9.33.4. General Requirements for Heating and Air-conditioning Systems

9.33.4.1. Design of Heating and Air-conditioning Systems

1) Heating and air-conditioning systems, including ducting, and mechanical heating and refrigeration equipment, shall be designed, constructed and installed to conform with good practice such as that described in
   a) the ASHRAE Handbooks and Standards,
   b) the HRAI Digest,
   c) the CHC Handbook on Hydronic Heating Systems,
   d) the Hydronics Institute Manuals,
   e) the SMACNA Manuals, and

(See also Subsection 9.32.3. for the design of systems that also provide ventilation.)

9.33.4.2. Reserved

9.33.4.3. Heating System Control

1) Where a single heating system serves a house with a secondary suite, individual temperature controls shall be provided in each dwelling unit served by the system.

(See Appendix A.)

9.33.4.4. Access

1) Equipment forming part of a heating or air-conditioning system, with the exception of embedded pipes or ducts, shall be installed with provision for access for inspection, maintenance, repair and cleaning.

9.33.4.5. Protection from Freezing

1) Equipment forming part of a heating or air-conditioning system that may be adversely affected by freezing temperatures and that is located in an unheated area shall be protected from freezing.

9.33.4.6. Expansion, Contraction and System Pressure

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

9.33.4.7. Structural Movement

1) Mechanical systems and equipment shall be designed and installed to accommodate the maximum amount of structural movement provided for in the construction of the building.

2) Where the building is in a location where the spectral response acceleration, $S_a(0.2)$, is greater than 0.55, heating and air-conditioning equipment with fuel or power connections shall be secured to the structure to resist overturning and displacement.

(See A-9.31.6.2.(3) in Appendix A.)

9.33.4.8. Asbestos

1) Asbestos shall not be used in air distribution systems or equipment in a form or in a location where asbestos fibres could enter the air supply or return systems.

9.33.4.9. Contaminant Transfer

1) Systems serving garages, and systems serving other occupied parts of a dwelling unit but located in or running through a garage, shall be designed and constructed in a manner such that means are not provided for the transfer of contaminants from the garage into other spaces in the dwelling unit.
14.3.2
The maximum length of continuous tubing from a supply-and-return manifold arrangement shall not exceed the lengths specified by the manufacturer or, in the absence of manufacturer's specifications, the lengths specified in Table 1. Actual loop lengths shall be determined by spacing, number of loops, and pressure drop requirements, as specified in the system design.

14.3.3
For the purpose of system balancing, each individual loop shall have a tag securely affixed to the manifold to indicate the length of the loop, and the room(s) and area(s) served.

14.3.4
In a single-zone multiple-manifold installation, balanced flow through all manifolds shall be achieved as specified in Clause 13.4.

14.4 Poured floor systems (thermal mass)

14.4.1 Spacing
When embedded in or installed under a thermal mass (e.g., a concrete slab), tubes shall be spaced in accordance with the design.

14.4.2 Slab penetration tube protection
When embedded in or installed under a thermal mass, tubing shall be protected from damage at all penetrations of the thermal mass through the slewing material or manufactured bench support.

14.4.3 Slab joint tube protection
The tubing at the location of a control, expansion, or construction joint in a concrete slab shall be protected by
(a) a rigid slewing material that covers the tubing for at least 300 mm (12 in) on either side of the joint;
or
(b) dipping the tubing below the slab.

14.4.4 Insulation

14.4.4.1
When a poured concrete radiant floor system is installed in contact with the soil, insulation that complies with Clause 14.4.4.3 and has a minimum RSI value of 0.9 m²·K/W (R-value of 3 h·ft²·°F/Btu) shall be placed between the soil and the concrete; extend as close as practical to the outside edges of the concrete; and be placed on all slab edges.

14.4.4.2
When a poured concrete radiant floor system is installed on grade, insulation that complies with Clause 14.4.4.3 and has a minimum RSI value of 0.9 m²·K/W (R-value of 3 h·ft²·°F/Btu) shall be placed on all vertical slab edges.

14.4.4.3
Thermal insulation installed under a poured concrete radiant floor system in contact with the soil shall comply with the requirements of
(a) CAN/ULC-S701;
(b) CAN/ULC-S704; or
(c) CAN/ULC-S705.1.
14.4.4.4
When a poured concrete radiant floor system is installed with habitable space above and below, the total RSI value of the floor system below the concrete slab shall be greater than the total RSI value of the material lying above the concrete slab, but the floor system shall not have an RSI value less than 0.5 m²•K/W (the R-value shall not be less than 3.0 h•ft²•°F/Btu).

14.4.4.5
Tubing shall be pressure tested in accordance with Clause 4.5.1. To ensure system integrity, air pressure shall be maintained during the concrete pour.

14.5 Joist systems and subfloors

14.5.1
When tubing is installed below a subfloor, the tube spacing shall be in accordance with the system design. The tube spacing may be modified where joist space limitations conflict with the design tube spacing.

14.5.2
When tubing is installed above or in the subfloor, the tube spacing shall not exceed 300 mm (12 in) centre-to-centre for living areas unless alternative spacing will satisfy the design requirements.

14.5.3
When tubing is installed in the joist cavity, the cavity shall be insulated with material having an RSI value of at least 2.1 m²•K/W (R-value of at least 12.0 h•ft²•°F/Btu).

14.5.4
A minimum air space of 50 mm (2 in) shall be maintained between the top of the insulation and the underside of the floor unless a conductive plate is used.

14.5.5
When tubing is installed above or in the subfloor and not embedded in concrete, the floor assembly shall be insulated with a minimum total insulated RSI value of 2.1 m²•K/W (R-value of 12 h•ft²•°F/Btu) below the tubing.

14.6 Wall and ceiling panels

14.6.1
When piping is installed in the wall stud cavity or the ceiling joist cavity, the cavity shall be insulated with material having an RSI value of at least 2.1 m²•K/W (R-value of at least 12 h•ft²•°F/Btu). The insulation shall be installed in such a way as to direct the heat towards the space intended to be heated.

14.6.2
A minimum air space of 50 mm (2 in) shall be maintained between the insulation and the interior surface of the panel unless a conductive plate is used.
9.36.2.8. **Division B**

8) Access hatches separating a conditioned space from an unconditioned space shall be insulated to a nominal thermal resistance of not less than 2.6 (m²·K)/W.

9.36.2.8. **Thermal Characteristics of Building Assemblies Below-Grade or in Contact with the Ground**

1) Except as provided in Sentence (2) and Article 9.36.2.5., the effective thermal resistance of building assemblies that are below-grade or in contact with the ground shall be not less than that shown for the applicable heating-degree day category in

a) Table 9.36.2.8.A., where the ventilation system does not include heat-recovery equipment, or

b) Table 9.36.2.8.B., where the ventilation system includes heat-recovery equipment conforming to Article 9.36.3.9.

(See Appendix A.)

**Table 9.36.2.8.A.**

Effective Thermal Resistance of Assemblies Below-Grade or in Contact with the Ground in Buildings without a Heat-Recovery Ventilator

<table>
<thead>
<tr>
<th>Building Assembly Below-Grade or in Contact with the Ground(1)</th>
<th>Heating Degree-Days of Building Location,°C in Celsius Degree-Days</th>
<th>Zone 4 &lt; 3000</th>
<th>Zone 5 3000 to 3999</th>
<th>Zone 6 4000 to 4999</th>
<th>Zone 7A 5000 to 5999</th>
<th>Zone 7B 6000 to 6999</th>
<th>Zone 8 ≥ 7000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation walls</td>
<td>Minimum Effective Thermal Resistance (Rsi), (m²·K)/W</td>
<td>1.99</td>
<td>2.98</td>
<td>2.98</td>
<td>3.46</td>
<td>3.46</td>
<td>3.97</td>
</tr>
<tr>
<td>Unheated floors(2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>below frost line(3)(4)</td>
<td>insulated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>above frost line(3)</td>
<td>insulated</td>
<td>1.96</td>
<td>1.96</td>
<td>1.96</td>
<td>1.96</td>
<td>1.96</td>
<td>1.96</td>
</tr>
<tr>
<td>Heated and unheated floors on permafrost(5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heated floors(6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slab-on-grade with an Integral footing(7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes to Table 9.36.2.8.A.:

(1) See Appendix A.

(2) See Article 1.1.3.1.

(3) Does not apply to below-grade floors over heated crawl spaces.

(4) Typically applies to floors-on-ground in full-height basements.

(5) Refers to undisturbed frost line before house is constructed.

(6) See Sentence 9.25.2.3.1(5) for requirement on placement of insulation. The design of slabs-on-grade with an integral footing is addressed in Part 4 (see Article 9.16.1.2.).

9-230 Division B

Alberta Building Code 2014 Volume 2
### Table 9.36.2.8.B.

**Effective Thermal Resistance of Assemblies Below-Grade or in Contact with the Ground in Buildings with a Heat-Recovery Ventilator**

Forming Part of Sentences 9.36.2.8.(1) to (9)

<table>
<thead>
<tr>
<th>Building Assembly Below-Grade or in Contact with the Ground(1)</th>
<th>Heating Degree-Days of Building Location(3) in Celsius Degree-Days</th>
<th>Minimum Effective Thermal Resistance (RSI), (m²·K)/W</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zone 4</td>
<td>Zone 5</td>
</tr>
<tr>
<td></td>
<td>&lt; 3000</td>
<td>3000 to 3999</td>
</tr>
<tr>
<td><strong>Foundation walls(2)</strong></td>
<td>1.99</td>
<td>2.98</td>
</tr>
<tr>
<td><strong>Unheated floors below frost line(4)(5)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above frost line(6)</td>
<td>1.96</td>
<td>1.96</td>
</tr>
<tr>
<td><strong>Heated and unheated floors on permafrost(7)</strong></td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Heated floors(8)</strong></td>
<td>2.32</td>
<td>2.32</td>
</tr>
<tr>
<td><strong>Slabs-on-grade with an integral footing(9)</strong></td>
<td>1.96</td>
<td>1.96</td>
</tr>
</tbody>
</table>

**Notes to Table 9.36.2.8.B.:**

1. See Appendix A.
2. See Article 1.1.3.1.
3. Does not apply to below-grade floors over heated crawl spaces.
4. Typically applies to floors-on-ground in full-height basements.
5. Refers to undisturbed frost line before house is constructed.
6. See Sentence 9.25.2.3.(5) for requirement on placement of insulation. The design of slabs-on-grade with an integral footing is addressed in Part 4 (see Article 9.16.1.2.).

2) Where an entire floor assembly falls into two of the categories listed in Tables 9.36.2.8.A. and 9.36.2.8.B., the more stringent value shall apply. (See Appendix A.)

3) Where the top of a section of foundation wall is on average less than 600 mm above the adjoining ground level, the above-ground portion of that section of wall shall be insulated to the effective thermal resistance required in Table 9.36.2.8.A. or 9.36.2.8.B.

4) Unheated floors-on-ground that are above the frost line and have no embedded heating pipes, cables or ducts shall be insulated to the effective thermal resistance required in Table 9.36.2.8.A. or 9.36.2.8.B.
   
   a) on the exterior of the foundation wall down to the footing, or
   b) on the interior of the foundation wall and, as applicable,
      i) beneath the slab for a distance not less than 1.2 m horizontally or vertically down from its perimeter with a thermal break along the edge of the slab that meets at least 50% of the required thermal resistance,
      ii) on top of the slab for a distance not less than 1.2 m horizontally from its perimeter, or
      iii) within the wooden sleepers below the floor for a distance not less than 1.2 m horizontally from its perimeter.

(See Appendix A.)

5) Except as provided in Sentence (6), floors-on-ground with embedded heating ducts, cables or pipes shall be insulated to the effective thermal resistance required in Table 9.36.2.8.A. or 9.36.2.8.B. under their full bottom surface including the edges.

6) Where only a portion of a floor-on-ground has embedded heating ducts, cables or pipes, that heated portion shall be insulated to the effective thermal resistance required in Table 9.36.2.8.A. or 9.36.2.8.B. under its full bottom surface to 1.2 m beyond its perimeter including exterior edges if applicable.
5) Except as provided in Sentences (8) and (9), where two planes of insulation are separated by a building envelope assembly and cannot be physically joined, one of the planes of insulation shall be extended for a distance equal to at least 4 times the thickness of the assembly separating the two planes. (See Appendix A.)

6) Where mechanical, plumbing or electrical system components, such as pipes, ducts, conduits, cabinets, chases, panels or recessed heaters, are placed within and parallel to a wall assembly required to be insulated, the effective thermal resistance of that wall at the projected area of the system component shall be not less than that required by Tables 9.36.2.6.A., 9.36.2.6.B., 9.36.2.8.A. and 9.36.2.8.B. (See Appendix A.)

7) Except as permitted by Article 9.36.2.11., where mechanical ducts, plumbing pipes, conduits for electrical services or communication cables are placed within the insulated portion of a floor or ceiling assembly, the effective thermal resistance of the assembly at the projected area of the ducts, pipes, conduits or cables shall be not less than 2.78 (m²·K)/W.

8) Joints and junctions between walls and other building envelope components shall be insulated in a manner that provides an effective thermal resistance that is no less than the lower of the minimum values required for the respective adjoining components. (See Appendix A.)

9) Sentence (1) does not apply where the continuity of the insulation is interrupted
   a) between the insulation in the foundation wall and that of the floor slab,
   b) by an integral perimeter footing of a slab-on-grade (see Sentences 9.25.2.3.(5) and 9.36.2.8.(8)), or
   c) at the horizontal portion of a foundation wall that supports masonry veneer and is insulated on the exterior.

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### 9.36.2.6. Thermal Characteristics of Above-ground Opaque Building Assemblies

1) Except as provided in Sentences (2) and 9.36.2.8.(3) and Articles 9.36.2.5., and 9.36.2.11., the effective thermal resistance of above-ground opaque building assemblies or portions thereof shall be not less than that shown for the applicable heating-degree day category in
   a) Table 9.36.2.6.A., where the ventilation system does not include heat-recovery equipment, or
   b) Table 9.36.2.6.B., where the ventilation system includes heat-recovery equipment conforming to Article 9.36.3.9.
   (See Appendix A.)

#### Table 9.36.2.6.A.

<table>
<thead>
<tr>
<th>Above-ground Opaque Building Assembly</th>
<th>Heating Degree-Days of Building Location, ( ^\circ \text{C} ) in Celsius Degree-Days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zone 4</td>
</tr>
<tr>
<td></td>
<td>&lt; 3000</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Effective Thermal Resistance ( R_{SI} ), (m²·K)/W</td>
<td></td>
</tr>
<tr>
<td>Ceilings below attics</td>
<td>6.91</td>
</tr>
<tr>
<td>Cathedral ceilings and flat roofs</td>
<td>4.67</td>
</tr>
<tr>
<td>Walls ( ^1 )</td>
<td>2.78</td>
</tr>
<tr>
<td>Floors over unheated spaces</td>
<td>4.67</td>
</tr>
</tbody>
</table>

**Notes to Table 9.36.2.6.A.:**

(1) See Article 1.1.3.1.
(2) See Sentence 9.36.2.8.(3) for requirements concerning the above-ground portion of foundation walls.
2) Service water heating systems that use solar thermal technology shall be installed in accordance with the Plumbing Code Regulation made pursuant to the Safety Codes Act.

3) Hot water storage tanks associated with the systems referred to in Sentence (2) shall be installed in a conditioned space.

9.36.4. Service Water Heating Systems

9.36.4.1. Scope and Application

1) This Subsection is concerned with the efficient use of energy by systems used to heat service water for household use as well as for indoor swimming pools and hot tubs.

2) Where service water heating equipment or techniques other than those described in this Subsection are used, the building shall be designed and constructed in accordance with the energy efficiency requirements of the NECB.

9.36.4.2. Equipment Efficiency

1) Service water heaters, boilers, pool heaters and storage tanks shall comply with the performance requirements stated in Table 9.36.4.2. (See Appendix A.)

2) Hot service water storage tanks not listed in Table 9.36.4.2. shall be covered with insulation having a minimum thermal resistance of 1.8 (m²·K)/W.

<table>
<thead>
<tr>
<th>Component</th>
<th>Input(1)</th>
<th>Standard</th>
<th>Performance Requirement(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Storage-Type Service Water Heaters</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric</td>
<td>≤ 12 kW (50 L to 270 L capacity)</td>
<td>CAN/CSA-C101</td>
<td>SL ≤ 35 + 3.20V (top inlet)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SL ≤ 40 + 0.20V (bottom inlet)</td>
</tr>
<tr>
<td></td>
<td>≤ 12 kW (&gt; 270 L and ≤ 454 L capacity)</td>
<td></td>
<td>SL ≤ (0.472V) – 38.5 (top inlet)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SL ≤ (0.472V) – 33.5 (bottom inlet)</td>
</tr>
<tr>
<td></td>
<td>&gt;12 kW (&gt; 75 L capacity)</td>
<td>ANSI Z21.10.3/CSA 4.3 and DOE 10 CFR, Part 431, Subpart G</td>
<td>S = 0.30 + 27N_m</td>
</tr>
<tr>
<td>Heat pump water heaters</td>
<td>≤ 24 A and ≤ 250 V</td>
<td>CAN/CSA-C745</td>
<td>EF ≥ 2.0</td>
</tr>
<tr>
<td></td>
<td>&lt; 22 kW</td>
<td>CAN/CSA-P3</td>
<td>EF ≥ 0.57 – 0.0005V</td>
</tr>
<tr>
<td></td>
<td>≥ 22 kW</td>
<td>ANSI Z21.10.3/CSA 4.3</td>
<td>E_1 ≥ 60% and standby loss ≤ rated input(1)(600 + 16.57·√V)</td>
</tr>
<tr>
<td>Gas-fired(1)</td>
<td>≤ 30.5 kW</td>
<td>CAN/CSA-B211</td>
<td>EF ≥ 0.59 – 0.0005V</td>
</tr>
<tr>
<td></td>
<td>&gt; 30.5 kW</td>
<td>ANSI Z21.10.3/CSA 4.3 and DOE 10 CFR, Part 431, Subpart G</td>
<td>E_1 ≥ 78% and standby loss ≤ rated input(1)(600 + 16.57·√V)</td>
</tr>
</tbody>
</table>
2.4.3. Location of Fixtures

2.4.3.1. Urinals

1) Urinals shall not be installed adjacent to wall and floor surfaces that are pervious to water. (See Article 3.7.2.6. of Division B of the NBC.)

2.4.3.2. Restricted Locations of Indirect Connections and Traps

1) Indirect connections or any trap that may overflow shall not be located in a crawl space or any other unfrequented area.

2.4.3.3. Equipment Restrictions Upstream of Grease Interceptors

1) Except as provided in Sentence (2), equipment discharging waste with organic solids shall not be located upstream of a grease interceptor. (See Appendix A.)

2) An organic solids interceptor may be installed upstream of a grease interceptor.

2.4.3.4. Fixtures Located in Chemical Storage Locations

1) A floor drain or other fixture located in an oil transformer vault, a high voltage room or any room where flammable, dangerous or toxic chemicals are stored or handled shall not be connected to a drainage system.

2.4.3.5. Macerating Toilet Systems

1) A macerating toilet system shall only be installed where no connection to a gravity sanitary drainage system is available.

2.4.3.6. Drains Serving Elevator Pits

1) Where a drain is provided in an elevator pit
   a) it shall be connected directly to a sump located outside the elevator pit, and
   b) the drain pipe that connects the sump to the drainage system shall have a backwater valve.

2.4.4. Treatment of Sewage and Wastes

2.4.4.1. Sewage Treatment

1) Where a fixture or equipment discharges sewage or waste that may damage or impair the sanitary drainage system or the functioning of a public or private sewage disposal system, provision shall be made for treatment of the sewage or waste before it is discharged to the sanitary drainage system.

2.4.4.2. Cooling of Hot Water or Sewage

1) Where a fixture discharges sewage or clear-water waste that is at a temperature above 75°C, provision shall be made for cooling of the waste to 75°C or less before it is discharged to the drainage system.

2.4.4.3. Interceptors

1) Where a fixture discharges sewage that includes fats, oils or grease and is located in a public kitchen, in a restaurant or in a care or detention occupancy, it shall discharge through a grease interceptor. (See Appendix A.)

2) Where the discharge from a fixture may contain oil or gasoline, an oil interceptor shall be installed. (See Article 2.5.5.2. for venting requirements for oil interceptors.)

3) Where a fixture discharges sand, grit or similar materials, an interceptor designed for the purpose of trapping such discharges shall be installed.

4) Every interceptor shall have sufficient capacity to perform the service for which it is provided.
Subject: Treatment of Sewage and Wastes

This bulletin has been jointly developed by Safety Services and the Plumbing Technical Council to inform the plumbing industry of the requirements associated with the installation of the following types of interceptors: grease, oil, sand/grit interceptors and the protecting of the drainage system.

Designers, Installers and Safety Codes Officers are reminded that where a fixture or equipment discharges sewage or waste that may damage or impair the sanitary drainage system or the functioning of a public or private sewage disposal system, provision shall be made for treatment of the sewage or waste before it is discharged to the sanitary drainage system. (See Appendix A) – A-2.4.4.4.(1)

FATS, OILS, GREASE (FOG)

N.P.C. - 2.4.4.3.(1) Where a fixture discharges sewage that includes fats, oils, or grease and is located in a public kitchen, in a restaurant or in a care or detention occupancy, it shall discharge through a grease interceptor. (See Appendix A.) – A-2.4.4.3.(3)

The intent of this requirement is to reduce the amount of FOG that will be discharged to the sewer system, which may cool and solidify within the drainage system, which could lead to blockage of the drainage system. Grease interceptor sizing and methods of installation can be found in the manufactures installation instructions and good engineering practices such as information found in ASPE 2008 Data Book -Volume 4, Chapter 8, Grease Interceptors or CSA B481 Series-12.
OIL OR GASOLINE

N.P.C. - 2.4.4.3.(2) Where the discharge from a fixture may contain oil or gasoline, an oil interceptor shall be installed. (See Article 2.5.5.2 for venting requirements for oil interceptors.)

2.5.5.2 Venting of Oil Interceptors
(See Appendix A.) (See also Article 4.3.5.2. of Division B of the AFC.)

1) Every oil interceptor shall be provided with 2 vent pipes that
   a) connect to the interceptor at opposite ends,
   b) extend independently to outside air, and
   c) terminate not less than 2 m above ground and at elevations differing by at least 300 mm.

2) Adjacent compartments within every oil interceptor shall be connected to each other by a vent opening.

Intent: To limit the probability that pressure differentials within oil interceptors will lead to an accumulation of flammable or explosive gases, which could lead to an explosion or fire, which could lead to harm to persons.

3) Where a secondary receiver for oil is installed in conjunction with an oil interceptor, it shall be vented in accordance with the manufacturer's recommendations, and the vent pipe shall
   a) in no case be less than 1 1/2 inches in size,
   b) extend independently to outside air, and
   c) terminate not less than 2 m above ground.

Intent: To limit the probability that a lack of vent pipes or the installation of vent pipes in a location where they are susceptible to blockage will lead to a restricted flow to the sump, which could lead to backups, which could lead to the entry of waste into occupied space, which could lead to unsanitary conditions, which could lead to harm to persons.

4) The vent pipes referred to in Sentence (1) are permitted to be one size smaller than the largest connected drainage pipe but not less than 1 1/4 inches in size, or can be sized in accordance with the manufacturer's recommendations.

5) Every vent pipe that serves an oil or grease interceptor and is located outside a building shall be not less than 3 inches in size in areas where it may be subject to frost closure.

OIL OR GASOLINE INTERCEPTOR PIPING MATERIAL

An objective of this Code is to limit the probability that, as a result of the design or installation of the plumbing system, a person in or adjacent to the building or facility will be exposed to an unacceptable risk of injury due to fire. The risks of injury due to fire addressed in this Code are those caused by - OS1.1 - fire or explosion occurring.

Installers are reminded that drainage and vent piping to oil interceptors must be suitable for the intended environment. Division A, Sentence 1.2.2.1.(1) states: "All materials, systems and equipment installed to meet the requirements of this code shall be free from defects and possess the necessary characteristics to perform their intended functions when installed."
ABS drain, waste and vent pipe and fittings should not be used to conduct sewage to an oil interceptor or to vent an oil interceptor. The intent of this requirement is to limit the probability that ABS would be severely effected by the interaction with oil products that accumulate in the oil interceptor.

Materials that are suitable for use include PVC pipe, copper tubing, and cast iron soil pipe.

The purpose of this notice is to ensure that Designers and Installers are aware of the provisions for venting oil interceptors and using materials suitable for the intended application.

A-2.5.5.2. Venting of Oil Interceptors.

![Diagram of oil interceptor venting](image)

Figure A-2.5.5.2. Venting of Oil Interceptors

SAND AND GRIT INTERCEPTORS

N.P.C. 2.4.4.3.(3) Where a fixture discharges sand, grit or similar materials, an interceptor designed for the purpose of trapping such discharges shall be installed.

The garage floor interceptor design and methods of installation as illustrated below are suitable on the basis of past performance.
Note: The cleanout shall be so located that it is accessible for use and protected from vehicular damage by using a ductile iron cover (minimum load rating 7,499 lbs) or equivalent material.

The minimum compartment inside dimensions is 600 mm (24 in.) by 600 mm (24 in.) for a Garage Floor Interceptor serving a service station, paint shop, workshop, and etc. The size of a Garage Floor Interceptor for a car wash or similar operation must be increased to suit the application.

A garage floor interceptor must be piped and vented in the same manner as a "floor drain" with exception of the required cleanout. The cleanout and any other piping shall not be located within the compartments in order to provide accessibility for cleaning and maintenance.

N.P.C. 2.4.4.3.(4) Every interceptor shall have sufficient capacity to perform the service for which it is provided.
1 Scope

1.1 This Code applies to the installation of
(a) *appliances, equipment, components, and accessories* where gas is to be used for fuel purposes;
(b) piping and tubing systems extending from the termination of the utility installation or from the
distributor’s propane tank;
(c) vehicle-refuelling appliances and associated equipment meeting the requirements of a
general-purpose appliance to fill a natural-gas-fuelled vehicle; and
(d) stationary gas *engines* and *turbines*.

1.2 This Code does not apply to
(a) marine or pipeline terminals;
(b) gas where used as a feedstock in petroleum refineries or chemical plants;
(c) utility pipeline distribution and transmission pipelines;
(d) storage and handling of liquefied natural gas or underground reservoirs for natural gas;
(e) the installation of NGV fuel systems, *containers*, and refuelling stations;
(f) the storage and utilization of compressed natural gas on boats;
(g) the installation of vehicle-refuelling appliances when NGV storage *containers* are installed as part of
the system;
(h) refrigerated storage or underground reservoirs for propane;
(i) propane used on boats;
(j) propane used as a propellant in aerosol containers;
(k) butane fuel cylinders of 150 g capacity or less; and
(l) the installation of *containers* and *equipment* to be used for propane in distribution locations and
filling plants and on tank trucks, tank trailers, and cargo liners.

1.3 Where the term “gas” is used, the requirements of this Code include, and apply equally to, any of the
following gases or mixtures of them: natural gas, manufactured gas, or mixtures of propane gas and air,
propane, propylene, butanes (normal butane or isobutane), and butylenes.

1.4 This Code and any Standards referenced in it do not make or imply any assurance or guarantee with
respect to the life expectancy, durability, or operating performance of equipment and materials
referenced in the Code.

1.5 The values given in yard/pound units are the standard. This Code contains SI (metric) equivalents to
yard/pound units so that the Code can be used in SI (metric) units. SI (metric) equivalents may be
approximate.
8.27 Manually operated flue dampers

8.27.1
A manually operated flue damper shall not be used with
(a) a residential appliance;
(b) an appliance equipped with a draft-control device; or
(c) a commercial- or industrial-type appliance, unless the damper is
   (i) provided with a fixed opening; and
   (ii) designed, constructed, and field tested to ensure safe operation at a fixed minimum opening.

8.27.2
When a baffle or neutral pressure point adjuster is used, it shall
(a) be located upstream of the draft regulator; and
(b) have a fixed safe minimum opening.

8.28 Installation of draft-control devices

8.28.1
When a draft-control device is either part of an appliance or supplied by the appliance manufacturer, it shall be installed in accordance with the appliance manufacturer's installation instructions.

8.28.2
A draft-control device shall be installed in the position for which it is designed with reference to the horizontal and vertical planes and shall be so located that relief openings are not obstructed.

8.29 Induced- or forced-draft devices

8.29.1
When an induced- or forced-draft device is used, provision shall be made to prevent the flow of gas to the burner on failure of the device.

8.29.2
A power venter certified for use as an add-on to a water heater may be used on a water heater that has an input of 50 000 Btuh (15 kW) or less.

8.30 Venting of appliances into canopies

8.30.1
An appliance may be vented through an exhaust canopy installed in a location other than a dwelling unit, provided that
(a) the canopy complies with the requirements of the local building code or, in the absence of such, with the requirements of the National Building Code of Canada;
(b) the exhaust volume of the canopy is sufficient to provide for capture and removal of grease-laden vapours and products of combustion;
(c) the appliance has an input not exceeding 400 000 Btuh (120 kW) and its flue outlet is directly under the canopy; and
(d) the appliance is interlocked with the exhaust in accordance with Clause 8.30.2, except where it is approved to ANSI Z83.11/CSA 1.8.
4.22.2
When an appliance is installed at elevations above 4500 ft (1350 m), the certified high-altitude input rating shall be reduced at the rate of 4% for each additional 1000 ft (300 m).

4.23 Protection of appliances from physical damage
Where an appliance is installed in an area where physical damage can be incurred, the appliance shall be protected from such damage.

4.24 Odorization

4.24.1
Natural gas used for fuel purposes supplying an occupied building shall be odorized in accordance with CSA Z662 or be otherwise readily detectable, or the building shall be equipped with an approved means of gas detection.

4.24.2
Propane distributed for fuel purposes shall be odorized in accordance with CAN/CGSB-3.14.

4.24.3
Odorization of the propane shall be the responsibility of the producer or processor, who shall indicate on the shipping document its compliance with CAN/CGSB-3.14 as referenced in Clause 4.24.2 of this Code.

4.25 Mobile homes and recreational vehicles

4.25.1
Every heating appliance, water heater, or refrigerator installed in a mobile home or a vehicle, other than a canvas-top tent trailer, shall be of the direct-vent appliance type or equivalent, and shall be installed to provide complete separation of the combustion system from the atmosphere of the space provided for living.

4.25.2
A combustion air inlet or flue gas outlet of an appliance or any other vehicle opening shall be located at least 3 ft (1 m) from any engine filler spout or liquid-level gauge of the vehicle if the intake, outlet, or opening is located above or at the same level. If any portion of such inlet, outlet, or opening is located below the spout or fixed-liquid-level gauge, the clearance shall be the sum of the vertical distance below the spout or fixed-liquid-level gauge plus 3 ft (1 m).

4.25.3
Propane vapour, at a pressure not in excess of 13 in w.c. (3.2 kPa), shall be supplied into the piping or tubing supplying any appliance.

4.25.4
An appliance installed in a propane-equipped mobile home or recreational vehicle shall be certified for use with propane.

4.25.5
Provision shall be made to ensure a supply of combustion air for an appliance, other than an appliance of the direct-vent type, as described in Clause 8.

4.25.6
An open door may be used as an alternative means of providing combustion or ventilation air to a
wash-mobile or food service vehicle, provided that the door is interlocked to the propane supply to ensure that the door remains open during appliance operation.

4.25.7
A cargo heater shall be installed in a readily accessible location.

4.25.8
A cargo heater shall be protected to prevent damage or impaired operation resulting from the shifting or handling of cargo.

4.25.9
A durable label in both English and French made of a material that is not adversely affected by water, employing an adhesive that is not water soluble, and measuring not less than 4.5 x 5.75 in (100 x 125 mm) shall be provided. This label shall be located on the vehicle, adjacent to the propane container, and shall be worded as follows:

(a) in English:
WARNING
This system is designed for use with PROPANE only.
DO NOT CONNECT NATURAL GAS TO THIS SYSTEM.

Before turning on propane:
• Be certain appliances are certified for propane and are equipped with correct burner orifices.
• Make certain all propane connections have been made tight, all appliance valves are turned off, and any unconnected outlets are capped.

After turning on propane:
• Light all pilots.
• Each connection, including those at appliances, regulators, and cylinders, shall be leak tested periodically with soapy water by the occupant. Never use a lighted match or other flame when checking for leaks.
• Do not leave system turned on or containers connected until system has been proven to be propane-tight.
• Cooking appliances must not be used for space heating.
• When the containers are disconnected, the propane supply line must be capped or plugged.

(b) in French:
AVERTISSEMENT
Cette installation est conçue pour fonctionner au PROPANE seulement.
NE PAS ALIMENTER CETTE INSTALLATION AVEC DU GAZ NATUREL.

Avant d’admettre le propane :
• S’assurer que l’appareil est certifié pour fonctionner au propane et qu’il est muni des orifices de brûleur appropriés.
• S’assurer que tous les raccordements sont étanches, que tous les robinets d’appareils sont fermés et que toutes les sorties non raccordées sont bouchées.

Après avoir ouvert l’admission de propane :
• Allumer toutes les veilleuses.
• L’occupant doit s’assurer périodiquement, à l’aide d’eau savonneuse, qu’il n’y a aucune fuite aux points de raccordement des appareils, des régulateurs et des bouteilles. Ne jamais utiliser une allumette allumée ou toute autre flamme pour déceler une fuite.
• Ne pas laisser le propane ni les récipients branchés avant de s’être assuré que l’installation ne présente aucune fuite de propane.
• Ne pas utiliser des appareils de cuisson pour réchauffer une pièce.
• Lorsque les récipients sont débranchés, la tuyauterie d’alimentation en propane doit être bouchée.
6.2.2.5. Air Contaminants

1) Air contaminants released within buildings shall be removed insofar as possible at their points of origin and shall not be permitted to accumulate in concentrations greater than permitted in the Industrial Ventilation Manual published by the American Conference of Governmental Industrial Hygienists.

2) Systems serving spaces that contain sources of contamination and systems serving other occupied parts of the building but located in or running through spaces that contain sources of contamination shall be designed in such a manner as to prevent spreading of such contamination to other occupied parts of the building.

3) Heating, ventilating and air-conditioning systems shall be designed to minimize the growth of micro-organisms. (See Appendix A.)

4) Air contaminants in spaces where workers will be present shall not exceed the occupational exposure limits set out in the Occupational Health and Safety Act and its Regulations.

6.2.2.6. Hazardous Gases, Dusts or Liquids

1) Except as provided in Subsection 6.2.12., systems serving spaces that contain hazardous gases, dusts or liquids, such as grain elevators, metal powder plants and ammonium nitrate storage, shall be designed, constructed and installed to conform to the requirements of this Code or, in the absence of specific requirements, to good engineering practice such as that described in the publications of the National Fire Protection Association and in the Alberta Fire Code 2014. (See Appendix A.)

2) When indoor piping for Class I flammable liquids is installed in a trench, the trench shall be
   a) provided with positive ventilation to the outdoors, or
   b) designed to prevent the accumulation of flammable vapours.

3) Ventilation systems in storage rooms where flammable liquids or combustible liquids are stored in compliance with the Alberta Fire Code 2014 shall provide at least 5 L/s of exhaust air per square metre of room area, but not less than 70 L/s in total.

4) Exhaust air from a ventilation system required in Sentence (3) shall be discharged outdoors and shall be taken from a point within 300 mm of the floor near a wall, with at least one makeup air inlet located near the opposite wall.

5) Makeup air openings for a ventilation system described in Sentence (3) shall be protected in conformance with the requirements of Subsection 3.1.8., where the makeup air is taken from within the building, and
   a) remote from any discharge referred to in Sentence (4), where the makeup air is taken from outside the building.

6) Ducts used to ventilate a flammable liquids or combustible liquids storage room described in Sentence (3) shall be used solely for that purpose.

7) Industrial ovens in which flammable vapours may be present or through which products of combustion are circulated shall be ventilated in accordance with NFPA 86, "Ovens and Furnaces."

6.2.2.7. Commercial Cooking Equipment

1) Systems for the ventilation of commercial cooking equipment shall be designed, constructed and installed to conform to NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," except as required by Sentence 3.6.3.1.(1) and Article 3.6.4.2.

2) Fire protection systems for commercial cooking equipment referred to in Sentence (1) using vegetable oil or animal fat shall conform to
   a) ANSI/UL 300, "Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment," or
   b) ULC/ORD-C1254.6, "Fire Testing of Restaurant Cooking Area Fire Extinguishing System Units."
Chapter 4  General Requirements

4.1 General.

4.1.1 Cooking equipment used in processes producing smoke or grease-laden vapors shall be equipped with an exhaust system that complies with all the equipment and performance requirements of this standard.

4.1.1.1* Cooking equipment that has been listed in accordance with UL 197 or an equivalent standard, for reduced emissions shall not be required to be provided with an exhaust system.

4.1.1.2 The listing evaluation of cooking equipment covered by 4.1.1.1 shall demonstrate that the grease discharge at the exhaust duct of a test hood placed over the appliance shall not exceed 3 mg/m² when operated with a total airflow of 0.236 m³/s (500 cfm).

4.1.2 All such equipment and its performance shall be maintained in accordance with the requirements of this standard during all periods of operation of the cooking equipment.

4.1.3 The following equipment shall be kept in working condition:

(1) Cooking equipment
(2) Hoods
(3) Ducts (if applicable)
(4) Fans
(5) Fire-extinguishing systems
(6) Special effluent or energy control equipment

4.1.3.1 Maintenance and repair shall be performed on all components at intervals necessary to maintain good working condition.

4.1.4 All airflows shall be maintained.

4.1.5 The responsibility for inspection, maintenance, and cleanliness of the ventilation control and fire protection of the commercial cooking operations shall be the ultimate responsibility of the owner of the system provided that this responsibility has not been transferred in written form to a management company or other party.

4.1.6* All solid fuel cooking equipment shall comply with the requirements of Chapter 14.

4.1.7 Multi-tenant applications shall require the concerted cooperation of design, installation, operation, and maintenance responsibilities by tenants and by the building owner.

4.1.8 All interior surfaces of the exhaust system shall be accessible for cleaning and inspection purposes.

4.1.9* Cooking equipment used in fixed, mobile, or temporary concessions, such as trucks, buses, trailers, pavilions, tents, or any form of roofed enclosure, shall comply with this standard.

4.2 Clearance.

4.2.1 Where enclosures are not required, hoods, grease removal devices, exhaust fans, and ducts shall have a clearance of at least 457 mm (18 in.) to combustible material, 76 mm (3 in.) to limited-combustible material, and 0 mm (0 in.) to noncombustible material.

4.2.2 Where a hood, duct, or grease removal device is listed for clearances less than those required in 4.2.1, the listing requirements shall be permitted.

4.2.3 Clearance Reduction.

4.2.3.1 Where a clearance reduction system consisting of 0.33 mm (0.013 in.) (28 gauge) sheet metal spaced out 25 mm (1 in.) on noncombustible spacers is provided, there shall be a minimum of 229 mm (9 in.) clearance to combustible material.

4.2.3.2 Where a clearance reduction system consisting of 0.69 mm (0.027 in.) (22 gauge) sheet metal on 25 mm (1 in.) mineral wool batts or ceramic fiber blanket reinforced with wire mesh or equivalent spaced out 25 mm (1 in.) on noncombustible spacers is provided, there shall be a minimum of 76 mm (3 in.) clearance to combustible material.

4.2.3.3 Zero clearance to limited-combustible materials shall be permitted where protected by metal lath and plaster, ceramic tile, quarry tile, other noncombustible materials or assembly of noncombustible materials, or materials and products that are listed for the purpose of reducing clearance.

4.2.4 Clearance Integrity.

4.2.4.1 In the event of damage, the material or product shall be repaired and restored to meet its intended listing or clearance requirements and shall be acceptable to the authority having jurisdiction.

4.2.4.2 In the event of a fire within a kitchen exhaust system, the duct and its enclosure (rated shaft, factory-built grease duct enclosure, or field-applied grease duct enclosure) shall be inspected by qualified personnel to determine whether the duct and protection method are structurally sound, capable of maintaining their fire protection function, and in compliance with this standard for continued operation.

4.2.4.3 Protection shall be provided on the wall from the bottom of the hood to the floor, or to the top of the noncombustible material extending to the floor, to the same level as required in 4.2.1.

4.2.4.4 The protection methods for ducts to reduce clearance shall be applied to the combustible or limited-combustible construction, not to the duct itself.

4.3 Field-Applied and Factory-Built Grease Duct Enclosures.

4.3.1 Field-applied grease duct enclosures shall be protected with a through-penetration firestop system classified in accordance with ASTM E 814 or UL 1479 having an "F" and "T" rating equal to the fire resistance rating of the assembly being penetrated.

4.3.1.1 The surface of the field fabricated grease duct shall be continuously covered on all sides from the point at which the duct enclosure penetrates a ceiling, wall, or floor to the outlet terminal.

4.3.1.2 The field-applied grease duct shall be listed in accordance with ASTM E 2396, and installed in accordance with the manufacturer's instructions and the listing requirements.

4.3.2* Where subjected to physical damage, field-applied grease duct enclosures shall be protected as deemed necessary by the authority having jurisdiction.

4.3.3 Factory-built grease duct enclosures shall be protected with a through-penetration firestop system classified in accordance with ASTM E 814 or UL 1479 having an "F" and "T" rating equal to the fire resistance rating of the assembly being penetrated from the point at which the duct penetrates a ceiling, wall, or floor to the outlet terminal.
6.2.2.8. Crawl Spaces and Attic or Roof Spaces

1) Unconditioned and unoccupied crawl spaces and unconditioned and unoccupied attic or roof spaces shall be ventilated by natural or mechanical means as required by Part 5. (See Appendix A.)

6.2.2.9. Projection Rooms

1) This Article applies to a projection room in which equipment is used to handle film more than 16 mm in width.

2) The temperature of a projection room shall be thermostatically controllable from within the projection room in order to maintain the temperature of the room at any value within the range of 18°C to 25°C.

3) A projection room exhaust air system shall be independent of any other air system in the building.

6.2.3. Air Duct Systems

6.2.3.1. Application

1) This Subsection applies to the design, construction and installation of air duct distribution systems serving heating, ventilating and air-conditioning systems other than those in dwelling units covered by Part 9.

6.2.3.2. Materials in Air Duct Systems

1) All ducts, duct connectors, associated fittings and plenums used in air duct systems shall be constructed of materials as described in Article 3.6.5.1.

2) Ducts that are used in a location where they may be subjected to excessive moisture shall have no appreciable loss of strength when wet and shall be resistant to moisture-induced corrosion.

3) All ductwork and fittings shall be constructed and installed as recommended in SMACNA Manuals and ASHRAE Standards.

4) All duct materials shall be suitable for exposure to the temperature and humidity of the air being carried and shall be resistant to corrosion caused by contaminants in the air being conveyed in the duct.

5) A crawl space shall not be used as a supply air plenum.

6.2.3.3. Connections and Openings in Air Duct Systems

1) Air duct systems shall have
   a) tight-fitting connections throughout, and
   b) no openings other than those required for the proper operation and maintenance of the system.

2) Access openings shall be provided in duct systems to allow the removal of material that may accumulate in plenums and ducts.
Fire-resistance rating means the time in minutes or hours that a material or assembly of materials will withstand the passage of flame and the transmission of heat when exposed to fire under specified conditions of test and performance criteria, or as determined by extension or interpretation of information derived therefrom as prescribed in this Code. (See Appendix Note D-1.2.1.(2) of Division B.)

Fire-retardant-treated wood means wood or a wood product that has had its surface-burning characteristics, such as flame spread, rate of fuel contribution and density of smoke developed, reduced by impregnation with fire-retardant chemicals.

Fire separation means a construction assembly that acts as a barrier against the spread of fire. (See Appendix A.)

Fire stop means a system consisting of a material, component and means of support used to fill gaps between fire separations or between fire separations and other assemblies, or used around items that wholly or partially penetrate a fire separation.

Fire stop flap means a device intended for use in horizontal assemblies required to have a fire-resistance rating and incorporating protective ceiling membranes, which operates to close off a duct opening through the membrane in the event of a fire.

Firewall means a type of fire separation of noncombustible construction that subdivides a building or separates adjoining buildings to resist the spread of fire and that has a fire-resistance rating as prescribed in this Code and has structural stability to remain intact under fire conditions for the required fire-rated time.

First storey means the uppermost storey having its floor level not more than 2 m above grade.

Flame-spread rating means an index or classification indicating the extent of spread-of-flame on the surface of a material or an assembly of materials as determined in a standard fire test as prescribed in this Code.

Flammable liquid means a liquid having a flash point below 37.8°C and having a vapour pressure not more than 275.8 kPa (absolute) at 37.8°C as determined by ASTM D 323, “Vapor Pressure of Petroleum Products (Reid Method).”

Flash point means the minimum temperature at which a liquid within a container gives off vapour in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

Floor area means the space on any storey of a building between exterior walls and required firewalls, including the space occupied by interior walls and partitions, but not including exits, vertical service spaces, and their enclosing assemblies.

Flue means an enclosed passageway for conveying flue gases.

Flue collar means the portion of a fuel-fired appliance designed for the attachment of the flue pipe or breeching.

Flue pipe means the pipe connecting the flue collar of an appliance to a chimney.

Foamed plastic means all materials that are homogeneous systems comprised of at least two phases, one is a continuous polymeric organic material and the second one is deliberately introduced for the purpose of distributing a gas in voids throughout the material, thereby achieving a reduction in density of the base material. Examples include, but are not limited to, polysisocyanurate foam, polystyrene foam, polyurethane foam and polyvinyl chloride foam.

Food establishment means premises where food that is intended for consumption by the public is served, offered for sale, displayed, processed, packaged, stored or handled.

Forced-air furnace means a furnace equipped with a fan that provides the primary means for the circulation of air.

Foundation means a system or arrangement of foundation units through which the loads from a building are transferred to supporting soil or rock.

Foundation unit means one of the structural members of the foundation of a building such as a footing, raft or pile.

Frost action means the phenomenon that occurs when water in soil is subjected to freezing which, because of the water/ice phase change or ice lens growth, results