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Amendment No. 1, September 2022
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Supersedes CAN/CGSB-3.511-2016
and Amendment No. 2, July 2018



Oxygenated automotive gasoline containing ethanol (E1-E10 and E11-E15)

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CAN/CGSB-3.511-2021
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Preface

This National Standard of Canada CAN/CGSB-3.511, *Oxygenated automotive gasoline containing ethanol (E1-E10 and E11-E15)* was published in October 2021. This edition was followed by Amendment No. 1 (September 2022) and Corrigendum No. 1 (August 2023).

Changes to the 2016 edition

- Under 6.5, new sentence that addresses wording previously used in footnote f to broaden its applicability.
- Addition of ASTM D7525 as an alternative method for oxidation stability with a minimum limit of 20 minutes.
- Addition of ASTM D8071 as an alternative test method for the determination of oxygen content, ethanol, methanol and benzene respectively.
- Modification of footnote e to indicate the required use of the equation for DVPE in ASTM D5482.
- Modification of footnote f to indicate the required use of the predicted DVPE equation in ASTM D6378.
- Modification of footnote h to indicate that the relative bias of ASTM D7345 versus the automated ASTM D86 is to be corrected using the information and equations provided in that ASTM D7345.
- Update of references to regulations.
- Rewording of footnotes in Tables 3B, 3C and 3D to better reflect the *Ontario Volatility* regulation.
- Addition of references to Newfoundland & Ontario Regulations.
- Addition of decimal points to all trailing zeroes in Tables 3A to 3H.
- Various editorial fixes related to the CGSB Style Manual.

Amendment No. 1 – Changes to the 2021 edition

- Update Tables 3E, 3F, 3H and Annex B.2.5 to reflect regulatory changes in Newfoundland and Labrador.

Corrigendum

- Added missing reference to table footnote a in Table 3F.
- Update Table 3H, DVPE limit for Sept 1-15 to 110 kPa to reflect the corresponding value in CAN/CGSB-3.5-2021 Amendment No. 1.

The following definitions apply in understanding how to implement this National Standard of Canada:

- "shall" indicates a **requirement**;
- "should" indicates a **recommendation**;
- "may" is used to indicate that something is **permitted**;
- "can" is used to indicate that something is **possible**, for example, that an organization is able to do something.

Notes accompanying clauses do not include requirements or alternative requirements. The purpose of a note accompanying a clause is to separate explanatory or informative material from the text. Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

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Oxygenated automotive gasoline containing ethanol (E1-E10 and E11-E15)

1 Scope

This National Standard of Canada applies to two types of oxygenated gasoline, E1-E10 (“Type A”) and E11-E15 (“Type B”), to which no lead or phosphorus compounds have been added, and in which the oxygenate consists essentially of ethanol. They are intended for use in spark-ignition engines under a wide range of climatic conditions. Each type may be supplied in one of four grades which differ in anti-knock index (octane rating).

Type B oxygenated gasoline in this standard is intended for use in automotive vehicles that are compatible with oxygenated gasoline containing up to 15 % by volume ethanol (see 9.6).

This standard is not intended to apply to the mixing of oxygenated gasolines and gasolines, either at the point of retail sale or after the point of retail sale.

Provincial, territorial and federal regulations control some parameters included in this standard, and when such government regulations are more restrictive, they supersede the requirements in this standard.

The testing and evaluation of a product against this standard may require the use of materials and/or equipment that could be hazardous. This document does not purport to address all the safety aspects associated with its use. Anyone using this standard has the responsibility to consult the appropriate authorities and to establish appropriate health and safety practices in conjunction with any applicable regulatory requirements prior to its use.

Units of measurement – Quantities and dimensions used in this standard are provided in units from the International System of Units (SI units). This standard expresses the industry standard nominal measurements in North America of “% by mass” and “% by volume”. The SI equivalent expressions for these units are % (m/m) and % (V/V) respectively.

2 Normative references

The following normative documents contain provisions that, through reference in this text, constitute provisions of this National Standard of Canada. The referenced documents may be obtained from the sources noted below.

Note: The contact information provided below was valid at the date of publication of this standard.

An undated reference is to the latest edition or revision of the reference or document in question, unless otherwise specified by the authority applying this standard. A dated reference is to the specified revision or edition of the reference or document in question.

2.1 Canadian General Standards Board (CGSB)

CAN/CGSB-3.0 — *Methods of testing petroleum and associated products:*

No. 14.3 — *Standard test method for the identification of components in automotive gasoline using gas chromatography*

No. 19.5 — *Determination of lead in automotive gasoline (Atomic absorption)*

No. 28.8 — *Visual haze rating of liquid fuels*

No. 60.32 — *Standard test method for determination of the corrosiveness to silver of gasoline, middle distillate fuels and oxygenated fuels using silver wool – Rapid ultrasonic method*

CAN/CGSB-3.516 — *Denatured fuel ethanol for use in automotive spark-ignition fuels*

2.1.1 Contact information

The above may be obtained from the Canadian General Standards Board. Telephone: 1-800-665-2472. E-mail: ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca. Web site: www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html. They may also be obtained from the Government of Canada Publications, Publishing and Depository Services, Public Services and Procurement Canada. Telephone: 1-800-635-7943 or 613-941-5995. Fax: 1-800-565-7757 or 613-954-5779. Email: publications@tpsgc-pwgsc.gc.ca. Web site: <http://publications.gc.ca/site/eng/home.html>.

2.2 ASTM International

Annual book of ASTM standards (see Annex A)

2.2.1 Contact information

The above may be obtained from ASTM International. Telephone: 610-832-9585. Fax: 610-832-9555. Web site: www.astm.org. It can also be obtained from IHS Markit. Telephone: 613-237-4250 or 1-800-267-8220. Fax: 613-237-4251. Web site: www.global.ihs.com.

2.3 Environment and Climate Change Canada (ECCC)

Benzene in Gasoline Regulations (SOR/97-493)

Sulphur in Gasoline Regulations (SOR/99-236)

2.3.1 Contact information

The above may be obtained from the Department of Justice Canada, Communications Branch. Web site: <http://laws-lois.justice.gc.ca/eng/index.html>. If this website becomes inoperative, regulations may also be found at www.canlii.org.

2.4 NACE International

TM0172 — *Determining Corrosive Properties of Cargoes in Petroleum Product Pipelines*

2.4.1 Contact information

The above may be obtained from NACE International. Telephone: 281-228-6200. Web site: www.nace.org. E-mail: firstservice@nace.org.

2.5 Transport Canada (TC)

Transportation of Dangerous Goods Regulations (SOR/2001-286)

2.5.1 Contact information

The above may be obtained from the Department of Justice Canada, Communications Branch. Web site: <http://laws-lois.justice.gc.ca/eng/index.html>. If this Web site becomes inoperative, regulations may also be found at www.canlii.org.

2.6 United States Environmental Protection Agency (U.S. EPA)

Certified Gasoline Detergents

2.6.1 Contact information

The above may be obtained from the U.S. Environmental Protection Agency, Transportation and Air Quality. Web site: <http://www3.epa.gov/otaq/fuels1/ffars/web-detrg.htm>.

2.7 See Annex B for other acts and regulations that apply to oxygenated automotive gasoline containing ethanol.

3 Terms and definitions

For the purposes of this National Standard of Canada, the following terms and definitions apply.

antiknock index

average of the Research (*RON*) and Motor (*MON*) octane number for the fuel, i.e. $(RON + MON)/2$.

benzene emissions number (BEN)

estimate of the evaporative, running and tailpipe benzene emissions from vehicles that is calculated in accordance with Schedule 1 of the *Benzene in Gasoline Regulations* (see Annex B, B.1.6).

closed loop side stream sampler

sample line connected to a storage tank or pipeline capable of extracting a sample and re-injecting any excess back into the product being sampled.

denatured fuel ethanol

commercially manufactured ethanol containing denaturant, as required by the *Denatured and Specially Denatured Alcohol Regulations* – SOR/2006-103, which makes the ethanol suitable for use in automotive spark-ignition engines and unsuitable for beverage or medicinal use.

driveability index (DI)

parameter based on distillation temperatures. It is designed to ensure good vehicle performance relating to time-to-start, stalls, hesitations, stumbles, surges and backfiring. It is defined as

$$DI = 1.5 \times T10 + 3 \times T50 + T90 + f \times (\% \text{ volume ethanol})$$

where:

T10, T50, T90 = temperatures (°C) at 10%, 50%, and 90% evaporated in a distillation test (see 6.20);

% volume ethanol = concentration of ethanol in the finished gasoline, in % by volume;

f = the multiplier for % volume ethanol, with the following assigned values.

% volume ethanol	<i>f</i>
1.0-10.	1.33
11	2.12
12	2.90
13	3.69
14	4.47
15	5.26

DI can be converted to its degrees Fahrenheit equivalent, as follows:

$$DI_F = 1.8 \times DI + 176$$

where:

$$DI_F = DI \text{ based on } ^\circ\text{F};$$

$$DI = DI \text{ based on } ^\circ\text{C}.$$

DVPE

dry vapor pressure equivalent.

ethanol

ethyl alcohol, the chemical compound $\text{CH}_3\text{CH}_2\text{OH}$.

grade

oxygenated gasoline as differentiated by the antiknock index, with Grade 1 having the lowest index (see 4.1.2).

oxygenate

oxygen-containing organic compound, such as an alcohol or ether, which may be used as a fuel or blend component.

oxygenated gasoline

fuel conforming to the requirements of this standard.

phase separation

formation of two layers: a lower aqueous layer and an upper hydrocarbon layer, separated by a common boundary or layer of emulsion.

point of blending

location where finished gasoline is produced by mixing gasoline with gasoline components. Blending does not include the mixing of finished gasolines or the addition of additives to finished gasoline.

point of retail sale

location where the end user takes delivery of the product.

primary supplier

for gasoline that is

- a) manufactured in a refinery, the manufacturer;
- b) imported, the importer; and
- c) blended, the blender.

primary terminal

distribution facility that

- a) is connected directly to a refinery; or
- b) can be supplied by pipeline from a refinery; or
- c) receives imported product directly; or
- d) is located on the Great Lakes and can be supplied by ship.

proportional sample

sample made by combining samples from different batches in volumetric proportion.

recirculation loop

pipng and a transfer pump configured into a loop and used to mix the product in a storage tank by recirculating the product from one part of the tank to another.

sample integrity

no significant change in the detailed requirement being tested, i.e., between the sample point and the analytical equipment.

type

oxygenated gasoline as differentiated by the percentage by volume ethanol, with Type A having 1.0 % to 10 % by volume and Type B having 11 % to 15 % by volume.

water tolerance

ability of a gasoline-alcohol blend to dissolve water without phase separation.

yearly pool average

volume weighted average of a parameter in the gasoline supplied by a primary supplier during a calendar year.

4 Classification

4.1 The oxygenated gasoline shall be supplied in the following types and grades, as specified (see 8.1).

4.1.1 Types

Type A — E1-E10;

Type B — E11-E15.

4.1.2 Grades

Grade 1 — Regular;

Grade 2 — Mid-grade;

Grade 3 — Premium;

Grade 4 — Super-premium.

5 General requirements

5.1 The gasoline shall comply with this standard at the point of retail sale except for the volatility requirements specified in 5.2.

5.2 Volatility requirements

The requirements for DVPE, distillation, and driveability index are adjusted by geographic zone of intended use and time of year. The zones are described in Table 2 and shown in Figures 1, 2 and 3. The limiting values for each zone are listed in Tables 3A to 3H.

5.3 Vapour pressure

When finished oxygenated gasoline is blended with a component that can increase the DVPE of the blend, the DVPE limits apply to the blended product at the point of blending.

5.3.1 Vapour pressure, maximum

Maximum DVPE limits at or below 72 kPa are set by provincial regulations to minimize evaporative losses in fuel distribution and from vehicles and equipment. DVPE limits at or below 72 kPa in Tables 3A to 3H may be waived by the regulator but shall not exceed 72 kPa (see Annex B).

5.3.2 Vapour pressure, minimum

Minimum DVPE limits are intended to help minimize formation of a flammable mixture in the vapour space of fuel tanks at low ambient temperatures.

5.4 The volatility requirements specified in 6.18, 6.19 and 6.20 shall be for the period and geographic zone of intended use, detailed in Tables 3A to 3H, with compliance at one of the following:

- a) primary terminal;
- b) point of entry into Canada.

The volatility schedules detailed in Tables 3A to 3H include a half-month period for turning over inventory at service stations, when necessary. A longer turnover period at times close to seasonal weather changes could result in degraded vehicle performance.

5.5 Oxygenated automotive gasolines containing ethanol may contain additives designed to improve the characteristics of the blend. Additives include but are not limited to metal deactivators, oxidation inhibitors, corrosion inhibitors, icing inhibitors and fuel system detergents. Additives designed and tested to enhance performance shall be added in amounts less than 1.0 % by volume, unless otherwise specified in this standard.

5.6 Vehicles require effective fuel system detergency to minimize engine deposits that impair performance and increase exhaust emissions.

5.7 Aldehydes, ketones, amines, acids, acid esters, halogenated compounds, silicon compounds, soluble polymers, used lubricating oils and solvents or other such materials shall not be added except as components of additives defined in 5.5 or as normally occurring trace constituents.

5.8 The oxygenated gasoline shall be visually clear and free from undissolved water, sediment and suspended matter under the temperature and conditions of custody transfer. Components shall be thoroughly mixed to prevent the sale of compositions that do not meet the standard or are potentially damaging due to stratification in dispensing tankage.

5.9 Materials used in refinery processes, such as caustics and acids, can be carried over in trace quantities into the gasoline and could cause unexpected problems. Moreover, these contaminants may not be detected by the standard tests listed in this standard. It is recommended that adequate quality assurance procedures be put in place to ensure that any refinery processing materials are identified and controlled.

6 Detailed requirements

6.1 Ethanol

The ethanol component (see 6.15) shall meet the requirements of type 1 or type 2 denatured fuel ethanol in CAN/CGSB-3.516.

6.2 The oxygenated gasoline shall comply with the specified limiting values. The specified limiting values shall not be changed. This precludes any allowances for the test method precision and for adding or subtracting digits.

6.2.1 For purposes of determining conformance with the specified limiting values, an observed value or a calculated value shall be rounded “to the nearest unit” in the last right-hand digit used in expressing the specified limiting value, in accordance with the rounding method of ASTM E29. There is one exception (see Table 1, Antiknock index).

6.2.2 Zeroes trailing the last nonzero digit for numbers represented with a decimal point are significant digits, in accordance with ASTM E29.

6.2.3 Where test values differ between two parties, a resolution shall be in accordance with ASTM D3244 in order to determine conformance with the specified limiting values, with the criticality of the limits set at $P = 0.5$.

6.3 Test methods other than those referenced in this standard may be used only if they have been validated in accordance with ASTM D3764 or D6708. Test methods validated by ASTM D4855 prior to 2010 may also be used. These are referred to as validated test methods.

6.3.1 Differences in precision, sensitivity and bias between the referee test methods referenced in the standard and the validated test methods shall be considered.

6.3.2 Validated test methods shall only be used within the bounds of the data covered in their validation.

6.4 In the event of a dispute, the procedures given in 6.2.1, 6.2.2 and 6.2.3 shall be used. If parties in a dispute cannot agree on an analytical method to resolve the dispute, the method listed in the standard shall be used. Where more than one method is listed for a given detailed requirement, the referee method shall be used.

6.5 Differences in precision, sensitivity and bias between the referee test methods and alternate methods listed in the standard shall be considered. When using alternate test methods referenced in this standard, users are cautioned to develop their own supporting data for correlation with the referee test method if the results are outside of the range quoted for the specific alternative test method’s precision and bias.

Property		Specified limiting values			
		All grades		Test methods	
		Min.	Max.	ASTM	CGSB (except 6.7)
6.6	Copper strip corrosion, 3 h at 50 °C	—	No. 1	D130	—
6.7	Corrosion, steel in water	—	B+	D7548	NACE TM-0172 ^a
6.8	Solvent washed gum content, mg/100 mL	—	5	D381	—
6.9	Lead content, mg/L ^b	—	5	D3237 D5059	CAN/CGSB-3.0 No. 19.5 ^a —

Property		Specified limiting values			
		All grades		Test methods	
		Min.	Max.	ASTM	CGSB (except 6.7)
6.10	Manganese content, mg/L	—	18	D3831	—
6.11	Oxidation stability, ^c (Induction period) min. or (Induction period) min.	240. 20.	— —	D525 ^a D7525	— —
6.12	Phosphorus content, mg/L	—	1.3	D3231	—
6.13	Sulphur content, mg/kg (see 6.27)	—	80.	D2622 D3120 D5453 ^a D7039 D7220	—
6.14	Oxygen content % by mass	Report		D4815 D5599 D6729 D6730 D8071	CAN/CGSB-3.0 No. 14.3 ^a
6.15	Ethanol ^d % by volume Type A Type B	1.0 11	10. 15	D4815 D5599 D6729 D6730 D8071	CAN/CGSB-3.0 No. 14.3 ^a
6.16	Methanol content % by volume	—	0.30	D4815 D5599 D6729 D6730 D8071	CAN/CGSB-3.0 No. 14.3 ^a
6.17	Antiknock performance	See Table 1		D2699 ^a D2700 ^a D2885	—
6.18	Dry vapour pressure equivalent (DVPE)	See Tables 3A to 3H		D4953 D5191 ^a D5482 ^e D6378 ^f	—
6.19	Driveability index	See Tables 3A to 3H		See Section 3, driveability index	—
6.20	Distillation	See Tables 3A to 3H		D86 ^a and ^g D7345 ^h	—

Property		Specified limiting values			
		All grades		Test methods	
		Min.	Max.	ASTM	CGSB (except 6.7)
6.20.1	Final boiling point, °C	—	225	D86 ^{a and g} D7345 ^h	—
6.21	Appearance at 20 to 25 °C, visual haze rating	—	1	—	CAN/CGSB-3.0 No. 28.8
6.22	Benzene content ⁱ , % by volume (see 6.26)	—	1.5	D6729 D8071	CAN/CGSB-3.0 No. 14.3 ^a
6.23	BEN (see 6.26) ^j	Report		—	—
6.24	Silver corrosion (see 9.2), Silver wool, or Silver strip	— —	B No. 1	— D7671	CAN/CGSB-3.0 No. 60.32 ^a —

^a The referee method(s) to be used in the event of a dispute.

^b The test methods identified were primarily developed for the determination of lead from alkyl lead addition. Caution is advised in the application of this method when determining lead contamination, which is suspected to originate from non-alkyl lead sources.

^c Oxidation stability can degrade over time. Suppliers should make appropriate allowances in order that this detailed requirement is met at point of sale.

^d Metered (measured) volumes may be used for reporting in place of analytical tests.

^e The DVPE value shall be reported using the equation given in ASTM D5482. With some instruments the DVPE calculation is done automatically.

^f The DVPE value shall be reported using the appropriate “Predicted DVPE” equation given in ASTM D6378.

^g ASTM Test Method D86 utilizes either manual or automated equipment. In cases of dispute, the automated test method shall be selected as the referee test method.

^h ASTM D7345 showed relative bias for some results versus the automated D86 (the referee test method). Reported results shall be bias-corrected to test method D86 using the equations and information given in ASTM D7345.

ⁱ In this standard, benzene content and BEN requirements shall conform to the *Benzene in Gasoline Regulations*, Schedule 1 (Annex B, B.1.6).

6.25 Deposit control additive

All gasoline retailed in Canada shall contain a deposit control additive sufficient to meet either:

- a) an intake valve deposit requirement of less than 100 mg average deposit mass per valve after a 16 093.0 km (10 000 mile) driving cycle, or less than 25 mg average deposit mass per valve after a 8046.5 km (5000 mile) driving cycle as specified by ASTM D5500; or
- b) an intake valve deposit requirement of less than 135 mg average deposit mass per valve after a 100 h dynamometer test cycle as specified by ASTM D6201.

6.25.1 The addition of a deposit control additive, sometimes referred to as a detergent package, is required to comply with 6.25. Proof of performance shall be provided by:

- a) certification by the deposit control additive supplier that the dosage recommended to the gasoline marketer/producer meets or exceeds the minimum as listed with the U.S. EPA; or

- b) certification by the marketer/producer that the gasoline meets the intake valve deposit limits given in 6.25 for the ASTM D5500 test; or
- c) certification by the marketer/producer that the gasoline meets the intake valve deposit limits given in 6.25 for the ASTM D6201 test.

In any case, the marketer/producer shall maintain records of volumes of gasoline and additives, to show that the gasoline does contain the amount of additive stated.

6.26 Benzene and BEN (benzene emissions number) are controlled by the federal *Benzene in Gasoline Regulations* (see Annex B, B.1.6). In accordance with the regulation, the maximum benzene content allowed for any batch of complying gasoline is 1.5 % by volume at point of final sale; this applies to primary suppliers (manufacturers, importers and blenders) who elect to produce gasoline to an annual pool average of 0.95%. The default compliance option in the regulation is a 1.0 % by volume flat limit without any associated yearly pool average. A number of options exist for the BEN limit, for details consult the *Benzene in Gasoline Regulations*.

6.27 Sulphur is controlled by the Federal *Sulphur in Gasoline Regulations* (see Annex B, B.1.7). In accordance with the regulations, the maximum sulphur content allowed for any batch of complying low-sulphur gasoline is 80 mg/kg. Primary suppliers (refiners, blenders, or importers) may elect to meet an annual pool average of 10 mg/kg. The default compliance option in the regulation is a 12 mg/kg flat limit without any associated yearly pool average. A temporary sulphur compliance unit trading system is in effect from January 1, 2020 until December 31, 2025.

7 Inspection

7.1 Sampling

Sampling equipment and procedures shall be designed and used to obtain representative samples of the product. Sampling lines, hose volumes, etc. should be flushed prior to taking a sample. Sampling containers shall be appropriate for preserving the integrity of the sample for the detailed requirement being determined and are described in ASTM D5842 and D5854. Sampling procedures recommended in ASTM D4057, D4177, D5842 and D5854 are acceptable but may not be applicable to all situations. Alternative procedures, which may be more appropriate, are described in 7.1.2, 7.1.3 and 7.1.4.

7.1.1 Sample volume shall be consistent with the requirements of the testing laboratory and/or the authority having jurisdiction. Unless otherwise specified (see 8.1), a sample of at least 3 L shall be collected.

7.1.2 Storage tanks

7.1.2.1 Closed loop side stream samplers designed to minimize volatile light-end losses during sampling may be used. The sample shall be transferred to the container using the procedures described in ASTM D5842. If the temperature of either the sample or container is above the initial boiling point of the product, precooling of the sample is required.

7.1.2.2 Samples may be taken from tank recirculation loops, provided that the recirculation time and intensity is sufficient to effect complete mixing of the product in the tank. The sampling probe and sample transfer shall be consistent with the requirements in ASTM D5842.

7.1.3 On-line analyses

The sampling system used for ASTM D2885 may also be used for other on-line analyses. Results may be obtained either as volumetric weighted averages of multiple determinations or as single determinations on proportional samples. The sampling system shall be connected to the on-line analyzer in a manner that ensures sample integrity is maintained.

7.1.4 Retail dispensers

Samples taken from retail dispensers shall be taken as described in ASTM D5842¹ to minimize splashing and vapour loss. The hose shall be flushed immediately prior to taking a sample. A minimum flushing volume of 4 L is required to ensure a representative sample is obtained from all types of dispensers.

7.1.5 Samples for visual inspection are prone to failure due to contamination from rain, snow and dust, or from sediment in sampling lines or equipment. If contamination is detected, a subsequent sample shall be taken to ensure that the contamination is not due to the sampling system.

7.1.6 To determine sampling equipment and procedure requirements, refer to local regulations. To determine sample transport requirements, refer to the *Transportation of Dangerous Goods Regulations* (see Annex B, B.1.4).

8 Options

8.1 The following options shall be specified in the application of this standard:

- a) type (see 4.1.1 and 6.15);
- b) grade (see 4.1.2 and Table 1);
- c) volatility requirements (Tables 3A to 3H);
- d) sample size, if other than as specified (see 7.1.1).

9 Precautions

9.1 Incorporating additives

The user is cautioned against incorporating other additives in the gasoline unless detailed test data are first obtained, confirming that performance is improved without harmful side effects.

9.2 Fuel level sending units

Premature failures of some silver alloy fuel level sending units can relate to reactive sulphur species in gasoline.

9.3 Filtration

It is recommended that all fuel dispensers be equipped with filters of 10 µm or less nominal pore size at point of retail sale to the customer.

9.4 Water tolerance

Blends of gasoline and ethanol can dissolve a significant amount of water under normal conditions, depending on the amount of ethanol used, the specific hydrocarbons present, and the temperature of the blend. Exposure to water can occur during off-loading into a storage facility tank or over time as the oxygenated gasoline is exposed to moisture in air. When blends are exposed to a greater amount of water than they can dissolve, they separate into two phases or layers. Blends containing ethanol are generally hygroscopic and can, with time, absorb sufficient moisture from the ambient air to cause separation. Separation can be avoided if fuels are sufficiently water-free initially and care is taken during distribution and use to prevent contact with water. An appearance test such as

¹ Ensure that the sample container material is appropriate for the type of analysis to be performed. Guidelines for sample containers are given in ASTM D5842 and D5854.

CAN/CGSB-3.0 No. 28.8 may be used to assess susceptibility to phase separation by performing the test at the temperature to which the blended fuel will be exposed.

9.5 Polymeric contamination

Abnormally high unwashed gums (see ASTM D381), measured prior to the addition of deposit control additives, can provide an indication of contamination by polymeric materials.

9.6 Type B oxygenated gasoline use

Some vehicles, motorcycles, small engines, and equipment were not designed for Type B oxygenated gasoline (E11 – E15) as defined in this standard and use of such fuel blends could result in unsatisfactory or unsafe operation and engine or equipment damage.

Figure 1 — Map of Geographic Zones — Canada Overview

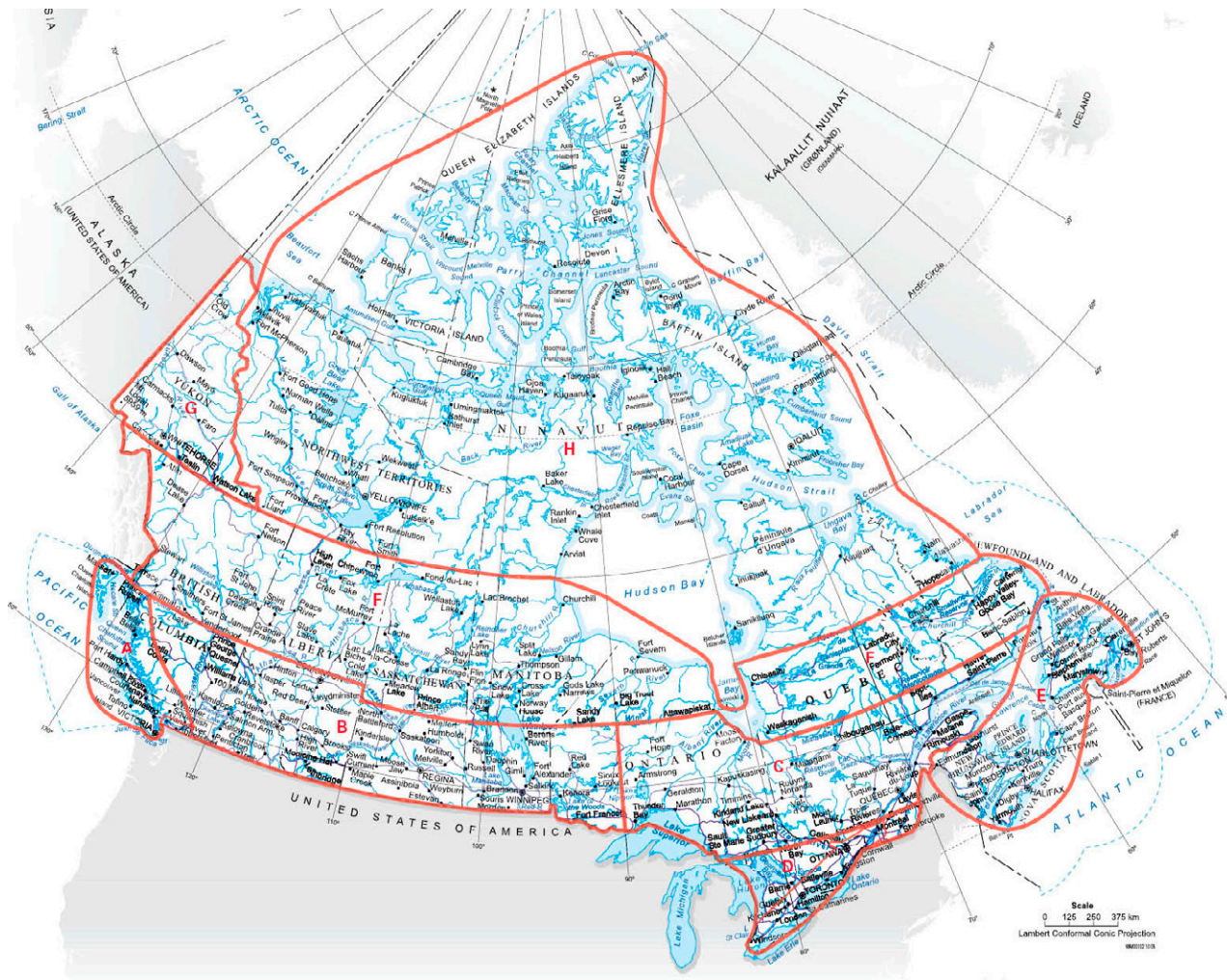


Figure 2 — Map of Geographic Zones — Western Canada



Figure 3 — Map of Geographic Zones — Eastern Canada

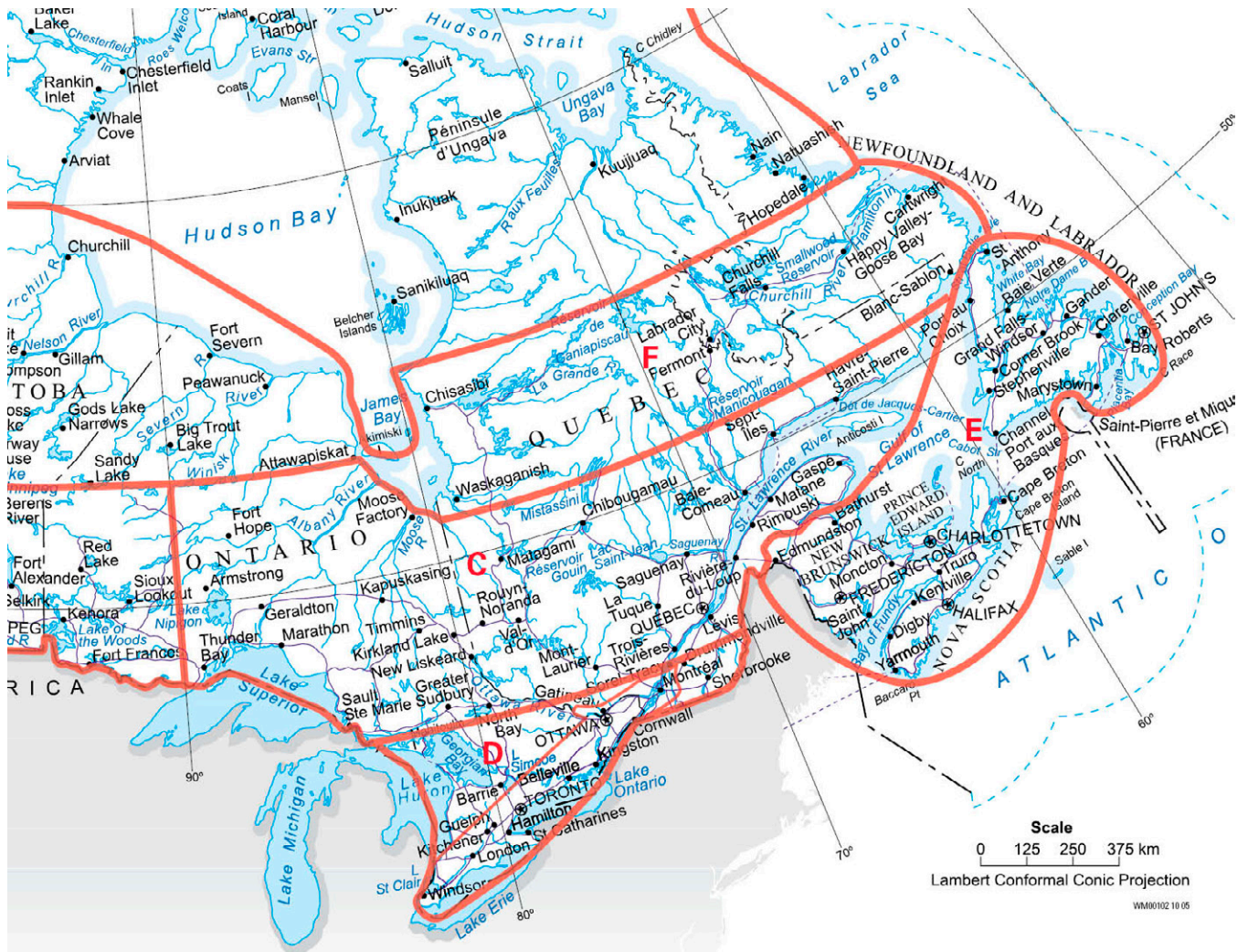


Table 1 — Gasoline antiknock performance

Grade	Antiknock index^a (RON + MON)/2 Min.	Motor octane number (MON) Min.
Grade 1 — Regular	87.0	82.0
Grade 2 — Mid-grade	89.0	—
Grade 3 — Premium	91.0	—
Grade 4 — Super-premium	93.0	—

^a The antiknock index shall be reported to the nearest 0.1 unit at point of manufacture or point of import and to the nearest 0.5 unit at the point of sale using the rounding method described in ASTM E29 (see 6.2.1).

Table 2 — Geographic zone definitions

Zone	Short description	Definition ^a
A	Coastal British Columbia	All the islands off the coast of British Columbia, the Lower Fraser Valley (LFV) ^b and that portion of the mainland within a nominal 100 km of the west coast of British Columbia between latitudes 49° 30' North and 54° North ^c .
B	South Western Canada	The portions of Ontario west of 90° West longitude and south of latitude 53° North, Manitoba south of latitude 53° North, Saskatchewan south of latitude 53° North, Alberta south of latitude 54° North, British Columbia south of latitude 54° North excluding Zone A (Coastal British Columbia).
C	Northern Ontario and Central Quebec	The portions of Ontario north of latitude 46° North, south of latitude 53° North and east of 90° West longitude and Quebec north of latitude 46° North and south of latitude 51° North.
D	Southern Ontario and Southern Quebec	The portions of Ontario and Quebec south of latitude 46° North, including the Seaway Corridor Sub Zone (SCSZ) ^d .
E	Atlantic Canada	The island of Newfoundland, the provinces of New Brunswick, Nova Scotia, and Prince Edward Island and les Îles-de-la-Madeleine.
F	Northern Canada	The portions of British Columbia and Alberta north of latitude 54° North, Saskatchewan, Manitoba, and Ontario north of latitude 53° North; Quebec between latitudes 51° North and 55° North; and Labrador south of latitude 55° North.
G	Yukon	The Territory of the Yukon.
H	Arctic Canada	All of the Northwest Territories, Nunavut and the portions of Quebec (Nunavik) and Labrador north of latitude 55° North.

^a See Figures 1, 2 and 3 for the approximate locations of the geographic zones.

^b The Lower Fraser Valley sub-zone means that part of British Columbia bounded on the north by latitude 49°30', on the west by longitude 123°20', and on the east by longitude 121°15'. It is defined in the BC *Cleaner Gasoline Regulation* (see Annex B, B.2.2.1).

^c Zone A includes the towns of Whistler and Pemberton. The town of Bella Coola may be supplied with either Zone A or Zone B quality.

^d The Seaway Corridor Sub-Zone (SCSZ) is defined in two parts:

1) That part of Ontario that lies south of a straight line passing through Arnprior and Grand Bend. Where the line so described runs across a local municipality, the entire local municipality is part of the sub-zone. This is defined by the *Ontario Regulation* (see Annex B, B.2.7.1).

2) That part of Southwestern Quebec defined in the *Québec Petroleum Products Act* (see Annex B, B.2.9.1) as "The Outaouais-Montréal Corridor". See Annex C for the municipalities in the Outaouais-Montréal Corridor.

Table 3A — Volatility requirements for Zone A (Coastal British Columbia)

Zone volatility limits		Coastal British Columbia									
		All the islands off the coast of British Columbia, the Lower Fraser Valley (LFV) ^a and that portion of the mainland within a nominal 100 km of the west coast of British Columbia between latitudes 49° 30' North and 54° North.									
		DVPE			T10 Evaporation		T50 Evaporation			T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max. ^b (kPa)	Max. ^b (kPa) LFV	Min. (°C)	Max. (°C)	Min. (°C)	Min (°C) LFV	Max. (°C)	Max. (°C)	Max. ^c (°C)
January	1 - 15	45	110.		—	60.	60.		120.	190.	575
January	16 - 31	45	110.		—	60.	60.		120.	190.	575
February	1 - 15	45	110.		—	60.	60.		120.	190.	575
February	16 - 28 (29)	45	110.		—	60.	60.		120.	190.	575
March	1 - 15	35	110.		—	70.	60.		120.	190.	590.
March	16 - 31	35	110.		—	70.	60.		120.	190.	590.
April	1 - 15	35	110.		—	70.	60.		120.	190.	590.
April	16 - 30	35	97	72 ^d	—	70.	60.	66	120.	190.	590.
May	1 - 15	35	97	72	—	70.	60.	66	120.	190.	590.
May	16 - 31	35	97	72	—	70.	60.	66	120.	190.	590.
June	1 - 15	35	72	62	35	70.	66		120.	190.	590.
June	16 - 30	35	72	62	35	70.	66		120.	190.	590.
July	1 - 15	35	72	62	35	70.	66		120.	190.	590.
July	16 - 31	35	72	55	35	70.	66		120.	190.	590.
August	1 - 15	35	72	55 ^d	35	70.	66		120.	190.	590.
August	16 - 31	35	72	62 ^d	35	70.	66		120.	190.	590.
September	1 - 15	35	97	72	—	70.	60.	66	120.	190.	590.
September	16 - 30	35	97		—	70.	60.		120.	190.	590.
October	1 - 15	35	110.		—	70.	60.		120.	190.	590.
October	16 - 31	35	110.		—	70.	60.		120.	190.	590.
November	1 - 15	35	110.		—	70.	60.		120.	190.	590.
November	16 - 30	45	110.		—	60.	60.		120.	190.	575
December	1 - 15	45	110.		—	60.	60.		120.	190.	575
December	16 - 31	45	110.		—	60.	60.		120.	190.	575

^a The Lower Fraser Valley sub-zone means that part of British Columbia bounded on the north by latitude 49°30', on the west by longitude 123°20', and on the east by longitude 121°15'. It is defined in the BC *Cleaner Gasoline Regulation* (see Annex B, B.2.2.1).

^b See 5.3.1.

^c If the required maximum DVPE is less than 72 kPa then the maximum DI shall be 597.

^d LFV: 72 kPa maximum applies starting April 16, 55 kPa maximum only applies ending August 14, 62 kPa maximum applies starting August 15. From July 16 to August 14, a 7 kPa waiver on maximum DVPE is allowed for specific ethanol blends under the BC *Cleaner Gasoline Regulation* (see Annex B, B.2.2.1).

Table 3B — Volatility requirements for Zone B (South Western Canada)

Zone volatility limits		South Western Canada							
		The portions of Ontario west of 90° West longitude and south of latitude 53° North, Manitoba south of latitude 53° North, Saskatchewan south of latitude 53° North, Alberta south of latitude 54° North, British Columbia south of latitude 54° North excluding Zone A (Coastal British Columbia).							
		DVPE		T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max. ^a (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
January	1 - 15	85	110.	—	50.	60.	110.	185	540.
January	16 - 31	85	110.	—	50.	60.	110.	185	540.
February	1 - 15	65	110.	—	50.	60.	110.	185	550.
February	16 - 28 (29)	65	110.	—	50.	60.	110.	185	550.
March	1 - 15	65	110.	—	50.	60.	110.	185	550.
March	16 - 31	50.	110.	—	55	60.	110.	190.	560.
April	1 - 15	45	97	—	60.	60.	120.	190.	575
April	16 - 30	45	97	—	60.	60.	120.	190.	575
May	1 - 15	45	86	—	60.	62	120.	190.	575
May	16 - 31	35	86	—	70.	66	120.	190.	590.
June	1 - 15	35	72	35	70.	66	120.	190.	590.
June	16 - 30	35	72	35	70.	66	120.	190.	590.
July	1 - 15	35	72	35	70.	66	120.	190.	590.
July	16 - 31	35	72	35	70.	66	120.	190.	590.
August	1 - 15	35	72	35	70.	66	120.	190.	590.
August	16 - 31	35	72	35	70.	66	120.	190.	590.
September	1 - 15	35	86 ^b	—	70.	62	120.	190.	590.
September	16 - 30	45	86	—	70.	62	120.	190.	590.
October	1 - 15	45	97	—	60.	60.	120.	190.	575
October	16 - 31	45	110.	—	60.	60.	120.	190.	575
November	1 - 15	50.	110.	—	55	60.	110.	185	560.
November	16 - 30	50.	110.	—	55	60.	110.	185	560.
December	1 - 15	65	110.	—	50.	60.	110.	185	550.
December	16 - 31	65	110.	—	50.	60.	110.	185	550.

^a See 5.3.1

^b The Ontario *Volatility Regulation* sets a maximum limit of 72 kPa starting June 1 and ending on either August 31 or September 14, depending upon specific conditions (see Annex B, B.2.7.1). Note that the 72 kPa limit is defined as being absolute in this Regulation.

Table 3C — Volatility requirements for Zone C (Northern Ontario and Central Quebec)

Zone volatility limits		Northern Ontario and Central Quebec The portions of Ontario lying north of latitude 46° North, south of latitude 53° North and east of 90° West longitude and Quebec lying north of latitude 46° North and south of latitude 51° North.							
		DVPE		T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max. ^a (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
January	1 - 15	85	110.	—	50.	60.	110.	185	540.
January	16 - 31	85	110.	—	50.	60.	110.	185	540.
February	1 - 15	85	110.	—	50.	60.	110.	185	540.
February	16 - 28 (29)	65	110.	—	50.	60.	110.	185	550.
March	1 - 15	65	110.	—	50.	60.	110.	185	550.
March	16 - 31	50.	110.	—	55	60.	110.	185	560.
April	1 - 15	50.	110.	—	55	60.	110.	185	560.
April	16 - 30	45	97	—	60.	60.	120.	190.	575
May	1 - 15	45	97	—	70.	60.	120.	190.	590.
May	16 - 31	35	86	—	70.	62	120.	190.	590.
June	1 - 15	35	72	35	70.	66	120.	190.	590.
June	16 - 30	35	72	35	70.	66	120.	190.	590.
July	1 - 15	35	72	35	70.	66	120.	190.	590.
July	16 - 31	35	72	35	70.	66	120.	190.	590.
August	1 - 15	35	72	35	70.	66	120.	190.	590.
August	16 - 31	35	72	35	70.	66	120.	190.	590.
September	1 - 15	35	97 ^b	—	70.	60.	120.	190.	590.
September	16 - 30	35	110.	—	70.	60.	120.	190.	590.
October	1 - 15	45	110.	—	60.	60.	120.	190.	575
October	16 - 31	45	110.	—	60.	60.	120.	190.	575
November	1 - 15	45	110.	—	60.	60.	110.	190.	575
November	16 - 30	50.	110.	—	55	60.	110.	185	560.
December	1 - 15	65	110.	—	50.	60.	110.	185	550.
December	16 - 31	65	110.	—	50.	60.	110.	185	550.

^a See 5.3.1.

^b The Ontario *Volatility Regulation* sets a maximum limit of 72 kPa starting June 1 and ending on either August 31 or September 14, depending upon specific conditions (see Annex B, B.2.7.1). Note that the 72 kPa limit is defined as being absolute in this Regulation.

Table 3D — Volatility requirements for Zone D (Southern Ontario and Southern Quebec)

Zone volatility limits		Southern Ontario and Southern Quebec								
		The portions of Ontario and Quebec south of latitude 46° North, including the Seaway Corridor Sub Zone (SCSZ) ^a								
		DVPE		SCSZ DVPE	T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max. ^b (kPa)	Max. ^b (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. ^c (°C)
January	1 - 15	65	110.		—	50.	60.	110.	185	550.
January	16 - 31	65	110.		—	50.	60.	110.	185	550.
February	1 - 15	65	110.		—	50.	60.	110.	185	550.
February	16 - 28 (29)	50.	110.		—	55	60.	110.	185	560.
March	1 - 15	50.	110.		—	55	60.	110.	185	560.
March	16 - 31	45	110.		—	60.	60.	120.	190.	575
April	1 - 15	45	97		—	60.	60.	120.	190.	575
April	16 - 30	35	97		—	70.	60.	120.	190.	590.
May	1 - 15	35	86		—	70.	62	120.	190.	590.
May	16 - 31	35	72 ^d		35	70.	66	120.	190.	590.
June	1 - 15	35	72	62	35	70.	66	120.	190.	590.
June	16 - 30	35	72	62	35	70.	66	120.	190.	590.
July	1 - 15	35	72	62	35	70.	66	120.	190.	590.
July	16 - 31	35	72	62	35	70.	66	120.	190.	590.
August	1 - 15	35	72	62	35	70.	66	120.	190.	590.
August	16 - 31	35	72	62	35	70.	66	120.	190.	590.
September	1 - 15	35	72 ^d		35	70.	66	120.	190.	590.
September	16 - 30	35	97		—	70.	60.	120.	190.	590.
October	1 - 15	45	97		—	70.	60.	120.	190.	575
October	16 - 31	45	110.		—	60.	60.	120.	190.	575
November	1 - 15	45	110.		—	60.	60.	120.	190.	575
November	16 - 30	45	110.		—	60.	60.	120.	190.	575
December	1 - 15	50.	110.		—	55	60.	110.	185	560.
December	16 - 31	50.	110.		—	55	60.	110.	185	560.

^a The Seaway Corridor Sub-Zone (SCSZ) is defined in two parts.

- 1) That part of Ontario that lies south of a straight line passing through Arnprior and Grand Bend. Where the line so described runs across a local municipality, the entire local municipality is part of the sub-zone. This is defined by the *Ontario Volatility Regulation* (see Annex B, B.2.7.1).
- 2) That part of Southwestern Quebec defined in the *Québec Petroleum Products Act* (see Annex B, B.2.9.1) as “The Outaouais-Montréal Corridor”.

^b See 5.3.1.

^c If the required maximum DVPE is less than 72 kPa then the maximum DI shall be 597.

^d In the Ontario portion of the SCSZ the Ontario Volatility Regulation sets a maximum limit of 62 kPa starting on either May 15 or June 1 and ending on September 14, depending upon specific conditions (see Annex B, B.2.7.1). Note that the 62 kPa limit is defined as being absolute in this Regulation.

Table 3E — Volatility requirements for Zone E (Atlantic)

Zone volatility limits		Atlantic Canada							
		The island of Newfoundland, the provinces of New Brunswick, Nova Scotia and Prince Edward Island and les Îles-de-la-Madeleine.							
		DVPE		T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max. ^b (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
January	1 - 15	65	110.	—	50.	60.	110.	185	550.
January	16 - 31	65	110.	—	50.	60.	110.	185	550.
February	1 - 15	65	110.	—	50.	60.	110.	185	550.
February	16 - 28 (29)	50.	110.	—	55	60.	110.	185	560.
March	1 - 15	50.	110.	—	55	60.	110.	185	560.
March	16 - 31	45	110.	—	60.	60.	120.	190.	575
April	1 - 15	45	110.	—	60.	60.	120.	190.	575
April	16 - 30	35	97	—	70.	60.	120.	190.	590.
May	1 - 15	35	97 ^a	—	70.	60.	120.	190.	590.
May	16 - 31	35	72	35	70.	66	120.	190.	590.
June	1 - 15	35	72	35	70.	66	120.	190.	590.
June	16 - 30	35	72	35	70.	66	120.	190.	590.
July	1 - 15	35	72	35	70.	66	120.	190.	590.
July	16 - 31	35	72	35	70.	66	120.	190.	590.
August	1 - 15	35	72	35	70.	66	120.	190.	590.
August	16 - 31	35	72	35	70.	66	120.	190.	590.
September	1 - 15	35	72	35	70.	66	120.	190.	590.
September	16 - 30	35	97	—	70.	60.	120.	190.	590.
October	1 - 15	35	110.	—	70.	60.	120.	190.	590.
October	16 - 31	45	110.	—	60.	60.	120.	190.	575
November	1 - 15	45	110.	—	60.	60.	120.	190.	575
November	16 - 30	45	110.	—	60.	60.	120.	190.	575
December	1 - 15	50.	110.	—	55	60.	110.	185	560.
December	16 - 31	50.	110.	—	55	60.	110.	185	560.

^a In Nova Scotia and New Brunswick the 72 kPa maximum is required at Terminals starting May 15 (see Annex B, B.2.4 and B.2.6).

^b See 5.3.1.

Table 3F — Volatility requirements for Zone F (Northern Canada)

Zone Volatility Limits ^a		Northern Canada The portions of British Columbia and Alberta north of latitude 54° North; Saskatchewan, Manitoba and Ontario north of latitude 53° North; Quebec lying between latitudes 51° North and 55° North; and Labrador south of latitude 55° North.							
		DVPE		T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max. ^b (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
January	1 - 15	85	110.	—	50.	60.	110.	185	540.
January	16 - 31	85	110.	—	50.	60.	110.	185	540.
February	1 - 15	85	110.	—	50.	60.	110.	185	540.
February	16 - 28 (29)	85	110.	—	50.	60.	110.	185	540.
March	1 - 15	65	110.	—	50.	60.	110.	185	550.
March	16 - 31	65	110.	—	50.	60.	110.	185	550.
April	1 - 15	50.	110.	—	55	60.	110.	185	560.
April	16 - 30	50.	97	—	55	60.	110.	185	560.
May	1 - 15	45	97	—	60.	60.	120.	190.	575
May	16 - 31	45	97	—	60.	60.	120.	190.	575
June	1 - 15	35	97	—	70.	60.	120.	190.	590.
June	16 - 30	35	86	—	70.	62	120.	190.	590.
July	1 - 15	35	86	—	70.	62	120.	190.	590.
July	16 - 31	35	86	—	70.	62	120.	190.	590.
August	1 - 15	35	86	—	70.	62	120.	190.	590.
August	16 - 31	35	86	—	70.	62	120.	190.	590.
September	1 - 15	35	97	—	70.	60.	120.	190.	590.
September	16 - 30	45	97	—	70.	60.	120.	190.	575
October	1 - 15	45	110.	—	60.	60.	120.	190.	575
October	16 - 31	45	110.	—	60.	60.	120.	190.	575
November	1 - 15	50.	110.	—	55	60.	110.	185	560.
November	16 - 30	65	110.	—	55	60.	110.	185	550.
December	1 - 15	85	110.	—	50.	60.	110.	185	540.
December	16 - 31	85	110.	—	50.	60.	110.	185	540.

^a Where fuel cannot be supplied in all seasons, it will generally not be possible to meet the zone volatility limits throughout the year. In these cases, different volatility requirements may be established between the fuel supplier and customer. To ensure cold start and warm-up performance during winter, meeting the volatility requirements for the December 1 to February 28 (29) period is recommended.

^b The *Ontario Volatility Regulation* sets a maximum limit of 72 kPa starting June 1 and ending on either August 31 or September 14, depending upon specific conditions (see Annex B, B.2.7.1). Note that the 72 kPa limit is defined as being absolute in this Regulation.

Table 3G — Volatility requirements for Zone G (Yukon)

Zone volatility limits		Yukon The Territory of the Yukon							
		DVPE		T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
		Min. (kPa)	Max. (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
Month	Dates								
January	1 - 15	85	110.	—	50.	60.	110.	185	540.
January	16 - 31	85	110.	—	50.	60.	110.	185	540.
February	1 - 15	85	110.	—	50.	60.	110.	185	540.
February	16 - 28 (29)	85	110.	—	50.	60.	110.	185	540.
March	1 - 15	65	110.	—	50.	60.	110.	185	540.
March	16 - 31	65	110.	—	50.	60.	110.	185	550.
April	1 - 15	50.	110.	—	50.	60.	110.	185	550.
April	16 - 30	45	110.	—	55	60.	110.	185	560.
May	1 - 15	45	97	—	60.	60.	120.	190.	575
May	16 - 31	35	97	—	70.	60.	120.	190.	590.
June	1 - 15	35	97	—	70.	60.	120.	190.	590.
June	16 - 30	35	86	—	70.	62	120.	190.	590.
July	1 - 15	35	86	—	70.	62	120.	190.	590.
July	16 - 31	35	86	—	70.	62	120.	190.	590.
August	1 - 15	35	86	—	70.	62	120.	190.	590.
August	16 - 31	35	97	—	60.	60.	120.	190.	575
September	1 - 15	35	110.	—	60.	60.	120.	190.	575
September	16 - 30	45	110.	—	60.	60.	120.	190.	575
October	1 - 15	45	110.	—	60.	60.	120.	190.	575
October	16 - 31	50.	110.	—	55	60.	110.	185	560.
November	1 - 15	65	110.	—	50.	60.	110.	185	540.
November	16 - 30	85	110.	—	50.	60.	110.	185	540.
December	1 - 15	85	110.	—	50.	60.	110.	185	540.
December	16 - 31	85	110.	—	50.	60.	110.	185	540.

Table 3H — Volatility requirements for Zone H (Arctic Canada)

Zone volatility limits ^a		Arctic Canada All of the Northwest Territories, Nunavut, and the portions of Quebec, Nunavik and Labrador north of latitude 55° North.							
		DVPE		T10 Evaporation		T50 Evaporation		T90 Evaporation	Driveability index
Month	Dates	Min. (kPa)	Max. (kPa)	Min. (°C)	Max. (°C)	Min. (°C)	Max. (°C)	Max. (°C)	Max. (°C)
January	1 - 15	85	110.	—	50.	60.	110.	185	540.
January	16 - 31	85	110.	—	50.	60.	110.	185	540.
February	1 - 15	85	110.	—	50.	60.	110.	185	540.
February	16 - 28 (29)	85	110.	—	50.	60.	110.	185	540.
March	1 - 15	85	110.	—	50.	60.	110.	185	540.
March	16 - 31	85	110.	—	50.	60.	110.	185	550.
April	1 - 15	65	110.	—	50.	60.	110.	185	550.
April	16 - 30	50.	97	—	55	60.	110.	185	560.
May	1 - 15	50.	97	—	55	60.	110.	185	560.
May	16 - 31	45	86	—	60.	62	120.	190.	575
June	1 - 15	45	86	—	60.	62	120.	190.	575
June	16 - 30	45	86	—	60.	62	120.	190.	575
July	1 - 15	45	86	—	60.	62	120.	190.	575
July	16 - 31	45	86	—	60.	62	120.	190.	575
August	1 - 15	45	86	—	60.	62	120.	190.	575
August	16 - 31	45	97	—	60.	60.	120.	190.	575
September	1 - 15	50.	110.	—	55	60.	110.	185	560.
September	16 - 30	65	110.	—	50.	60.	110.	185	550.
October	1 - 15	65	110.	—	50.	60.	110.	185	550.
October	16 - 31	65	110.	—	50.	60.	110.	185	550.
November	1 - 15	85	110.	—	50.	60.	110.	185	540.
November	16 - 30	85	110.	—	50.	60.	110.	185	540.
December	1 - 15	85	110.	—	50.	60.	110.	185	540.
December	16 - 31	85	110.	—	50.	60.	110.	185	540.

^a Where fuel is normally delivered in the summer or fall for use during the following winter, the delivered fuel shall meet the volatility requirements for the November 1 to March 31 period. The intent is to ensure cold start and warm-up performance during winter.

Annex A (normative)

Referenced ASTM International publications (see 2.4)

A.1 Annual Book of ASTM Standards

- ASTM D86 — Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure
- ASTM D130 — Standard Test Method for Corrosiveness to Copper from Petroleum Products by the Copper Strip Test
- ASTM D381 — Standard Test Method for Gum Content in Fuels by Jet Evaporation
- ASTM D525 — Standard Test Method for Oxidation Stability of Gasoline (Induction Period Method)
- ASTM D2622 — Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry
- ASTM D2699 — Standard Test Method for Research Octane Number of Spark-Ignition Engine Fuel
- ASTM D2700 — Standard Test Method for Motor Octane Number of Spark-Ignition Engine Fuel
- ASTM D2885 — Standard Test Method for Determination of Octane Number or Spark-Ignition Engine Fuels by On-Line Direct Comparison Technique
- ASTM D3120 — Standard Test Method for Trace Quantities of Sulfur in Light Liquid Petroleum Hydrocarbons by Oxidative Microcoulometry
- ASTM D3231 — Standard Test Method for Phosphorus in Gasoline
- ASTM D3237 — Standard Test Method for Lead in Gasoline by Atomic Absorption Spectroscopy
- ASTM D3244 — Standard Practice for Utilization of Test Data to Determine Conformance with Specifications
- ASTM D3764 — Standard Practice for Validation of the Performance of Process Stream Analyzer Systems
- ASTM D3831 — Standard Test Method for Manganese in Gasoline by Atomic Absorption Spectroscopy
- ASTM D4057 — Standard Practice for Manual Sampling of Petroleum and Petroleum Products
- ASTM D4177 — Standard Practice for Automatic Sampling of Petroleum and Petroleum Products
- ASTM D4815 — Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C1 to C4 Alcohols in Gasoline by Gas Chromatography
- ASTM D4855 — Standard Practice for Comparing Test Methods
- ASTM D4953 — Standard Test Method for Vapor Pressure of Gasoline and Gasoline-Oxygenate Blends (Dry Method)
- ASTM D5059 — Standard Test Methods for Lead and Manganese in Gasoline by X-Ray Fluorescence Spectroscopy
- ASTM D5191 — Standard Test Method for Vapor Pressure of Petroleum Products and Liquid Fuels (Mini Method)

ASTM D5453 — Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence

ASTM D5482 — Standard Test Method for Vapor Pressure of Petroleum Products and Liquid Fuels (Mini Method-Atmospheric)

ASTM D5500 — Standard Test Method for Vehicle Evaluation of Unleaded Automotive Spark-Ignition Engine Fuel for Intake Valve Deposit Formation

ASTM D5599 — Standard Test Method for Determination of Oxygenates in Gasoline by Gas Chromatography and Oxygen Selective Flame Ionization Detection

ASTM D5842 — Standard Practice for Sampling and Handling of Fuels for Volatility Measurement

ASTM D5854 — Standard Practice for Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products

ASTM D6201 — Standard Test Method for Dynamometer Evaluation of Unleaded Spark-Ignition Engine Fuel for Intake Valve Deposit Formation

ASTM D6378 — Standard Test Method for Determination of Vapor Pressure (VPX) of Petroleum Products, Hydrocarbons, and Hydrocarbon-Oxygenate Mixtures (Triple Expansion Method)

ASTM D6708 — Standard Practice for Statistical Assessment and Improvement of Expected Agreement Between Two Test Methods that Purport to Measure the Same Property of a Material

ASTM D6729 — Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100-Meter Capillary High Resolution Gas Chromatography

ASTM D6730 — Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100-Metre Capillary (with Precolumn) High-Resolution Gas Chromatography

ASTM D7039 — Standard Test Method for Sulfur in Gasoline, Diesel Fuel, Jet Fuel, Kerosine, Biodiesel, Biodiesel Blends, and Gasoline-Ethanol Blends by Monochromatic Wavelength Dispersive X-ray Fluorescence Spectrometry

ASTM D7220 — Standard Test Method for Sulfur in Automotive, Heating, and Jet Fuels by Monochromatic Energy Dispersive X-ray Fluorescence Spectrometry

ASTM D7345 — Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure (Micro Distillation Method)

ASTM D7525 — Standard Test Method for Oxidation Stability of Spark Ignition Fuel—Rapid Small Scale Oxidation Test (RSSOT)

ASTM D7548 — Standard Test Method for Determination of Accelerated Iron Corrosion in Petroleum Products

ASTM D7671 — Standard Test Method for Corrosiveness to Silver by Automotive Spark - Ignition Engine Fuel — Silver Strip Method

ASTM D8071 — Standard Test Method for Determination of Hydrocarbon Group Types and Select Hydrocarbon and Oxygenate Compounds in Automotive Spark-Ignition Engine Fuel Using Gas Chromatography with Vacuum Ultraviolet Absorption Spectroscopy Detection (GC-VUV)

ASTM E29 — Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

Annex B (informative)

Federal, provincial and territorial acts and regulations applicable to automotive gasoline containing ethanol (see 2.2)²

B.1 Federal acts and regulation³

B.1.1 *Fuels Information Regulations, No. 1* (C.R.C., c. 407 as amended by SOR/79-280, 80-138, 2000-105)

These regulations require producers and importers to submit information on sulphur and additive contents (other than lead).

B.1.2 *Gasoline Regulations* (SOR/90-247)

These regulations limit the lead content in unleaded gasoline, restrict leaded gasoline use, and require reporting of lead used in gasoline production. They also limit phosphorus content in gasoline (see 6.9 and 6.12).

B.1.3 *Contaminated Fuel Regulations* (SOR/91-486)

These regulations prohibit the importation of fuels that have been contaminated with hazardous wastes.

B.1.4 *Transportation of Dangerous Goods Regulations* (SOR/2001-286)

These regulations give detailed packaging, labelling and documentation requirements for transporting gasoline samples within Canada.

B.1.5 *Renewable Fuels Regulations* (SOR/2010-189)

These regulations require the use of renewable fuels in Canada.

Note: These regulations require labelling as a “high renewable fuel” of any gasoline containing over 10 % by volume ethanol. In this standard that would refer to Type B oxygenated gasoline.

B.1.6 *Benzene in Gasoline Regulations* (SOR/97-493)

These regulations establish the limits for benzene and BEN in gasoline and benzene in oxygenates (see 6.22 and 6.23).

B.1.7 *Sulphur in Gasoline Regulations* (SOR/99-236)

These regulations establish the limits for sulphur in gasoline and in oxygenates (see 6.13 and 6.27).

² The regulations listed are subject to revision by the relevant authority. The user should consult the relevant authority to confirm the current regulations. The information provided about the regulations is for information only. In case of conflict, the text of the regulation takes precedence. If any of the Web sites referenced become inoperative, regulations can also be found at the Web site www.canlii.org.

³ These regulations can be obtained from the Department of Justice Canada (see 2.2.1).

B.2 Provincial and territorial regulations

B.2.1 Alberta

B.2.1.1 Renewable fuels requirements

Renewable fuel requirements are controlled under the *Renewable Fuel Standard Regulation*, Regulation 29/2010.

B.2.2 British Columbia

B.2.2.1 General requirements and vapour pressure

Vapour pressure is controlled under the *Environmental Protection Act* and the *Cleaner Gasoline Regulation* (BC Reg. 498/95).⁴

B.2.2.2 Renewable content and carbon intensity requirements

Requirements for renewable fuel volumes and reduction of fuel carbon intensity are controlled under the *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act* and the *Renewable and Low Carbon Fuel Requirements Regulation* (BC Reg. 394/2008)⁴.

B.2.3 Manitoba

B.2.3.1 General requirements

General requirements are controlled under the *Dangerous Good Handling and Transportation Act*, including the *Dangerous Good Handling and Transportation Regulation* (55/2003) and the *Storage and Handling of Petroleum Products and Allied Products Regulation* (188/2001)⁵. However, these two regulations do not address fuel quality.

B.2.3.2 Ethanol requirements

Ethanol requirements, including maximum vapour pressure limits for “splash” blends are controlled under the *Ethanol General Regulation, Regulation 165/2007*, as amended by M.R. 118/2011 and M.R. 149/20. This Regulation does require that ethanol blended gasoline comply with CAN/CGSB-3.511 unless it is “splash blended” with gasoline complying with CAN/CGSB-3.5.

B.2.4 New Brunswick

B.2.4.1 Vapour pressure

Vapour pressure is controlled under the *Clean Air Act* and Regulations — *Air Quality Regulation* (N.B. Reg. 97-133).

B.2.5 Newfoundland and Labrador

B.2.5.1 Gasoline requirements

Gasoline requirements are controlled under the *Environmental Protection Act, Air Pollution Control Regulations, 2022, Newfoundland and Labrador Regulation 11/22*. This regulation cites CAN/CGSB-3.5-2021, as amended from time to time, in the section on gasoline volatility control.

⁴ Available from the government of British Columbia at www.bclaws.gov.bc.ca.

⁵ Available from the Government of Manitoba at <https://web2.gov.mb.ca/laws/regs/>.

B.2.6 Nova Scotia

B.2.6.1 Vapour pressure

Vapour pressure is controlled under the *Environment Act* and Regulations — *Air Quality Regulations* (N.S. Reg. 28/2005 as amended by N.S. Reg. 8/2020).

B.2.7 Ontario

B.2.7.1 Vapour pressure

Vapour pressure is controlled under *Ontario Regulation 271/91, Gasoline Volatility* as amended by *Ontario Regulations 45/97 and 112/20*.⁶

B.2.7.2 Fuel products

Definitions (as per CGSB standards) listed under the latest revision of the *Technical Standards and Safety Act* — *Liquid Fuels Handling Code*.

B.2.7.3 Bio-based content requirements

Bio-based content requirements are controlled under *Ontario Regulation 663/20, Cleaner Transportation Fuels: Renewable Content Requirements for Gasoline and Diesel Fuels*. This Regulation refers to a Guideline entitled “Technical Guideline: Cleaner Transportation Fuels” published by the Ontario Ministry of Environment, Conservation and Parks. The Guideline requires “blended gasoline” sold in Ontario to meet the relevant CGSB Standard: CAN/CGSB-3.5, CAN/CGSB-3.511 or CAN/CGSB-3.512.

B.2.8 Prince Edward Island

B.2.8.1 General requirements

General requirements are controlled under the *Petroleum Products Act Regulations* (EC38/91).

B.2.9 Québec

B.2.9.1 General requirements

The general requirements are controlled under the *Loi sur les produits pétroliers*, RLQR, c. P-30.1, *Règlement sur les produits pétroliers*, RLRQ, c P30.01 r.2 or *Petroleum Products Act*, CQLR, c. P-30.01, *Petroleum Products Regulation*, CQLR, c. P-30.01 r.2⁷. This regulation lists Quebec quality requirements for aviation gasolines, aviation turbine fuels, automotive gasolines, gasolines containing denatured fuel ethanol for use in automotive spark-ignition fuels, diesel fuels, diesel fuels containing biodiesel (B100) for blending in middle distillate fuels, fuel oil types 0, 1 and 2; and fuel oil types 4, 5 and 6. Amendments and editions published apply only 90 days after the last day of the month that the French text of the amendments or editions was published. The Direction générale des combustibles propres et des réservoirs of the ministère de l'Énergie et des Ressources naturelles is responsible for the application and revision of this regulation. Web site: <https://mern.gouv.qc.ca/en/energy-transition/>.

⁶ Available from the Ontario e-Laws Ontario Statutes and Regulations Web site at <http://www.e-laws.gov.on.ca>.

⁷ Available from Les Publications du Québec, telephone: 1-800-463-2100 or 418-643-5150. Fax: 1-800-561-3479 or 418-643-6177. Also available on-line at <https://www.legisquebec.gouv.qc.ca/en/document/cs/P-30.01%20/>.

B.2.9.2 Low-carbon-intensity fuel content and carbon intensity requirements

Requirements for low-carbon-intensity fuel content volumes and reduction of fuel carbon intensity are controlled under the *Regulation respecting the integration of low-carbon-intensity fuel content into gasoline and diesel fuel*⁸ and the *Order of the Minister of Energy and Natural Resources concerning the measurement methods and tools for the purposes of the Regulation respecting the integration of low-carbon-intensity fuel content into gasoline and diesel fuel*⁹.

B.2.10 Saskatchewan

B.2.10.1 Ethanol requirements

Ethanol requirements are controlled under the *Ethanol Fuel (General) Regulations, RRS c E-11.1 Reg 1*.

B.2.11 Yukon

B.2.11.1 General requirements

General requirements are controlled under the *Gasoline Handling Act and Regulations — Gasoline Handling Regulations (O.I. C. 1972/137)*.

⁸ Available from the Government of Québec at <http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=1&file=105402.pdf> or <http://www3.publicationsduquebec.gouv.qc.ca/gazetteofficielle/lawsregulations.fr.html>.

⁹ Available from the Government of Québec at <http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=1&file=105408.pdf> or <http://www3.publicationsduquebec.gouv.qc.ca/gazetteofficielle/lawsregulations.fr.html>.

Annex C
(normative)

List of municipalities in the Outaouais-Montréal corridor

Municipalities are listed either by regional county municipalities (RCM) or by administrative region or metropolitan community. The indicated numbers correspond to the codes assigned to each municipality, RCM, administrative region or metropolitan community in the Répertoire des municipalités published by the Ministère des Affaires municipales et de l'Habitation.

530 PIERRE DE SAUREL
53085 Saint-Gérard-Majella, P

550 ROUVILLE
55023 Saint-Césaire, V
55030 Sainte-Angèle-de-Monnoir, M
55037 Rougemont, M
55048 Marieville, V
55057 Richelieu, V
55065 Saint-Mathias-sur-Richelieu, M

560 LE HAUT-RICHELIEU
56083 Saint-Jean-sur-Richelieu, V
56097 Mont-Saint-Grégoire, M
56105 Sainte-Brigide-d'Iberville, M

570 LA VALLÉE-DU-RICHELIEU
57005 Chambly, V
57010 Carignan, V
57020 Saint-Basile-le-Grand, V
57025 McMasterville, M
57030 Otterburn Park, V
57033 Saint-Jean-Baptiste, M
57035 Mont-Saint-Hilaire, V
57040 Beloeil, V
57045 Saint-Mathieu-de-Beloeil, M
57050 Saint-Marc-sur-Richelieu, M
57057 Saint-Charles-sur-Richelieu, M
57068 Saint-Denis-sur-Richelieu, M
57075 Saint-Antoine-sur-Richelieu, M

590 MARGUERITE D'YOUVILLE
59010 Sainte-Julie, V
59015 Saint-Amable, M
59020 Varennes, V
59025 Verchères, M
59030 Calixa-Lavallée, M
59035 Contrecoeur, V

600 L'ASSOMPTION
60005 Charlemagne, V
60013 Repentigny, V
60020 Saint-Sulpice, P
60028 L'Assomption, V
60035 L'Épiphanie, V
60040 L'Épiphanie, P

630 MONTCALM
63005 Sainte-Marie-Salomé, P
63013 Saint-Jacques, M
63023 Saint-Alexis, M
63030 Saint-Esprit, M
63035 Saint-Roch-de-l'Achigan, M
63040 Saint-Roch-Ouest, M
63048 Saint-Lin-des-Laurentides, V
63055 Saint-Calixte, M
63060 Sainte-Julienne, M
63065 Saint-Liguori, P

640 LES MOULINS
64008 Terrebonne, V
64015 Mascouche, V

13 OUTSIDE AN RCM / LAVAL
65005 Laval, V

**663 OUTSIDE AN RCM / COMMUNAUTÉ
MÉTROPOLITAINE DE MONTRÉAL**
58007 Brossard, V
58012 Saint-Lambert, V
58033 Boucherville, V
58037 Saint-Bruno-de-Montarville, V
58227 Longueuil, V
66007 Montréal-Est, V
66023 Montréal, V
66032 Westmount, V
66047 Montréal-Ouest, V
66058 Côte-Saint-Luc, V
66062 Hampstead, V
66072 Mont-Royal, V
66087 Dorval, V
66092 L'Île-Dorval, V
66097 Pointe-Claire, V
66102 Kirkland, V
66107 Beaconsfield, V
66112 Baie-d'Urfé, V
66117 Sainte-Anne-de-Bellevue, V
66127 Senneville, VL
66142 Dollard-des-Ormeaux, V

16 OUTSIDE AN RCM / MONTÉRÉGIE

67802 Kahnawake, R.I.
69802 Akwesasne, R.I.

670 ROUSSILLON

67005 Saint-Mathieu, M
67010 Saint-Philippe, M
67015 La Prairie, V
67020 Candiac, V
67025 Delson, V
67030 Sainte-Catherine, V
67035 Saint-Constant, V
67040 Saint-Isidore, P
67045 Mercier, V
67050 Châteauguay, V
67055 Léry, V

680 LES JARDINS-DE-NAPIERVILLE

68020 Sainte-Clotilde, M
68025 Saint-Patrice-de-Sherrington, M
68040 Saint-Jacques-le-Mineur, M
68045 Saint-Édouard, M
68050 Saint-Michel, M
68055 Saint-Rémi, V

690 LE HAUT-SAINT-LAURENT

69010 Franklin, M
69017 Saint-Chrysostome, M
69025 Howick, M
69030 Très-Saint-Sacrement, P
69037 Ormstown, M
69045 Hinchinbrooke, M
69050 Elgin, M
69055 Huntingdon, V
69060 Godmanchester, CT
69065 Sainte-Barbe, M
69070 Saint-Anicet, M
69075 Dundee, CT

700 BEAUHARNOIS-SALABERRY

70005 Saint-Urbain-Premier, M
70012 Sainte-Martine, M
70022 Beauharnois, V
70030 Saint-Étienne-de-Beauharnois, M
70035 Saint-Louis-de-Gonzague, P
70040 Saint-Stanislas-de-Kostka, M
70052 Salaberry-de-Valleyfield, V

710 VAUDREUIL-SOULANGES

71005 Rivière-Beaudette, M
71015 Saint-Télesphore, M
71020 Saint-Polycarpe, M
71025 Saint-Zotique, M
71033 Les Coteaux, M
71040 Coteau-du-Lac, M
71045 Saint-Clet, M

71050 Les Cèdres, M
71055 Pointe-des-Cascades, VL
71060 L'Île-Perrot, V
71065 Notre-Dame-de-L'Île-Perrot, V
71070 Pincourt, V
71075 Terrasse-Vaudreuil, M
71083 Vaudreuil-Dorion, V
71090 Vaudreuil-sur-le-Lac, VL
71095 L'Île-Cadieux, V
71100 Hudson, V
71105 Saint-Lazare, V
71110 Sainte-Marthe, M
71115 Sainte-Justine-de-Newton, M
71125 Très-Saint-Rédempteur, M
71133 Rigaud, M
71140 Pointe-Fortune, VL

720 DEUX-MONTAGNES

72005 Saint-Eustache, V
72010 Deux-Montagnes, V
72015 Sainte-Marthe-sur-le-Lac, V
72020 Pointe-Calumet, M
72025 Saint-Joseph-du-Lac, M
72032 Oka, M
72043 Saint-Placide, M

730 THÉRÈSE-DE-BLAINVILLE

73005 Boisbriand, V
73010 Sainte-Thérèse, V
73015 Blainville, V
73020 Rosemère, V
73025 Lorraine, V
73030 Bois-des-Filion, V
73035 Sainte-Anne-des-Plaines, V

15 OUTSIDE AN RCM / LAURENTIDES

74005 Mirabel, V

750 LA RIVIÈRE-DU-NORD

75005 Saint-Colomban, V
75017 Saint-Jérôme, V
75028 Sainte-Sophie, M
75040 Prévost, V
75045 Saint-Hippolyte, M

760 ARGENTEUIL

76008 Saint-André-d'Argenteuil, M
76020 Lachute, V
76025 Gore, CT
76030 Mille-Isles, M
76035 Wentworth, CT
76043 Brownsburg-Chatham, V
76055 Grenville, VL
76052 Grenville-sur-la-Rouge, M
76065 Harrington, CT

770 LES PAYS-D'EN-HAUT

77022 Sainte-Adèle, V
77030 Piedmont, M
77035 Sainte-Anne-des-Lacs, P
77043 Saint-Sauveur, V
77050 Morin-Heights, M

800 PAPINEAU

80005 Fassett, M
80010 Montebello, M
80015 Notre-Dame-de-BonSecours, M
80020 Notre-Dame-de-la-Paix, M
80027 Saint-André-Avellin, M
80037 Papineauville, M
80045 Plaisance, M
80050 Thurso, V
80055 Lochaber, CT
80060 Lochaber-Partie-Ouest, CT
80065 Mayo, M
80070 Saint-Sixte, M
80078 Ripon, M
80085 Mulgrave-et-Derry, M

07 OUTSIDE AN RCM / OUTAOUAIS

81015 Gatineau, V

820 LES COLLINES-DE-L'OUTAOUAIS

82005 L'Ange-Gardien, M
82010 Notre-Dame-de-la-Salette, M
82015 Val-des-Monts, M
82020 Cantley, M
82025 Chelsea, M
82030 Pontiac, M
82035 La Pêche, M

840 PONTIAC

84005 Bristol, M
84010 Shawville, M
84015 Clarendon, M
84020 Portage-du-Fort, VL
84025 Bryson, M
84030 Campbell's Bay, M
84035 L'Île-du-Grand-Calumet, M
84040 Litchfield, M
84045 Thorne, M