATORS

Emergency operation of elevators in high buildings is regulated by Article 3.2.6.4. Elevators for firefighters' use are addressed in Article 3.2.6.5.

Emergency recall operation is required for all elevators serving storeys above the first storey.

All elevators require manual recall, initiated by key-operated switches located conspicuously in each elevator lobby at the recall level, and in the central alarm and control facility.

Additional automatic recall operation is required for elevators serving storeys above the first storey in unsprinklered buildings.

Automatic recall is initiated by the building fire alarm system or smoke detection in each elevator lobby in each storey.

Each elevator car is required to be equipped with in-car emergency service switches.

CENTRAL ALARM AND CONTROL FACILITY

A central alarm and control facility is the principal incident command location for firefighters in a fire emergency. It is therefore required that the central alarm and control facility be located on the storey containing the principal entrance for firefighters and in a readily accessible location.

A summary of primary functions is provided in Table 8-3

Detailed requirements are described in Article 3.2.6.7.

- water supply for fire-fighting in conformance with Article 3.2.5.7., if the supply is dependent on electrical power supplied to the building, and the building is within the scope of Subsection 3.2.6.,
- fans and other electrical equipment that are installed to maintain the air quality specified in Article 3.2.6.2., and
- fans required for venting by Article 3.2.6.6.

The emergency power supply for elevators required above is to be capable of operating all elevators for firefighters plus one additional elevator simultaneously.

This requirement does not apply if the time to recall all elevators under emergency power supply is not more than 5 min, each from its most remote *storey* to

- the storey containing the entrance for firefighter access referred to in Articles 3.2.5.4 and 3.2.5.5., or
- to a transfer lobby.

WATER SUPPLY

An emergency power supply capable of operating under a full load for not less than 30 min is to be provided by emergency generator for water supply for fire-fighting in conformance with Article 3.2.5.7., if the supply is dependent on electrical power supplied to the *building*, and the *building* is not within the scope of Subsection 3.2.6.

The above does not apply to the water supply for a standpipe system.

STOP

Example Question

What is the full name and applicable edition year of the standard for the installation of emergency power systems in hospitals?

Answer: _____

_____

_____

OBC Reference: _____

4. A battery type emergency power supply is provided for a voice communication system required by Article 3.2.6.8.What is the required minimum battery capacity for electrical supervision, trouble signal and to operate voice communication?

   a) 30 min

   b) 24 h

   c) 24 h, 1 h

   d) 5 min

OBC Reference: _____

STOP

3. A three storey sprinklered building 14 m (45 ft 11 in) high may require a standpipe system depending on building area and occupancy classifications. Which one of the following conditions is correct?

   a) occupancy classification Group A, 2000m^2, therefore standpipe required

   b) occupancy classification Group D, 1500m^2, therefore standpipe required

   c) occupancy classification Group C, 1000m^2, therefore standpipe required

   d) none of the above

OBC Reference: _____

4. From Table 3.2.9.1., which of the following occupancy/building height combination results in the greatest allowable building area building limit ?

   a) Group D, 2 storeys

   b) Group A, 1 storey

   c) Group D, 1 storey

   d) Group F Div 3, 1 storey

OBC Reference: _____

STOP

STANDPIPE SYSTEM DESIGN

As stated in Sentence 3.2.9.2.(1), the design, construction, installation and testing of a standpipe system are to be in conformance with NFPA 14, "Installation of Standpipe and Hose Systems", except as modified and otherwise provided in Subsection 3.2.9. Standpipe Systems.

Modifications to the Requirements of NFPA 14

A standpipe riser is to be located in an *exit* stair shaft, or a vertical *service space* separated from the adjacent floor area by a fire separation with a fire-resistance rating conforming to Table 3.6.3.1.

Dry Standpipe Not Connected

A dry standpipe that is not connected to a water supply is not considered as fulfilling the requirements of standpipe system design as per Sentence 3.2.9.2(2).

3. In a storage garage if access is provided through a fire separation to a Group A, B or C occupancy, which one of the following describes the requirements for the vestibule ventilation?

   a) rate of 14 ft^3/h for each square metre

   b) rate of 14 m^3/h for each square foot

   c) rate of 14 m^3/h for each square metre

   d) mechanical venting not permitted

OBC Reference: _____

4. Indoor storage of compressed gases shall be separated from the remainder of the building by fire separation with a fire-resistance rating of?

   a) 1 1/2 hours

   b) 0 hours

   c) 2 hours

   d) 1 hours

OBC Reference: _____

STOP

Storage and Dispensing Rooms for Flammable Liquids and Combustible Liquids

As per Sentence 3.3.6.4.(1), a room intended for the storage of flammable liquids and combustible liquids shall be separated from the remainder of the building by a fire separation having a fire resistance rating in conformance with the Fire Code.

A room intended for the storage or dispensing of Class IA or IB liquids in open containers shall be designed to prevent critical structural and mechanical damage from an internal explosion in accordance with good engineering practice, such as described in NFPA 68, "Explosion Protection by Deflagration Venting". This does not apply to a room intended for the storage of distilled beverage alcohol. Sentences 3.3.6.4.(2) and (3),

As per Sentence 3.3.6.4.(4), a room in an occupancy or facility covered by Regulation 851 of the Revised Regulations of Ontario, 1990 (Industrial Establishments), made under the Occupational Health and Safety Act, or Ontario Regulation 67/93 (Health Care

1. What is the value for Degree Days Below 18°C for Beaverton, Ontario?

   a) 4550

   b) 5400

   c) 950

   d) 4100

OBC Reference: _____

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.

OBC Reference: _____

3. What outdoor condition design temperature criteria is to be used in designing heating, ventilating and air-conditioning systems for Group B care occupancies?

   a) 2.5%

   b) 1%

   c) Part 6 and to good engineering practice.

   d) 22°C

OBC Reference: _____

4. What exact edition of the NFPA Fire Codes is applicable for conformance to the OBC?

   a) 2005

   b) 1996

   c) As referenced

   d) Latest Edition

OBC Reference: _____

STOP

1. Exhaust systems are permitted to exhaust into a storage garage provided certain requirements are met. Which one of the following forms part of the conditions?

   a) serve rooms accessible only from the garage

   b) must not be connected directly to a sewer

   c) provided with fire dampers

   d) shall incorporate smoke detector control

OBC Reference: _____

2. Required exhaust for a room is calculated on the basis of 24 L/s for each sanitary fixture.Which one of the following is the exception to the requirement?

   a) a water closet;

   b) a lavatory;

   c) a shower;

   d) a slop sink.

OBC Reference: _____

3. Combustible coverings and linings of ducts, including associated adhesives and insulation, are required to be interrupted under certain arrangements.Which one of the following arrangements does NOT require an interruption of the combustible material?

   a) near a fuel-burning heater;

   b) near a cooling coil;

   c) near a electric resistance heater;

   d) near a furnace.

OBC Reference: _____

STOP

INTERCONNECTION OF SYSTEMS

Air duct systems serving *storage garages* must not be interconnected with ductwork serving other parts of the *building*, except as permitted by Sentence 6.2.3.8.(6) as per Article 6.2.3.9..

In a *residential occupancy*, air from one *suite* must not be circulated to any other *suite* nor to a *public corridor* or public stairway.

Branch Duct

Article 9.32.3.7. requires branch *supply ducts* leading from the main distribution trunk duct to the rooms to which outdoor air is to be distributed are to be provided and sized according to Part 6 OBC, except that the branch *supply ducts* may be sized according to Table 9.32.3.7.B where

- the total duct length from outdoor hood to supply register does not exceed 21 m, and
- the total number of fittings does not exceed 8.

Table 9.32.3.7.B. Minimum Branch Supply Duct Sizes Forming Part of Sentence 9.32.3.7.(7)

TABLE 17-7

Room, Space **Or** *Storey* **Served**	**Minimum Branch** *Supply Duct* **Diameter**	
	1 and 2 Bedroom *Dwelling Units*, **mm**	**3, 4 and 5 Bedroom** *Dwelling Units*, **mm**
Master bedroom	100	100
Other bedrooms	75	75
Storey with no bedrooms or living area	75	100
Column 1	2	3

Where the *dwelling unit* has more than 5 bedrooms, ducting is to be sized according to Part 6 OBC.

All branch *supply ducts* which are not fitted with diffusers with adjustable balance stops are to be supplied with accessible dampers which can be adjusted and fixed in their adjusted positions and which include devices to indicate the positions of the dampers.

Provision for Air Circulation Path

Provision is to be made for the free flow of air to all rooms by leaving gaps beneath doors, using louvered doors or installing grilles in doors as per Article 9.32.3.7.

STOP

2. What is the outdoor design temperature value for Cobourg Ontario?

   a) –21°C

   b) –23°C

   c) –25°C

   d) 22°C in all living spaces

OBC Reference: _____

3. Which one of the following solid-fuel burning devices does NOT required conformance to the CAN/CSA-B365-M, "Installation Code for Solid-Fuel Burning Appliances and Equipment"?

   a) range

   b) masonry fireplace

   c) stove

   d) space heater

OBC Reference: _____

4. What is the heating degree day value for Campbellford, Ontario?

   a) 4550

   b) 4150

   c) 4280

   d) 850

OBC Reference: _____

STOP

CARBON MONOXIDE ALARMS

As per Article 9.33.4.1., 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*.

Location of Carbon Monoxide Alarms

Where a fuel-burning *appliance* is installed in a *suite* of *residential occupancy*, a carbon monoxide alarm is required by Article 9.33.4.2. to be installed adjacent to each sleeping area in the *suite*.

NUMBER	PART 3 - REQUIREMENTS	PART 11 - COMPLIANCE ALTERNATIVE
B20	3.2.4.	(a) Existing fire alarm system may remain except that Article 3.2.4.5. does not apply where the "Fire Safety Plan" (as described in Subsection 2.8.2. of the Ontario Fire Code) for the *building* addresses the intent of Subsection 3.2.4. (i.e. "stage" system, electrical supervision, detection as required, Fire Department connection, and emergency power supply), and (b) extension of an existing system must ensure continuity and compatibility, and integrity of the system.
B26	3.2.5.4.; 3.2.5.5.; 3.2.5.6.	Existing access route to existing *occupancy* is acceptable if the *building* is *sprinklered*. Where existing *building* is changed to a "B" *occupancy*, access route shall be provided.
B27	3.2.5.7.; 3.2.5.18.	Does not apply except where a change in *occupancy* occurs to a "B1" or "B2" *occupancy*, where occupants are not normally evacuated from the *building*.
B28	3.2.5.13.	Existing sprinkler systems in existing *buildings* that do not conform to NFPA 13 may be altered, added to, or extended from the existing system without complying with NFPA 13, provided the system is operational and adequate with respect to coverage, water supply and controls, and provided the system is evaluated by a qualified *designer*.
B29	3.2.9.	Does not apply except where a change in *occupancy* occurs to a Group B *occupancy*, where occupants are not normally evacuated from the *building*.
B38	3.3.3.7.	45 min *fire separation* acceptable.
B45	3.4.5.1.(2) and (9)	Existing illuminated legible *exit* signs are acceptable.
B61	3.6.2.7.(1)	45 min *fire separation* acceptable.

COMPLIANCE ALTERNATIVES C4, C7, C9, C17, C18, C22-C26, C48, C64, C66, C76, C86-C90, C92-C94, C176, C191-C197

Selecting C28 as an example for *compliance alternative*; reference Subsection **3.2.9. Standpipe Systems**, of **Section 3.2 Building Fire Safety**. The Part 3 requirement is as follows:

- *start of OBC text* -

3.2.9. Standpipe Systems

3.2.9.6. Water Supply for 38 mm Hose Connections

(1) If a standpipe and hose system is required, the water supply shall be sufficient to provide a flow, measured at each of the two hydraulically most remote 38 mm diameter hose connections

a) of not less than 380 L/min,

b) for not less than 30 min,

c) at a pressure of not less than 450 kPa, and

d) of not less than 190 L/min from each of the two outlets simultaneously.

3.2.9.7. Water Supply for 65 mm Hose Connections

(1) If 65 mm diam hose connections are required, the water supply shall be sufficient to provide a flow, measured at each of the two hydraulically most remote 65 mm diam hose connections

a) of not less than 1 890 L/min,

b) for not less than 30 min,

c) at a pressure of not less than 450 kPa, and

d) of not less than 945 L/min from each of the two outlets simultaneously.

(2) If the *building* is less than 84 m high, measured between *grade* and the ceiling level of the top *storey*, the water supply required in Sentence (1) is permitted to be supplied through the fire department connection.

(3) If the *building* is 84 m or more high, measured between *grade* and the ceiling level of the top *storey*, the water supply required in Sentence (1) shall be provided by sufficient pumping capacity.

(4) If the *building* is 84 m or more high, measured between *grade* and the ceiling level of the top *storey*, the *building* shall be served by not less than two sources of water supply from a public water system.

- *end of OBC text* -

Subsection 3.2.9. sets out the OBC requirements for the installation of standpipe systems. In the case of an existing *building* of *residential occupancy* with proposed alterations to *building systems* the *compliance alternative* C28 revises the Part 3 requirement as worded

- - - - - - - - - - - - - - - - - - *start of OBC text* -

C28 – Does not apply to *buildings* 4 *storeys* and less. For existing *buildings* over 4 *storeys* in *building height*, existing standpipe and hose systems water supply is acceptable provided it can deliver a minimum flow rate of 265 L/min for 30 min at 345 kPa (gauge) at the two highest and most remote hose valves, with not less than 132 L/ min from each of the two simultaneously.

- *end of OBC text* -

This *compliance alternative* takes into account the functionality of the existing standpipe system equipment and revises the minimum pressure and flow rate requirements.

Note *compliance alternatives* dealing with Subsection 3.2.9. Standpipe Systems occur as A26, B29, DE27, and F28 in Tables 11.5.1.1.A., 11.5.1.1.B., 11.5.1.1.D/E., and 11.5.1.1.F. correspondingly. However, the wording of the *compliance alternatives* is not identical.

The following portion of Table 11.5.1.1.C. contains some of the *compliance alternatives* directly related to the scope of the Building Services course.

NUMBER	PART 3 - REQUIREMENTS	PART 11 - COMPLIANCE ALTERNATIVE
C91	6.2.3.9.(1)	In a *building* containing not more than four *dwelling units* or residential *suites*, the existing heating or *air conditioning* system may be altered to serve more than one *dwelling unit* or *suite* provided *smoke alarms* are installed in each *dwelling unit* or *suite* and provided *a smoke detector is* installed in the supply or return air duct system serving the entire *building* which would turn off the fuel supply and electrical power to the heating system upon activation of such detector.
C92	6.2.3.12.	Existing openings, grilles and diffusers acceptable.
C93	6.2.4.2.(1); 6.2.4.3.(1) to (3)	Existing acceptable.
C94	6.2.4.3.(10)	Where the duct system is being altered, lesser amounts and extent of insulation will be permitted.
C96	6.2.9.2.	Existing acceptable.
C98	6.3.1.	Existing acceptable, provided products of combustion are safely vented.
C179	9.18.3.	Existing vents and ventilation acceptable.
C194	9.32.	In detached houses, semi-detached houses, townhouses and row houses containing not more than two *dwelling units*, rooms or spaces in *dwelling units* to be ventilated by natural means in accordance with Subsection 9.32.2. or by providing adequate mechanical ventilation.

Compliance Alternative C197 in Table 11.5.1.1.C. lists the following alternative:

Carbon monoxide alarms may be battery operated or plugged into an electrical outlet.

Which one of the following best describes the intent of the *compliance alternative*?

a) solution to structural problem

b) solution for safe/practical addition of building system (no new electrical circuits required)

c) limit electrical loads for existing building

d) provide immediate detector coverage

OBC Reference: _____

STOP

COMPLIANCE ALTERNATIVES DE4, DE9, DE19, DE24-DE27, DE36, DE45, DE65, DE67, DE71, DE83,DE85, DE152, DE 166 F4, F9, F20, F25-F28, F38, F47, F66, F68, F72, F83-F86, F148, F162

Selecting DE26 as an example for *compliance alternative;* reference Article **3.2.5.13 Automatic Sprinkler Systems**, of **Section 3.2 Building Fire Safety**. The Part 3 requirement is as follows:

- *start of OBC text* -

3.2.5.13. Automatic Sprinkler Systems

(1) Except as permitted by Sentences (2), (3) and (4), an automatic sprinkler system shall be designed, constructed, installed and tested in conformance with NFPA 13, "Standard for the Installation of Sprinkler Systems".

- *end of OBC text* -

Article 3.2.5.13. sets out the OBC requirements for automatic sprinkler systems. In the case of an existing *building* of *business* or *mercantile occupancy* with proposed alterations to *building systems* the *compliance alternative* DE22 revises the Part 3 requirement as worded

BUILDING SERVICES
ANSWER GUIDE

Module 1: The OBC and Building Services – Definitions and Scope		
Exercise	**Question**	**Answer and OBC Reference**
# 1-1	Example	Answer: Enter Table 1.3.1.2. under column "Issuing Agency" – "ULC" find listing for CAN/ULC-S109, note OBC references under "Code Reference" and search references for connectors in air duct systems. OBC: 6.2.3.16.(1)
# 1-1	# 1	Answer: d OBC: Division A, 1.1.2.2(a)(iii)
# 1-1	# 2	Answer: Enter Table 1.3.1.2. under column "Issuing Agency" – "ULC" find listing for CAN/ULC-S112, note edition reference as: CAN/ULC-S112-M90 OBC: Table 1.3.1.2.
# 1-1	# 3	Answer: b OBC: 12.2.1.1.(4)
# 1-1	# 4	Answer: Refer to Table of Contents for Part 3 Fire Protection Occupant Safety and Accessibility and search for applicable reference to exits – Section 3.4. Exits, search through contents for applicable reference to fire separations – Subsection 3.4.4. Fire Separation of Exits, search for applicable reference to breaching of fire separations – Article 3.4.4.4. Integrity of Exits. OBC: 3.4.4.4.
# 1-2	Example	Answer: b OBC: Division A, 1.4.1.2.
# 1-2	# 1	Answer: a OBC: Division A, 1.4.1.2.
# 1-2	# 2	Answer: c OBC: Division A, 1.4.1.2.
# 1-3	Example	Answer: c OBC: Division A, 1.4.1.2.
# 1-3	# 1	Answer: c OBC: Division A, 1.4.1.2.
# 1-3	# 2	Answer: b OBC: Division A, 1.4.1.2.

Module 2: Energy Efficiency		
Exercise	**Question**	**Answer and OBC Reference**
# 2-1	# 1	Answer: c OBC: 12.2.1.1.(2)
# 2-1	# 2	Answer: a OBC: 12.2.1.1.(4)(b)
# 2-2	# 1	Answer: to clarify and modify requirements to ensure compatibility with Canadian climate and construction practices; to enhance building envelope provisions of ANSI/ASHRAE/IES Standard 90.1 -2010 and enable the use of Canadian testing procedures for HVAC and Service Water Heating Equipment Division 1, Chapter 1 of SB-10
# 2-2	# 2	Answer: the exemption applies where the environmental condition within the building is governed by the operation or process within the building OBC: SB-10, 1.2.1.1
# 2-2	# 3	Answer: d OBC: 12.2.1.1. SB-10
# 2-3	# 1	Answer: b OBC: 1.2.1.1.(2)(a), 1.3.1.1. Division 1 of SB-10
# 2-3	# 2	Answer: d OBC: 1.1.1.1.(2) Division 1 of SB-10
# 2-3	# 3	Answer: b 1.2.1.1.(5) Division 2, Chapter 1 of SB-10
# 2-3	# 4	1.1.1.4., Table 1.2.1.1. Note (1), and 5.4.3.1.A of Division 2, Chapter 2 of SB-10, 5.4.1.2.(1)(b) of OBC.
# 2-3	# 5	Answer: c 1.1.1.6. and 7.4.5.2. of Division 2, Chapter 2 of SB-10
# 2-3	# 6	Answer: a 1.1.1.1.(2) of Division 2, Chapter 3 of SB-10
# 2-3	# 7	Answer: d 1.1.1.1. of Division 4 of SB-10

Module 6: Fire Alarm and Detection Systems		
Exercise	**Question**	**Answer and OBC Reference**
# 6-1	Example	Answer: b OBC: 3.2.4.1.(2)(f)
# 6-1	# 1	Answer: d OBC: 3.2.4.1.(4)
# 6-1	# 2	Answer: b OBC: 3.2.4.1(2).(h)
# 6-1	# 3	Answer: b OBC: 3.2.4.2.(5)
# 6-1	# 4	Answer: a OBC: 3.2.4.1.(5)
# 6-2	Example	Answer: c OBC: 3.2.4.4.(c)
# 6-2	# 1	Answer: b OBC: 3.2.4.3.(1)(a)
# 6-2	# 2	Answer: c OBC: Division A, 1.4.1.2.(1)(b)
# 6-2	# 3	Answer: d OBC: 3.2.4.4.(3)(a)
# 6-2	# 4	Answer: c OBC: 3.2.4.10.(2)
# 6-3	Example	Answer: d OBC: 3.2.4.16.
# 6-3	# 1	Answer: a OBC: 3.2.4.12.(1)(e)
# 6-3	# 2	Answer: d OBC: 3.2.4.18.(1)
# 6-3	# 3	Answer: b OBC: 3.2.4.22.(1)
# 6-3	# 4	Answer: b OBC: 3.2.4.22.(5)
# 6-4	Example	Answer: d OBC: 3.2.4.9.(2)(b)
# 6-4	# 1	Answer: c OBC: 3.2.4.9.(7)
# 6-4	# 2	Answer: c OBC: 3.2.4.7.(3)
# 6-4	# 3	Answer: a OBC: 3.2.4.8.(1)(c)
# 6-4	# 4	Answer: d OBC: 3.2.4.15.(3)
# 6-5	Example	Answer: c OBC: 3.2.4.20.(6)
# 6-5	# 1	Answer: c OBC: 3.2.4.19.(2)
# 6-5	# 2	Answer: c OBC: 3.2.4.20.(10)
# 6-5	# 3	Answer: d OBC: 3.2.4.23.(4)(b)
# 6-5	# 4	Answer: b OBC: 3.2.4.23.(5)

Module 7: Provisions for Fire Fighting		
Exercise	**Question**	**Answer and OBC Reference**
# 7-1	Example	Answer: locate adjacent to hydrants, total distance not more than 90 m, of which vehicle to building is not more than 45 m OBC: 3.2.5.5.(2)
# 7-1	# 1	Answer: locate adjacent to hydrants, total distance not more than 90 m, of which vehicle to building is not more than 45 m OBC: 3.2.5.5.(2), 3.2.5.16.(2) and (3)
# 7-1	# 2	Answer: b OBC: 3.2.5.5.(4)
# 7-1	# 3	Answer: search for fire pump requirements, find 3.2.5.19, standard is NFPA 20, refer to Part 1 Table 1.3.1.2 OBC: 3.2.5.19; 1.3.1.2
# 7-1	# 4	Answer: c OBC: 3.2.5.5.(1)
# 7-2	Example	Answer: NFPA 13R allowed for residential occupancy not more than 4 storeys, or B3 with sleeping accommodation for less than 10 and not more than 6 requiring evacuation assistance; NFPA 13D allowed for building of residential occupancy containing not more that 2 dwelling units and system with fewer than 9 sprinkler heads may be supplied from domestic system OBC: 3.2.5.13. (2-4)
# 7-2	# 1	Answer: standpipe riser not less that 6 in diam, hydraulically designed combined water supply, water supply to be increased by a minimum of 570 L/min, water detection on branch from riser, separate indication on fire alarm annunciator. OBC: 3.2.5.15.(5)
# 7-2	# 2	Answer: a OBC: 3.2.5.14.(3)
# 7-2	# 3	Answer: cables and wires meet 3.1.5.21., noncombustible construction, is used for A/C – smoke detector required, easy access, more that 2 000 m^2, smoke detectors required to be zoned for every 2 000 m^2 OBC: 3.2.5.15.(4)
# 7-2	# 4	Answer: d OBC: 3.2.5.13.(5)

Module 8: Additional (Fire Fighting) Requirements for High Buildings		
Exercise	**Question**	**Answer and OBC Reference**
# 8-1	Example	Answer: Major occupancy: D and E, therefore OBC Clause 3.2.6.1.(1)(a) applies. Building height: 6 storeys x 4 m/storey = 24 m to the floor level of the top storey, therefore OBC Subclause 3.2.6.1.(1)(a)(ii) applies. Cumulative occupant load: (2 x 450) + (4 x 200) = 1 700 persons above the first storey. Total exit width: 3 exits x 1.4 m = 4.2 m Occupant load/exit width factor: 1 700/(1.8 x 4.2) = 225 The occupant load/exit width factor is less than 300 therefore the building is NOT a high building.
# 8-1	# 2.a	Answer: 14 x 3.5 = 49 m > 36 m, therefore high building OBC: 3.2.6.1.(1)(a)(i)
# 8-1	# 2.b	Answer: B occupancy above the 3rd storey, therefore high building OBC: 3.2.6.1.(1)(b)
# 8-1	# 2.c	Answer: 5 x 3.4 = 17 m < 18 m, therefore not a high building OBC: 3.2.6.1.(1)(d)
# 8-1	# 3	Answer: Cold temperatures result in large differences between indoor and outdoor temperatures, thereby accentuating stack effect and creating conditions for substantial smoke spread.
# 8-2	# 1.a	Answer: must be located where breakage will not endanger pedestrians below OBC: 3.2.6.6.(2)
# 8-2	# 1.b	Answer: must be permanently marked to be easily identified OBC: 3.2.6.6.(3)
# 8-2	# 2.a	Answer: elevator lobby at recall level OBC: 3.2.6.4.(2)(a)
# 8-2	# 2.b	Answer: central alarm and control facility OBC: 3.2.6.4.(2)(b)

# 8-2	# 3	Answer: requires emergency recall only if the elevator serves storeys above the first storey OBC: 3.2.6.4.(1)
# 8-3	# 1	Answer: 10 seconds in hospitals with 24 h supervisory personnel and 30 seconds in other occupancies OBC: 3.2.4.23.(4)
# 8-3	# 2	Answer and OBC: 3.2.4.23.(5)
# 8-3	# 3	Answer and OBC: 1 X X 3.2.6.12.(2)(b) 2 X 3.2.6.12.(2)(c) 3 X 3.2.6.12.(2)(k) 4 X X 3.2.6.12.(2)(l) 5 X 3.2.6.7.(2)(m)

Module 9: Lighting and Emergency Power Systems		
Exercise	**Question**	**Answer and OBC Reference**
# 9-1	Example	Answer: 500 and 300 lx at floor level OBC: 3.2.7.1.(7) & (8)
# 9-1	# 1	Answer: 2 h for 3.2.6 building, 1 h Group B (not 3.2.6.), 30 min all other OBC: 3.2.7.4.(1)(b)
# 9-1	# 2	Answer: a OBC: 3.2.7.3.(3)
# 9-1	# 3	Answer: it will assume the electrical load automatically OBC: 3.2.7.4.(1)(b)
# 9-1	# 4	Answer: b OBC: Table 9.34.2.7.
# 9-2	Example	Answer: CSA-Z32, "Electrical Safety and Essential Electrical Systems for Health Care Facilities", 2004 OBC: Table 1.3.1.2.
# 9-2	# 1	Answer: separate service space with minimum 45 min rating OBC: 3.2.7.7.(2)
# 9-2	# 2	Answer: b OBC: 3.2.7.8.(3)(a)
# 9-2	# 3	Answer: does not apply if the time to recall all elevators under emergency power supply is not more than 5 min OBC: 3.2.7.9.(3)
# 9-2	# 4	Answer: c OBC: 3.2.7.8.(3)

Module 10: Mezzanines and Opening through Floor Assemblies		
Exercise	**Question**	**Answer and OBC Reference**
# 10-1	Example	Answer: 2h, 1%, and January 2.5% OBC: 3.2.8.4.(1)
# 10-1	# 1	Answer: restrict passage of smoke OBC: 3.2.8.6.(1)(a)
# 10-1	# 2	Answer: a OBC: 3.2.8.4.(2)
# 10-2	Example	Answer: exceeds 17, 000m³ then only 4 air change per hour. 17, 000m³ or under then 6 ACH OBC: 3.2.8.9.(6)
# 10-2	# 1	Answer: no response, 2 smoke detectors in a single zone will cause a shutdown OBC: 3.2.8.9.(3)
# 10-2	# 2	Answer: d OBC: 3.2.8.9.(8)
# 10-3	Example	Answer: more than 18 m then 2 h power for smoke control fans OBC: 3.2.8.10.(1)
# 10-3	# 1	Answer: storeys that are wholly of partially within an IFS and all storeys below the IFS are to be sprinklered OBC: 3.2.8.7.(1)
# 10-3	# 2	Answer: b OBC: 3.2.8.8.(1)(b)(i)

Module 12: Safety and Accessibility within Floor Areas		
Exercise	**Question**	**Answer and OBC Reference**
# 12-1	Example	Answer: c OBC: 3.3.1.2.(3)
# 12-1	# 1	Answer: d OBC: 3.3.1.2.(2)
# 12-1	# 2	Answer: a OBC: 3.3.1.7.(1)(a)(iii)
# 12-1	# 3	Answer: d OBC: 3.8.1.5.(1)
# 12-1	# 4	Answer: c OBC: 3.4.5.1.(4)
# 12-2	Example	Answer: d OBC: 3.3.2.12.(5)
# 12-2	# 1	Answer: b OBC: 3.3.2.4.(14)(g)
# 12-2	# 2	Answer: c OBC: 3.3.3.7.(4)
# 12-2	# 3	Answer: c OBC: 3.3.5.7.(3)(b)(ii)
# 12-2	# 4	Answer: c OBC: 3.3.6.3.(1)(a)
# 12-3	Example	Answer: b OBC: 3.6.2.2.(1)
# 12-3	# 1	Answer: c OBC: 3.6.2.7.(9)
# 12-3	# 2	Answer: d OBC: 3.6.2.7.(12)(d)
# 12-3	# 3	Answer: a OBC: 3.6.4.3.(1)(a)
# 12-3	# 4	Answer: b OBC: 3.3.6.4.(5)
# 12-3	# 5	Answer: d OBC: 3.3.6.5.(1)
# 12-3	# 6	Answer: c OBC: 3.3.6.6.(1)

Module 13: Portable Classrooms and Self-Service Storage Buildings		
Exercise	**Question**	**Answer and OBC Reference**
# 13-1	Example	Answer: a OBC: 3.9.3.7.(4)(b)
# 13-1	# 1	Answer: d OBC: 3.10.4.4.(1)
# 13-1	# 2	Answer: c OBC: 3.9.3.7.(2)(a)
# 13-1	# 3	Answer: d OBC: 3.10.3.4.(2) / (3)

Module 17: Heating, Ventilating and Air-Conditioning for Housing and Small Buildings		
Exercise	**Question**	**Answer and OBC Reference**
# 17-1	Example	Answer: c OBC: 9.32.1.1.(1)
# 17-1	# 1	Answer: a OBC: Table 9.32.2.1
# 17-1	# 2	Answer: c OBC: 9.32.1.3.(3)
# 17-1	# 3	Answer: d OBC: 9.32.1.3.(3)
# 17-2	Example	Answer: d OBC: 9.32.3.1.(1)(b)
# 17-2	# 1	Answer: d OBC: 9.32.3.1.(2)(a)(i)
# 17-2	# 2	Answer: b OBC: 9.32.3.2.(1)(b)
# 17-2	# 3	Answer: b OBC: Table 9.32.3.3
# 17-2	# 4	Answer: b OBC: Table 9.32.3.3. note 4
# 17-3	Example	Answer: c OBC: Table 9.32.3.4.A
# 17-3	# 1	Answer: b OBC: 9.32.3.4.(3)
# 17-3	# 2	Answer: d OBC: 9.32.3.4.(7)(b)
# 17-3	# 3	Answer: a OBC: Table 9.32.3.4.B
# 17-3	# 4	Answer: c OBC: Table 9.32.3.4.B and 9.32.3.4.(10)(b)
# 17-4	Example	Answer: b OBC: 9.32.3.5.(1); Table 9.32.3.4.A
# 17-4	# 1	Answer: c OBC: 9.32.3.5.(2)
# 17-4	# 2	Answer: d OBC: 9.32.3.5.(4)(b)
# 17-4	# 3	Answer: c OBC: Table 9.32.3.5. note 1
# 17-4	# 4	Answer: d OBC: 9.32.3.5.(7)
# 17-4	# 5	Answer: a OBC: 9.32.3.5.(6)
# 17-5	Example	Answer: d OBC: 9.32.3.6.
# 17-5	# 1	Answer: b OBC: 9.32.3.7.(4)
# 17-5	# 2	Answer: b OBC: Table 9.32.3.7.A
# 17-5	# 3	Answer: a OBC: 9.32.3.7.(7)(a)
# 17-5	# 4	Answer: c OBC: 9.32.3.7.(10)
# 17-6	Example	Answer: c OBC: 9.32.3.8.(2)
# 17-6	# 1	Answer: c OBC: 9.32.3.9.(3)
# 17-6	# 2	Answer: c OBC: 9.32.3.10.(2)
# 17-6	# 3	Answer: a OBC: 9.32.3.10.(4)
# 17-6	# 4	Answer: c OBC: Table 9.32.3.10.B
# 17-7	Example	Answer: d OBC: 9.32.3.11.(3)
# 17-7	# 1	Answer: d OBC: 9.32.3.11.(9)
# 17-7	# 2	Answer: c OBC: 9.32.3.12.(4)

Module 18: Renovations		
Exercise	**Question**	**Answer and OBC Reference**
# 18-1	Example	Answer: c OBC: 11.3.1.1
# 18-1	# 1	Answer: a OBC: 11.3.3.1.(2)
# 18-1	# 2	Answer: c OBC: 1.4.1.2., compliance alternative definition
# 18-1	# 3	Answer: a OBC: 11.3.1
# 18-2	# 1	Answer: c OBC: Part 11 – A58
# 18-2	# 2	Answer: b OBC: Part 11 – B28
# 18-3	# 1	Answer: d
# 18-3	# 2	Answer: d
# 18-3	# 3	Answer: b
# 18-4	# 1	Answer: a OBC: Part 11 – DE27
# 18-4	# 2	Answer: c OBC: Part 11 – F83