IMPORTANT

Ontario Customers: The *B139 Series-15* dated January 2015 is the version currently in force in Ontario.

*B139 Series-15* was published in January 2015. It was revised with *Update No. 1*, published in May 2016.

Since the TSSA has not yet adopted the May 2016 update, the version dated January 2015 is the version currently in force in Ontario. It is expected that TSSA will adopt the update but the adoption date is unknown.

These are the pages from the January 2015 version that were replaced by the update.
(e) vehicle heaters;
(f) construction heaters; and
(g) stationary internal combustion engines when used for shaft-power applications for buildings.

**Note:** For installation of internal combustion engines for emergency power applications, see also CSA C282 and CSA Z32. Both these Standards refer to CSA B139 Series for installation of accessories such as fuel tanks and piping.

### 1.5
This Code provides minimum requirements for installing or altering ancillary equipment, including
(a) piping and tubing systems;
(b) pumps;
(c) control devices;
(d) venting systems;
(e) accessories;
(f) heat distribution systems that affect the proper operation of the oil-burning equipment;
(g) central oil distribution systems; and
(h) underground supply tanks, above-ground outdoor tanks, and above-ground tanks installed inside of buildings.

### 1.6
This Code provides requirements for the maintenance of the most commonly used types of oil-burning equipment.

### 1.7
This Code provides recommended precautions for filling tanks (see Annex I).

### 1.8
This Code does not apply to
(a) process equipment installed in refineries;
(b) appliances installed in mobile housing, recreational vehicles, and marine craft;
(c) portable devices such as lamps, blowtorches, melting pots, and weed burners; or
(d) integral fuel tanks of 45 L (10 gal) capacity or less on internal combustion engines.

**Note:** For installation of oil-burning equipment in mobile housing and recreational vehicles, see the CAN/CSA-Z240 MH Series.

### 1.9
In this Code, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; and “may” is used to express an option or that which is permissible within the limits of the standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

### 1.10
The values given in SI units are the units of record for the purposes of this Code. The values given in parentheses are for information and comparison only.

### 1.11
Figures and tables that are referenced with the prefix “B” are to be found in Annex B of the B139.1.0 Code.
2 Reference publications

2.1 This Code refers to publications for products and materials that are listed in Annex A, which is a mandatory part of this Code.

2.2 This Code refers to the following publications, and where such reference is made, it shall be to the edition listed below.

**CSA Group**

B51-09

*Boiler, pressure vessel, and pressure piping code*

B140 series of Standards

- B140.0-03 (R2013)
  *Oil-burning equipment: General requirements*

- B140.1-1966 (R2011)
  *Vapourizing-type oil burners*

- B140.2.1-10
  *Atomizing-type oil burners*

- B140.2.2-1971 (R2011)
  *Pressure atomizing oil burner nozzles*

- B140.2.3-M1981 (withdrawn)
  *Replacement burners and replacement combustion heads for residential oil burners*

- B140.3-1962 (R2011)
  *Oil burning stoves and water heaters*

- CAN/CSA-B140.4-04 (R2009)
  *Oil-fired warm air furnaces*

- B140.7-05 (R2010)
  *Oil-burning equipment: steam and hot-water boilers*

- B140.8-1967 (R2011)
  *Portable industrial oil-fired heaters*

- B140.9.1-1972 (R2011)
  *Portable liquid fuelled catalytic appliances*

- B140.9.2-10
  *Portable, pressurized-type, liquid-petroleum-fuelled camp stoves*

- CAN3-B140.9.3-M86 (R2011)
  *Portable kerosine-fired heaters*

- B140.9.4-10
  *Portable, pressurized-type, liquid-petroleum-fuelled lamps and lanterns*
B140.10-06 (R2011)
Oil-fired warm-air heating appliances for mobile housing and recreational vehicles

CAN/CSA-B140.11-M89 (R2010)
Oil/gas-fired commercial/industrial pressure washers and steam cleaners

B140.12-03 (R2013)
Oil-burning equipment: service water heaters for domestic hot water, space heating, and swimming pools

CAN/CSA-B140.14-M1979 (withdrawn)
Automatic flue-pipe dampers for use with oil-fired appliances

CAN/CSA-B149.1-10
Natural gas and propane installation code

CAN/CSA-B149.2-10
Propane storage and handling code

CAN/CSA-B214-12
Installation code for hydronic heating systems

C22.1-12
Canadian Electrical Code, Part I, Safety Standard for Electrical Installations

C22.2 No. 3-M1988 (R2009)
Electrical features of fuel-burning equipment

C282-09
Emergency electrical power supply for buildings

Z32-09
Electrical safety and essential electrical systems in health care facilities

CAN/CSA-Z240 RV Series-08 (R2013)
Recreational vehicles

CAN/CSA-Z662-11
Oil and gas pipeline systems

ANSI/SMACNA (American National Standards Institute/Sheet Metal and Air Conditioning Contractors’ National Association)
Rectangular Industrial Duct Construction Standards, 2004

Round Industrial Duct Construction Standards, 2004

API (American Petroleum Institute)
Tank Inspection, Repair, Alteration, and Reconstruction

ASME (American Society of Mechanical Engineers)
B31.1-2012
Power Piping

B31.3-2012
Process Piping
Figure B.16(c)
(See Clause 6.5.3 of CSA B139.2.)

Option 3: Steel reinforced concrete patio stones

Tank legs are to be centered at midpoint of reinforced concrete patio stone

150 mm (6 in) of 3/4 in clear stone or "A" gravel mechanically compacted along bottom and around all exposed sides of patio stones (typ.)

2 - 450 mm × 900 mm × 65 mm (18 in × 36 in × 2.6 in) reinforced concrete patio stone (21 mpa - 3000 psi) c/w fibre reinforcement and/or 6 × 6-w4/w4 steel welded wire mesh

T/O patio stone to be flush with surrounding soil

Impervious layer (top soil)

Undisturbed non-organic free draining, densely compacted soil

Oil tank

Slope grade min. 2% from pad at all locations

2 - 450 mm × 900 mm × 75 mm (18 in × 36 in × 3 in) reinforced concrete patio stone (21 mpa - 3000 psi) c/w fibre reinforcement and/or 6 × 6-w4/w4 steel welded wire mesh

150 mm (6 in) of 3/4 in clear stone or "A" gravel mechanically compacted along bottom and around all exposed sides of patio stones (typ.)
6.2.3
Where the engine fuel supply is from an auxiliary supply tank, the auxiliary supply tank shall be equipped with a level control device that shall
(a) when the fuel level in the tank reaches not more than 90% of the auxiliary supply tank’s maximum fuel storage capacity, result in either
   (i) the fill line pumps being shut off; or
   (ii) the closing of an automatic valve installed on the fill line to the tank; the automatic valve shall fail close on loss of power or control signal; and
(b) be equipped with a separate circuit that, when the fuel level in the tank reaches not more than 95% of the tank’s maximum fuel storage capacity, shall result in either
   (i) the fill line pumps being shut off and an alarm to annunciate; or
   (ii) the automatic valve required in Clause 6.2.3(a)(ii) to close and an alarm to annunciate.

Note: This requirement is not meant to prevent operating the auxiliary tank in a continuous overflow condition, provided the overflow is set at a lower tank level than 90% and the tank venting requirements are met. However, caution should be used when using continuous overflow when venting the auxiliary tank through the overflow pipe to the main supply tank.

6.2.4
An electrically powered level control device and automatic valves for auxiliary supply tanks supplying generators shall be provided with continuous power.

Note: Tying into the generator circuit and main power is acceptable.

6.3 Venting of engine supply tanks
Venting of supply tanks and auxiliary supply tanks shall comply with the requirements of CSA B139.1.0.

6.4 Operating temperature

6.4.1
Except as permitted by Clauses 6.4.2 and 6.4.3, an engine supply tank shall be located and operated so that the temperature of the oil in the tank does not exceed 38 °C (100°F).

6.4.2
Where an auxiliary supply tank is located inside a building and is vented through the overflow pipe to the main supply tank, the requirements of Clause 6.4.1 shall not apply.

6.4.3
Where an engine supply tank is located inside a building and is vented directly to atmosphere, the oil temperature in the engine supply tank
(a) shall not exceed 52 °C (125°F) if the tank serves emergency equipment, emergency generators, or stand-by generators, and
   (i) The normal vent is provided with a pressure/vacuum vent cap rated to open at 3.5 kPa (8 oz) positive pressure or less and relieve vacuum at 250 Pa (1 in. w.c.) or less.
   (ii) Normal and emergency vent terminations shall be located at least 3.5 m (11.5 ft) above adjacent ground level and 1.5 m (5 ft) from any building opening, and be so arranged that vapours will not enter the building or be trapped near any part of the building.
   (iii) The engine return oil pipe shall be installed in accordance with Clause 5.1.3.
   (iv) The fuel oil system is designed to keep the engine supply tank oil temperature from not exceeding 52° C (125°F); and
(b) shall not exceed 38 °C (100°F) if the tank serves non-emergency equipment including prime or continuous duty generators, and
   (i) The engine return oil pipe shall be installed in accordance with Clause 5.1.3.
   (ii) The fuel oil system is designed to keep the engine supply tank oil temperature from not exceeding 38 °C (100°F).
1.4
This Code provides minimum requirements for installing or altering ancillary equipment, including
(a) piping and tubing;
(b) control devices;
(c) venting systems;
(d) accessories;
(e) heat distribution systems that affect the proper operation of the oil-burning equipment; and
(f) above-ground supply tanks that have a maximum individual capacity of 2500 L (550 gal) and a
maximum total capacity of 5000 L (1100 gal).

Note: Underground fuel oil tank installations of any size and above-ground installations over 2500 L (550 gal) are covered by CSA B139.1.0, CSA B139.1.1, and CSA B139.1.2.

1.5
This Code provides requirements for the maintenance of the most commonly used types of oil-burning equipment.

1.6
This Code provides recommended precautions for filling tanks (see Annex I).

1.7
This Code does not apply to
(a) process equipment installed in refineries;
(b) appliances installed in mobile housing, recreational vehicles, and marine craft;
(c) portable devices such as lamps, blowtorches, melting pots, and weed burners; or
(d) installations supplying oil-fuelled stationary engines.

Note: For installation of oil-burning equipment in mobile housing and recreational vehicles, see CAN/CSA-Z240 MH Series.

1.8
In this Code, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; and “may” is used to express an option or that which is permissible within the limits of the standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

1.9
The values given in SI (metric) units are the standard. The values given in parentheses are for information only.

1.10
Figures and tables that are referenced with the prefix “B” are to be found in Annex B of CSA B139.1.0.

Note: For example, a reference in this Code to “Table B.1” means Table B.1 in Annex B of CSA B139.1.0.

2 Reference publications
Clause 2 of CSA B139.1.0 applies to this Code. This Code refers to publications for products and materials that are listed in Annex A of CSA B139.1.0, which is a mandatory part of CSA B139.1.0.
(c) if it is a double-wall vacuum monitored tank, so that the vacuum gauge is clearly visible after installation; and
(d) so that it does not interfere with the required working space of any electrical panel or apparatus. A minimum working space of 1 m (3.3 ft) horizontally shall be provided.

6.4.5
A bottom outlet tank shall be installed to permit removal of water by being pitched towards the outlet with a longitudinal slope of not less than 2% (1/4 in per foot);

Note: Bottom connections with sloped supports are preferred for metallic tanks to minimize the accumulation of water in the bottom of the tank.

6.4.6
Any unused openings in a tank shall be sealed vapour- and liquid-tight.

6.4.7
Metallic end outlet tanks shall
(a) be sloped 2% (1/4 in/ft) toward the outlet; and
(b) have a dedicated opening for the purpose of water testing and removal that shall be
   (i) located at the top of the tank;
   (ii) a minimum 50 mm (2 in) diameter opening;
   (iii) centred within 200 mm (8 in) from the outlet end of the tank; and
   (iv) provided with a capped pipe long nipple.

6.5 Outdoor tank foundations

6.5.1
The tank foundation shall be
(a) non-combustible;
(b) designed to prevent uneven settlement of the tank and to prevent overturning or uplifting of the tank;
(c) designed to prevent the pooling of water in the contact area between the tank or tank supports and the foundation if the material of the tank or its supports is subject to corrosion; and
(d) installed in accordance with the manufacturer’s instructions.

6.5.2
The site shall be prepared as follows:
(a) The existing soil shall be removed to a minimum depth of 150 mm (6 in) or until undisturbed subsoil is reached.
(b) The removed soil shall then be replaced with crushed, clean, compacted stone.

6.5.3
Outdoor tanks shall be supported on either
(a) a one-piece reinforced concrete slab with a compressive strength of 21 MPa (3,045 psi) (see Figure B.16(a)); and
   (i) for tanks up to 1000 L (222 gal) capacity, the slab shall be a minimum of 90 mm (3.5 in) thick and extend 150 mm (6 in) past the tank foot print on each side;
   (ii) for tanks over 1000 L (222 gal) capacity, the slab shall be a minimum of 140 mm (5.5 in) thick and extend 150 mm (6 in) past the tank foot print on each side;
   (iii) the minimum required reinforcement shall be 150 mm x 150 mm (6 in by 6 in) W4/W4 welded wire mesh to prevent the foundation slab from cracking as a result of uneven settling; and
   (iv) the wire mesh shall be installed at the midpoint of the slab height and 150 mm (6 in) smaller on all sides than the slab plan dimension;
(b) except as restricted by Clause 6.5.4, precast rebar-reinforced concrete sleepers or reinforced concrete patio stones* (see Figure B.16(b) and Figure B.16(c)), and
  (i) if installed parallel to the support legs or cradles, the sleepers shall provide continuous support for the legs or cradles;
  (ii) if the sleepers are installed perpendicular to the support legs or cradles, then sufficient sleepers shall be installed side by side to support the legs or cradles for their complete length;
  (iii) the sleepers shall be a minimum of 100 mm thick × 200 mm wide (4 in × 8 in) and be long enough to extend 150 mm (6 in) past each side or end of the tank;
  (iv) the minimum requirement for reinforced concrete patio stones shall be 65 mm high × 460 mm wide × 950 mm long (2.6 in × 18 in × 36 in); and
  (v) the sleepers or patio stones shall be firmly bedded in the stone on all exposed sides to prevent lateral movement; or
(c) pressure-treated wood sleepers,† used under tank legs or cradles (see Figure B.16(d)), provided that
  (i) they are placed below grade and in contact with the ground; the top surface may be exposed;
  (ii) the minimum requirements for pressure-treated wood sleepers shall be 150 mm × 150 mm (6 in × 6 in) and of sufficient length to extend 150 mm (6 in) past each side or end of the tank;
  (iii) cut ends of pressure-treated wood sleepers shall be treated with wood preservative;
  (iv) pressure-treated wood sleepers shall be firmly bedded in the stone on all exposed sides to prevent lateral movement; and
  (v) the top face of pressure-treated wood sleepers shall be flush with the surrounding grade.

*Non-reinforced concrete patio stones are not considered acceptable for tank foundations.
†Foundation materials should be suitable for ground or soil contact and not contain combustible preservative material.

6.5.4
The top of the foundation support described in Clause 6.5.3(a) or (b) shall be a minimum of 25 mm (1 in) above the highest point of the surrounding grade to ensure the tank supports do not sit in water.

6.5.5
Where anchoring is required due to wind load, seismic movement, buoyancy, or any other concerns, a reinforced concrete slab is the only acceptable foundation. Buoyancy calculations might indicate slab dimensions greater than those indicated in Clause 6.5.3(a).

6.5.6
For horizontal (flat) tanks, four reinforced concrete patio stones may be used (see Figure B.16(e)).

6.5.7
A tank that has any part of its body in contact with the foundation shall have secondary containment and shall be monitored for leaks. Where secondary containment is provided in accordance with an approved secondary containment standard,* monitoring shall be conducted in accordance with that document.

*For example, ULC/ORD-C142.20.

6.6 Elevated tank installations in designated areas

6.6.1
In addition to the requirements in Clause 6.3.3, an above-ground tank may be installed outdoors on an elevated stand, provided
(a) the installation is located only in geographical areas designated by the authority having jurisdiction;
(b) the stand has been designed by a professional engineer;
(c) the stand is of non-combustible construction and need not be provided with fire resistance protection;
(d) the stand is acceptable to the tank manufacturer and installed in accordance with the tank manufacturer’s instructions; and
(e) safe access to the tank for the purpose of operation, servicing, and inspection shall be provided.
(ii) a double bottom with interstitial monitoring between the steel walls, unless the supply tank is a non-metallic tank in compliance with CAN/ULC-S670.

(b) The capacity of any one tank or combination of end or bottom-connected tanks shall not exceed 2500 L (550 gal).

(c) The total capacity of tanks shall not exceed 5000 L (1100 gal).

(d) When the total capacity of the tanks connected to one supply line exceeds 2500 L (550 gal),

(i) all connections for the transfer of oil to and from the consuming appliance shall be situated at the top of the tanks;

(ii) transfer shall be by appliance integrally mounted pump only; and

(iii) means shall be provided to prevent siphoning through the line to the consuming appliances.

7.3.5

All oil supply lines for outside located tanks specified in Clause 7.3.4 shall be

(a) a single-line system connected to the top of the tank and a de-aerator shall be installed in accordance with Clause 5.1.3;

(b) a standard weight carbon or stainless steel pipe with a minimum nominal diameter of 32 mm (1-1/4 in) connected to the end or bottom of the tank; the supply line may transition to copper tubing after the line has passed into the building; or

(c) a stainless steel flexible line with a minimum diameter of 25 mm (1 in) with the provision to transition to copper tubing as specified in Item (b).

7.3.6

Piping installed in accordance with

(a) Clause 7.3.5(a) shall run horizontally and be supported to the building; and

(b) Clause 7.3.5(b) or (c) shall be installed with a downward minimum slope of 1% (1/8 in/ft) until it enters the building.

7.3.7

Piping or tubing from the tank to the building shall be installed in accordance with Clause 5.2.6.

7.4 Multiple end- or bottom-connected supply tanks (see Figure B.11(a) and B.11(b))

7.4.1

Supply tanks installed indoors or outdoors at ground level and using end or bottom connections to a common appliance supply line shall comply with Clause 7.4.2.

7.4.2

A maximum of two supply tanks with a total capacity of 2500 L (550 gal) or less may be interconnected at their ends or bottoms, provided that

(a) The two tanks are mounted on a common installation pad foundation.

(b) The tops of the two tanks are at the same elevation.

(c) The fill pipe is connected to one tank only, unless otherwise certified.

(d) A vent whistle or warning device in accordance with Clause 8.2.1 or 8.2.2 is installed on the tank to which the fill pipe is connected.

(e) The size of the connecting pipe between the tank ends or bottoms is at least the size of the fill pipe.

(f) Each tank is individually vented from the top.

(g) Where individual vents are to be joined to a common vent pipe,

(i) They shall do so through a vent manifold pipe located at an elevation above that of the entry of each fill pipe to an individual tank.

(ii) Each tank's vent pipe shall be at least 50 mm (2 in) in size and the common vent pipe and manifold shall be at least 76 mm (3 in) in size or as supplied by the multiple tank system manufacturer or designed by a professional engineer.
8.2.3
The release prevention barrier specified in Clause 8.2.2 shall be constructed of a material compatible with the product to be contained, and
(a) be capable of containing a minimum of 2.5% of the tank’s volumetric capacity; and
(b) be placed
(i) below the centreline running the entire length of the vertical standing obround supply tank; or
(ii) under the entire tank area where the standard obround supply tank is placed in either the vertical or horizontal (flat) position.

8.3 Tank venting — Venting of supply tanks

8.3.1
Each supply tank over 45 L (10 gal) capacity shall be provided with means for venting, and the piping for the venting of the tank shall meet the requirements of Clause 5.2. Vent pipe termination points on supply tanks shall not be located higher than 4.15 m (13-1/2 ft) above the bottom of the tank, unless the tank is in compliance with Clause 6.2.2.2.

**Note:** See Annex I for recommended fill operations.

8.3.2
Where a tank is provided with a separate emergency vent connection, the venting of the tank shall comply with the requirements of Clause 10.5 of CSA B139.1.0.

8.3.3
Vent pipes shall meet the following requirements:
(a) A single tank shall have a vent pipe with a minimum nominal inside diameter selected on the basis of equivalent length, as listed in Table 1. The vent pipe nominal inside diameter conforming to iron pipe size standards shall not be less than 32 mm (1-1/4 in).

**Table 1**

<table>
<thead>
<tr>
<th>Tank capacity, L (gal)</th>
<th>Vent pipe nominal steel pipe size, NPS</th>
<th>Maximum equivalent length, m (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1200 (264 gal)</td>
<td>32 (1-1/4)</td>
<td>≤ 7.6 m (25 ft)</td>
</tr>
<tr>
<td></td>
<td>38 (1-1/2)</td>
<td>15.2 m (50 ft)</td>
</tr>
<tr>
<td></td>
<td>50 (2)</td>
<td>30.5 m (100 ft)</td>
</tr>
<tr>
<td>1201–1500 (265–333)</td>
<td>65 (2-1/2)</td>
<td>28.5 m (93 ft)</td>
</tr>
<tr>
<td></td>
<td>75 (3)</td>
<td>85 m (280 ft)</td>
</tr>
<tr>
<td></td>
<td>100 (4)</td>
<td>350 m (1148 ft)</td>
</tr>
<tr>
<td>1501–2500 (334–555)</td>
<td>65 (2-1/2)</td>
<td>15 m (50 ft)</td>
</tr>
<tr>
<td></td>
<td>75 (3)</td>
<td>45 m (148 ft)</td>
</tr>
<tr>
<td></td>
<td>100 (4)</td>
<td>190 m (623 ft)</td>
</tr>
</tbody>
</table>

(b) For all tanks, pipe sizes for vent pipes of equivalent length exceeding the values in Table 1 shall be designed by a professional engineer.