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Automotive ethanol fuel (E50-E85)

ICS 75.160.20



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Automotive ethanol fuel (E50-E85)

CETTE NORME NATIONALE DU CANADA EST DISPONIBLE EN VERSIONS
FRANÇAISE ET ANGLAISE.

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Canadian General Standards Board 

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Canadian General Standards Board
Automotive ethanol fuel (E50-E85)

Preface

This National Standard of Canada, *Automotive ethanol fuel (E50-E85)*, was published in September 2013. This 2014 amended standard includes the following changes in content. No formatting or editorial changes are listed.

Revised clauses/subclauses 7.5, 7.9, Annex A

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Automotive ethanol fuel (E50-E85)

1 Scope

This National Standard of Canada applies to automotive fuel composed of 50 to 85% by volume denatured fuel ethanol and gasoline strictly for use in flexible fuel vehicles over a wide range of climatic conditions.

Fuel produced to this standard is **not for use** in conventional vehicles designed to operate on gasoline containing up to 10% by volume ethanol.

Precautions for the use of Automotive Ethanol Fuel (E50–E85) complying with this standard are also identified¹.

This standard addresses four volatility classes where the denatured fuel ethanol and gasoline of the fuel blend are seasonally adjusted to ensure adequate startability, operability and safety.

The composition of Automotive Ethanol Fuel (E50–E85) is seasonally adjusted based upon climatic history, and varies from 85% to as low as 50% by volume denatured fuel ethanol under warm and cold climatic conditions, respectively. The proportion of gasoline is increased at lower temperatures to increase vapour pressure and so improve flexible fuel vehicle (FFV) operability.

The testing and evaluation of a product against this standard may require the use of materials and/or equipment that could be hazardous. This standard 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.

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 addresses provided below were 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 hydrocarbon components in automotive gasoline using gas chromatography*

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

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*

¹ See 10 and Appendix B.

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CAN/CGSB-3.5 — *Automotive gasoline*

CAN/CGSB-3.511 — *Oxygenated automotive gasoline containing ethanol (E1–E10)*

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

2.1.1 Source

The above may be obtained from the Canadian General Standards Board, Sales Centre, Gatineau, Canada K1A 1G6. Telephone 819-956-0425 or 1-800-665-2472. Fax 819-956-5740. E-mail ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca. Web site www.tpsgc-pwgsc.gc.ca/ongc-cgsb.

2.2 Canada Revenue Agency (CRA)

See referenced regulations in Annex C, C1.7.

2.2.1 Source

The above may be obtained from the Department of Justice Canada, Communications Branch, 284 Wellington Street, Ottawa, Ontario, Canada K1A 0H8. Telephone 613-957-4222 or TTY 613-992-4556. Fax 613-954-0811. Web site www.laws.justice.gc.ca.

2.3 Environment Canada (EC)

Benzene in Gasoline Regulations

Sulphur in Gasoline Regulations.

2.3.1 Source

The above may be obtained from the Department of Justice Canada, Communications Branch, 284 Wellington Street, Ottawa, Canada K1A 0H8. Telephone 613-957-4222 or TTY 613-992-4556. Fax 613-954-0811. Web site www.laws.justice.gc.ca.

2.4 Suncor Energy Products Partnership

Weather Data Analysis Pack².

2.4.1 Source

The above may be obtained from <http://www.petro-canada.ca/weatherdataanalysispack>.

2.5 ASTM International

Annual Book of ASTM Standards (see Annex A).

2.5.1 Source

The above may be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, U.S.A., telephone 610-832-9585, fax 610-832-9555, Web site www.astm.org, or from IHS Global Canada Ltd., 200-1331 MacLeod Trail SE, Calgary, Alberta T2G 0K3, telephone 613-237-4250 or 1-800-267-8220, fax 613 237-4251, Web site www.global.ihs.com.

² See 3.1, 4.1.1 and Annex D ; available at www.petro-canada.ca/weatherdataanalysispack.

2.6 NACE International

TM-0172 — *Determining Corrosive Properties of Cargoes in Petroleum Product Pipelines.*

2.6.1 Source

The above may be obtained from NACE International, 1440 South Creek Drive, Houston, TX 77084-4906, U.S.A. Web site www.nace.org.

2.7 See Annex C for federal, provincial and territorial acts and regulations that can apply to Automotive Ethanol Fuel (E50-E85).

3 Terms and definitions

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

3.1

10th percentile low-end design temperature

10th percentile design value is the temperature at or below which 10% of the hourly ambient air temperatures are observed to occur for an indicated half-month period at a specified weather station.

NOTE The 10% low-end design temperature for weather stations in Canada by half-month period may be obtained from the Weather Data Analysis Pack. This data pack is based upon an analysis of hourly weather readings from weather stations across Canada taken over a minimum of 10 years to a maximum of 40 years per station.

3.2

automotive ethanol fuel (E50-E85)

seasonally adjusted blend consisting nominally of 50 – 85% by volume denatured fuel ethanol and the remainder 50 – 15% by volume gasoline for use in FFVs.

3.3

benzene emissions number (BEN)

estimate of the evaporative, running and tailpipe benzene emissions from vehicles, calculated in accordance with schedule 1 of the *Benzene in Gasoline Regulations* (see Annex C, C1.5).

3.4

blendstock for oxygenate blending (BOB)

gasoline blendstock that when blended with up to 10% by volume denatured fuel ethanol produces an oxygenated gasoline that complies with CAN/CGSB-3.511.

3.5

ethanol

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

3.6

denatured fuel ethanol

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

3.7

flexible fuel vehicle (FFV)

vehicle that is specifically designed by the original equipment manufacturer or the manufacturer of record to operate on fuel blends consisting nominally of 0 – 85% by volume denatured fuel ethanol and 100 – 15% by volume gasoline.

**3.8
gasoline**

automotive fuel meeting the requirements of CAN/CGSB-3.5 or BOB.

**3.9
point of retail sale**

location where the end user takes delivery of the product.

4 Classification

4.1 The Automotive Ethanol Fuel (E50-E85) shall be supplied in the following volatility classes (see Table 1), as specified (see 9.1).

4.1.1 Volatility classes

Table 1

Volatility class^a	10% low-end design temperature guidelines^b, °C
Class I	>5
Class II	<5
Class III	<-7
Class IV	<-20

^a The volatility classes allow sufficient range for the operation of FFVs in Canadian climatic conditions from data supplied by FFV manufacturers.

^b The purpose of the 10% low-end design temperature guidelines is to assist users in selecting the appropriate class of automotive ethanol fuel (E50–E85), considering the intended geographical location of use and time of year. Class I is suitable for warm, summer conditions. Classes II and III are intended for progressively cooler conditions. Class IV is intended for very cold, mid-winter temperatures in parts of Canada.

4.1.1.1 The minimum vapour pressure limits specific to the respective volatility classes exist to help minimize the formation of a flammable mixture in the vapour space of fuel tanks at low temperatures. Where the 10% design temperature is below -30°C, the minimum vapour pressure shall be 80 kPa (see 7.6).

4.1.1.2 Refer to Annex D for guidance on appropriate volatility classes for selected locations across Canada for half-month periods of the year.

5 General requirements

5.1 The Automotive Ethanol Fuel (E50-E85) shall be a stable homogeneous liquid free from foreign matter and dissolved material that can clog filters or nozzles or damage equipment designed for its use.

5.2 The Automotive Ethanol Fuel (E50–E85) shall be visually clear and free from undissolved water, sediment and suspended matter under the temperature and conditions at the point of retail sale. The Automotive Ethanol Fuel (E50–E85) 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.

5.3 The Automotive Ethanol Fuel (E50–E85) may contain additives designed to improve its characteristics. Additives include but are not limited to corrosion inhibitors, deposit control additives (also called detergents) (see 6.1.1 and 6.2.2), metal deactivators and oxidation inhibitors. Additives designed and tested to enhance performance may be added in amounts less than 1.0% by volume, unless otherwise specified in this standard (see 10.3 and Annex B, B4).

5.3.1 Aldehydes, ketones, amines, acid esters and soluble polymers shall not be added except as functional components of additives. Halogenated compounds, silanes, fusel oils, used lubricating oils and used solvents or other such materials shall not be added, except as normally occurring trace constituents.

5.4 The volatility class selected shall be based on the expected minimum temperature of use (see 4.1.1).

5.5 The detailed requirements for Automotive Ethanol Fuel (E50–E85) shall apply at the point of retail sale, with the exception of the volatility requirements (see 7.6), which shall be for the date and location of intended use and shall apply at the following:

- a. Primary terminals
- b. Point of entry into Canada
- c. Point of blending (to the blended product).

6 Detailed requirements for denatured fuel ethanol and gasoline components

6.1 Denatured fuel ethanol

The ethanol component (see 7.3) shall meet the requirements of CAN/CGSB-3.516, Type 2.

6.1.1 Deposit control additive

Only deposit control additives that are soluble in denatured fuel ethanol may be added to the denatured fuel ethanol component (see 6.2.2 and Annex B, B4).

6.2 Gasoline

The gasoline component of Automotive Ethanol Fuel (E50–E85) shall meet the requirements of CAN/CGSB-3.5 or BOB.

6.2.1 The gasoline component shall meet the seasonal and geographical requirements specified in CAN/CGSB-3.5 or BOB as required for the delivery date and delivery location of the Automotive Ethanol Fuel (E50–E85) (see also 10.3).

6.2.2 The gasoline component shall meet deposit control additive requirements of CAN/CGSB-3.5.

7 Detailed requirements for Automotive Ethanol Fuel (E50-E85)

7.1 Automotive Ethanol Fuel (E50–E85) 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.

7.1.1 The appropriateness of several ASTM test methods has not been demonstrated for use with Automotive Ethanol Fuel (E50–E85). Several test methods listed in Annex A are in the development stages or lack precision and bias determinations for Automotive Ethanol Fuel (E50–E85).

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7.2 For the purpose of determining conformance with the specified value, an observed value or a calculated value shall be rounded off “to the nearest unit” in the last right-hand digit used in expressing the specified limiting value, in accordance with the rounding-off method of ASTM E29.

7.2.1 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 fixed at $P = 0.5$.

Specified limiting values for automotive ethanol fuel (E50-E85)

	Property	Class I		Class II		Class III		Class IV		Test Method
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
7.3	Denatured fuel ethanol, at point of blending, % by volume	50	85	50	80	50	75	50	75	See footnote ³
7.4	Ethanol, % by volume	46	84	46	79	46	74	46	74	CAN/CGSB-3.0 No. 14.3 ⁴ ASTM D5501
7.5	Gasoline, % by volume	Balance								See footnote ⁵
7.6	Vapour pressure ^{6,7} , kPa	38	62	45	72	62	86	80	107	ASTM D4953 D5191 ⁴

	Property	All Classes		Test Method
		Min.	Max.	
7.7	Sulphur, mg/kg	—	80 ⁸	ASTM D2622 D5453 ⁴ D7039
7.8	Methanol, % by volume	—	0.5	ASTM D4815 CAN/CGSB-3.0 No. 14.3 ⁴
7.9	Total acidity, as acetic acid, mg/L (% by mass)			ASTM D1613 D7795 ⁴
	a. In absence of corrosion inhibitors and detergents	—	40 (0.0051)	
	b. In presence of corrosion inhibitors and detergents	—	56 (0.0071)	

³ When reporting this parameter, use metered (measured) volumes when the component is added.

⁴ The referee method to be used in the event of a dispute.

⁵ Use ASTM D5501 to determine ethanol content; ASTM D4815 to determine other alcohols, MTBE and other ethers; and ASTM E203 to determine water content. To determine the percent hydrocarbon/aliphatic ether, subtract the volume percentage of alcohols and water.

⁶ See 4.1.1

⁷ Provincial regulations may limit the maximum vapour pressure during some months of the year. See Annex C.

⁸ Compliance with the sulphur, benzene and aromatics requirements ensures that the denatured fuel ethanol is a ‘commercially pure oxygenate’ under the *Benzene in Gasoline Regulations* and a ‘sulphur-limited oxygenate’ in the *Sulphur in Gasoline Regulations*. If levels are greater than the limits of this table, the finished fuel blend shall be recertified to ensure compliance with the *Benzene in Gasoline Regulations*.

	Property	All Classes		Test Method
		Min.	Max.	
7.10	Solvent-washed gum content, mg/100 mL	—	5	ASTM D381
7.11	Copper strip corrosion, 3 h at 50°C	—	No. 1	ASTM D130
7.12	Corrosion, steel in water	—	B+	NACE TM-0172 ⁴ ASTM D7548
7.13	Chloride, mg/kg	—	1	ASTM D7319 ⁴ D7328
7.14	Water, % by mass	—	1.0	ASTM E203 D6304 ⁴
7.15	Lead, mg/L	—	5	CAN/CGSB-3.0 No.19.5
7.16	Phosphorus, mg/L	—	1.3	ASTM D3231
7.17	Silver corrosion (Annex B. B5)	—	No. B	CAN/CGSB-3.0 No. 60.32 ⁴
		—	No. 1	ASTM D7671
7.18	Benzene content ⁹ , % by volume	—	1.5	CAN/CGSB-3.0 No. 14.3
7.19	BEN		See footnote 9	
7.20	Electrical conductivity, µS/m	—	500	ASTM D1125
7.21	Sulphate, mg/kg	—	4	ASTM D7318 D7319 ⁴ D7328
7.22	pHe	6.5	9.0	ASTM D6423

⁹ In this standard, benzene content shall conform to the *Benzene in Gasoline Regulations*. The BEN calculation required for those regulations is not valid for this fuel. The producer must inform the minister in writing as an annex to the annual report that the fuel is out of range for the BEN calculation because the oxygen level is above 3.7%.

8 Packaging, packing, labelling and marking

8.1 Sampling

8.1.1 A sample of not less than 3 L shall be provided for inspection and testing, and shall be obtained (see 10.1) in accordance with ASTM D4057 with the following modifications:

- a. Do not use water displacement
- b. Rinse the container with Automotive Ethanol Fuel (E50–E85) instead of soapy water.

8.1.2 The sample shall be collected in containers that are compatible with Automotive Ethanol Fuel (E50–E85). Where practical, glass containers should be used for sampling.

9 Option

9.1 The following option shall be specified in the application of this standard:

- a. Volatility class/classes (see 4.1.1).

10 Precautions

10.1 Health and safety

Users should refer to the supplier's MSDS for guidance on the safe handling of Automotive Ethanol Fuel (E50–E85).

10.2 Equipment

Equipment¹⁰ in contact with Automotive Ethanol Fuel (E50–E85) should be specifically designed and approved by the appropriate authority having jurisdiction for use with this fuel. Otherwise, component degradation, fuel contamination and component failure can result (see Annex B, B1).

10.3 Incorporating additives

The user is cautioned against incorporating other additives in the fuel unless detailed test data are first obtained to confirm that performance is improved with no harmful side effects.

The Automotive Ethanol Fuel (E50–E85) shall not contain any materials such as drag reducing additive or its degradation products that separate after blending.

10.4 Startability and operability

Users of fuel meeting this standard should consult the motor vehicle owner's manual for advice on cold weather starting. Classes II, III and IV, which contain increased concentrations of gasoline, are intended for use in progressively lower temperature conditions (see 4.1.1).

10.5 Transportation, storage and handling

See Annex B for additional precautionary information on transportation, storage, handling and dispensing denatured fuel ethanol and Automotive Ethanol Fuel (E50–E85).

¹⁰ Contact Underwriters' Laboratories of Canada for information on dispensing equipment.

Annex A

(normative)

Referenced ASTM publications (see 2.5)

Annual Book of ASTM Standards

- D86 Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure
- D130 Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
- D381 Standard Test Method for Gum Content in Fuels by Jet Evaporation
- D1125 Standard Test Methods for Electrical Conductivity and Resistivity of Water
- D1613 Standard Test Method for Acidity in Volatile Solvents and Chemical Intermediates Used in Paint, Varnish, Lacquer, and Related Products
- D2622 Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry
- D3231 Standard Test Method for Phosphorus in Gasoline
- D3237 Standard Test Method for Lead in Gasoline by Atomic Absorption Spectroscopy
- D3244 Standard Practice for Utilization of Test Data to Determine Conformance with Specifications
- D4057 Standard Practice for Manual Sampling of Petroleum and Petroleum Products
- D4814 Standard Specification for Automotive Spark-Ignition Engine Fuel
- D4815 Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C1 to C4 Alcohols in Gasoline by Gas Chromatography
- D4953 Standard Test Method for Vapor Pressure of Gasoline and Gasoline-Oxygenate Blends (Dry Method)
- D5059 Standard Test Methods for Lead in Gasoline by X-ray Spectroscopy
- D5190 Standard Test Method for Vapor Pressure of Petroleum Products (Automatic Method)
- D5191 Standard Test Method for Vapor Pressure of Petroleum Products (Mini Method)
- D5453 Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuels and Engine Oil by Ultraviolet Fluorescence
- D5500 Standard Test Method for Vehicle Evaluation of Unleaded Automotive Spark-Ignition Engine Fuel for Intake Valve Deposit Formation
- D5501 Standard Test Method for Determination of Ethanol Content of Denatured Fuel Ethanol by Gas Chromatography
- D6201 Standard Test Method for Dynamometer Evaluation of Unleaded Spark-Ignition Engine Fuel for Intake Valve Deposit Formation
- D6304 Standard Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fisher Titration

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D6423 Standard Test Method for Determination of pH_e of Ethanol, Denatured Fuel Ethanol, and Fuel Ethanol (Ed75-Ed85)

D7039 Standard Test Method for Sulfur in Gasoline and Diesel Fuel by Monochromatic Wavelength Dispersive X-ray Fluorescence Spectrometry

D7318 Standard Test Method for Total Inorganic Sulfate in Ethanol by Potentiometric Titration

D7319 Standard Test Method for Determination of Total and Potential Sulfate and Inorganic Chloride in Fuel Ethanol by Direct Injection Suppressed Ion Chromatography

D7328 Standard Test Method for Determination of Total and Potential Inorganic Sulfate and Total Inorganic Chloride in Fuel Ethanol by Ion Chromatography Using Aqueous Sample Injection

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

D7795 Standard Test Method for Acidity in Ethanol and Ethanol Blends by Titration

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

E203 Standard Test Method for Water Using Volumetric Karl Fischer Titration.

Annex B (informative)

Precautionary information for transportation, storing, handling and dispensing denatured fuel ethanol and Automotive Ethanol Fuel (E50-E85)

B1. Storage and dispensing

Automotive Ethanol Fuel (E50–E85) should be transported, stored and dispensed using equipment specifically designed for this purpose. Note that ethanol can corrode aluminum alloys. Since denatured fuel ethanol is an electrolyte (see B2), it will promote the formation of galvanic corrosion cells when in contact with dissimilar metals. The galvanic reaction will introduce metallic ions of the anodic metal into the fuel, which can result in plugged vehicle filters. Brass in direct contact with aluminum in denatured fuel ethanol has resulted in galvanic corrosion, giving rise to fuel contamination.

B1.1 Product cleanliness at dispensers

If verifying dispensing hose compatibility with the fuel, collect the first litre of product from a dispenser nozzle, preferably after the dispenser has been inactive, such as first thing in the morning.

B1.2 There is a suitable report published by the US department of Energy from July 2010, *Handbook for Handling, Storing, and Dispensing E85*, DOE/GO-102010-3073¹¹.

B2. Water

Automotive Ethanol Fuel (E50–E85) is hygroscopic, and it can eventually absorb enough moisture from the ambient air to cause the fuel to separate into two phases or layers. Separation can be avoided if fuels are clear and bright initially, and care is taken during storage, distribution and use to prevent contact with water or humid air. Phase separation is a greater risk at lower temperatures.

B3. Denaturant

The choice of a denaturant can be impacted by the *Benzene in Gasoline Regulations* and the *Sulphur in Gasoline Regulations*.

B4. Deposit control additives

Some deposit control additives commonly used in gasolines can have limited solubility in ethanol blends covered by this standard, resulting in hazy fuels and possible precipitates. This should be considered when blending the gasoline component with denatured fuel ethanol.

B4.1 Intake valve deposits

Ethanol, and some additives used in ethanol, can generate engine deposits and intake valve deposits (IVD). However, the standard IVD tests require use of an engine that is not compatible with Automotive Ethanol Fuel (E50–E85). There are currently no sanctioned test methods for evaluating the effectiveness of detergents in preventing induction system deposits with automotive ethanol fuel. A number of additive companies have developed tests for evaluating the performance of detergents in automotive ethanol fuel blends.

B4.1.1 If vehicle performance degrades due to deposits, one mitigating action is to operate an FFV on gasoline periodically, following the vehicle manufacturers' recommendations, which allows the detergent in gasoline to clean deposits.

B5. Fuel level sending units

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

¹¹ This report is available at the US Department of Energy at www.afdc.energy.gov/pdfs/48162.pdf.

Annex C (informative)

Federal, provincial and territorial acts and regulations applicable to Automotive Ethanol Fuel (E50-E85) (see 2.7)¹²

C1. Federal acts and regulations¹³

C1.1 *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) for liquid fuels.

C1.2 *Gasoline regulations* (SOR/90-247, as in effect at any given time)

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.

C1.3 *Contaminated fuel regulations* (SOR/91-486).

These regulations prohibit the importation of fuel that has been contaminated with hazardous wastes.

C1.4 *Transportation of dangerous goods regulations* (SOR/2001-286).

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

C1.5 *Benzene in gasoline regulations* (SOR/97-493)

These regulations establish the limits for benzene and BEN in gasoline (see 7.18 and 7.19), and the limits for sulphur, benzene and aromatics in oxygenates.

C1.6 *Sulphur in gasoline regulations* (SOR/99-236)

These regulations establish the limits for sulphur in oxygenates and in gasoline (see 7.7).

C1.7 *Denatured and specially denatured alcohol regulations* (SOR/2005-22, 2005-02-01).

This regulation is made under the *Excise Act, 2001, Denatured and Specially Denatured Alcohol Regulations, P.C. 2005-45, 2005-02-01*.¹⁴

C2. Provincial and territorial regulations

C2.1 British Columbia

¹² This list is not necessarily complete. It is the user's responsibility to refer to the appropriate regulations.

¹³ Refer to the latest versions. Federal acts and regulations are obtainable from the Canada Gazette Web site at www.gazette.gc.ca and consolidated acts and regulations may be available from <http://laws.justice.gc.ca/>

¹⁴ Available from the Department of Justice Web site at <http://laws-lois.justice.gc.ca/eng/regulations/SOR-2005-22/FullText.html>.

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C2.1.1 General requirements, deposit control additives and vapour pressure

General requirements, deposit control additives and vapour pressure requirements are controlled under the latest version of the *Cleaner Gasoline Regulation* (B.C. Reg. 498/95)¹⁵.

C2.2 Manitoba

C2.2.1 General requirements and vapour pressure

The general requirements and vapour pressure are controlled under the latest version of the *Dangerous Goods Handling and Transportation Act*, including the *Dangerous Goods Handling and Transportation Regulation* (55/2003) and the *Storage and Handling of Petroleum Products and Allied Products Regulation* (188/2001).

C2.3 Nova Scotia

C2.3.1 Vapour pressure

Vapour pressure is controlled under the *Environment Act* (S.N.S. 1994-95, c. 1) and the *Air Quality Regulations* (N.S. Reg. 55/95).

C2.4 New Brunswick

C2.4.1 Vapour pressure

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

C2.5 Newfoundland and Labrador

C2.5.1 Vapour pressure

Vapour pressure is controlled under the *Environmental Protection Act* (O.C. 2003-229) — *Gasoline Volatility Control Regulations* (62/03).

C2.6 Ontario

C2.6.1 Vapour pressure

Vapour pressure is controlled under the latest version of *Ontario Regulation* (O.Reg.) 271/91, as amended by O.Reg. 45/97 *Gasoline Volatility*.¹⁶

C2.6.2 Sulphur

See the reporting requirements under the *Environmental Protection Act: Reporting Requirements – Sulphur Levels in Gasoline* (O.Reg. 212/02).

C2.6.3 Fuel products

Standards describing fuel products are listed under the *Technical Standards and Safety Act, 2000* — O.Reg. 223/01, *Liquid Fuels* (O.Reg. 217/01) — *Liquid Fuels Handling Code*.

¹⁵ Available from the British Columbia Ministry of Water, Land and Air Protection Web site at http://www.qp.gov.bc.ca/statreg/reg/E/EnvMgmt/498_95.htm. The official version of the legislation is available through <http://www.qplegaleze.ca/default.htm>, the Web site for the British Columbia Queen's Printer.

¹⁶ Available from Ontario e-Laws Web site at www.e-laws.gov.on.ca/.

C2.7 Prince Edward Island

C2.7.1 General requirements

The general requirements are controlled under the *Petroleum Products Act Regulations* (EC 38/91), as amended by EC 639/93, 639/97, 762/98, 699/2000.

C2.8 Quebec

C2.8.1 General requirements

The general requirements are controlled under the latest version of the *Loi sur les produits pétroliers*, L.R.Q., c. P-30.1. *Règlement sur les produits pétroliers*, D.226-2007, 2007 G.O. 2, 1668B, or *Petroleum Products Act*, R.S.Q., c. P-30.1. *Petroleum Products Regulation*, O.C. 226-2007, 2007 G.O. 2, 1244B¹⁷. In this regulation, Quebec quality requirements are listed 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 oils Types 0,1 and 2, and fuel oils 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 hydrocarbures et des biocombustibles of the Ministère de l'Énergie et des Ressources naturelles du Québec is responsible for the application and revision of this regulation. Web site www.mern.gouv.qc.ca/english/energy/index.jsp.

C2.9 Yukon

C2.9.1 General requirements

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

¹⁷ 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 online at www2.publicationsquebec.gouv.qc.ca/home.php.

Annex D *(informative)*

Volatility class geographic locality table (E50-E85)

D1. The following table provides guidance to the semi-monthly volatility class for a number of geographic locations in Canada (see footnote 13 and Annex C).

D2. The 10th Percentile Low-End Design Temperatures for a particular location and time of the year may be obtained from the Weather Data Analysis Pack (see 2.4 and 3.1), which is derived from long term weather data (see 3.1).

Table D1 — Volatility class geographic locality table — Guidance

Geographic Zone ¹⁸	Semi-monthly volatility classes based on 10 th percentile low-end design temperature																							
	January		February		March		April		May		June		July		August		September		October		November		December	
	1-15	16-31	1-15	16-28/29	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31
A	II	II	II	II	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	II
B	IV	IV	III	III	II	I	I	I	I	I	I	I	I	I	I	I	I	II	II	II	III	III	IV	IV
C	IV	IV	III	III	II	I	I	I	II	II	I	I	I	I	I	I	I	II	II	II	III	III	IV	IV
D	III	III	III	III	II	I	I	II	II	II	I	I	I	I	I	I	I	I	II	II	II	III	III	III
E	III	III	III	III	II	I	I	II	II	II	I	I	I	I	I	I	I	I	II	II	II	III	III	III
F	IV	IV	IV	IV	II	I	I	II	II	II	I	I	I	I	I	I	II	II	II	III	III	IV	IV	IV
G	IV	IV	IV	IV	II	I	I	II	II	II	I	I	I	I	II	II	II	II	II	III	III	IV	IV	IV
H	IV	IV	IV	IV	III	II	II	III	III	III	II	II	I	I	II	II	II	II	III	III	IV	IV	IV	IV

See 4.1.1

¹⁸ See CAN/CGSB-3.5 Table 2 for a definition of the geographic zones.

Figure 1 — Map of geographic zones — Canada overview

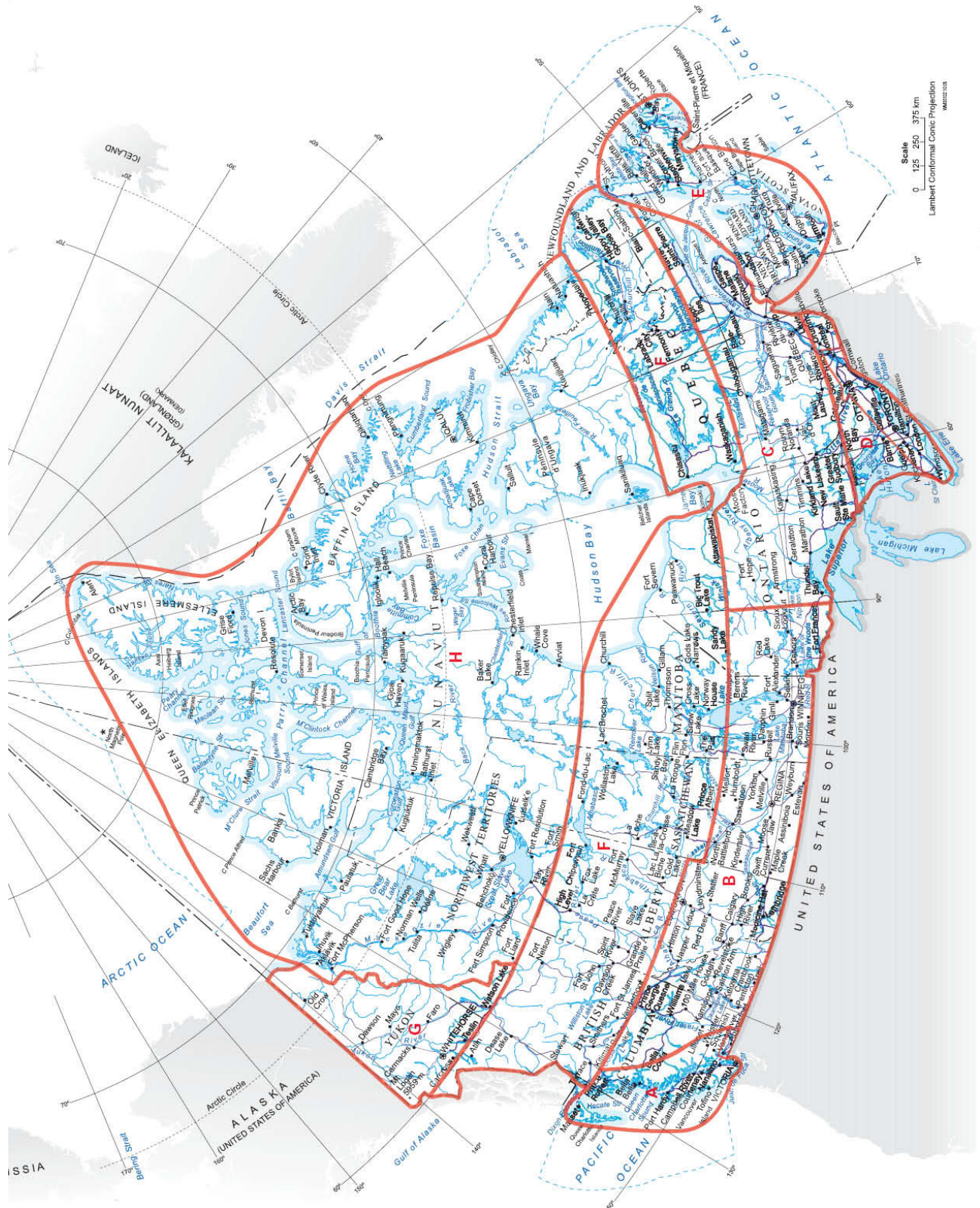


Figure 2 — Map of geographic zones — Western Canada

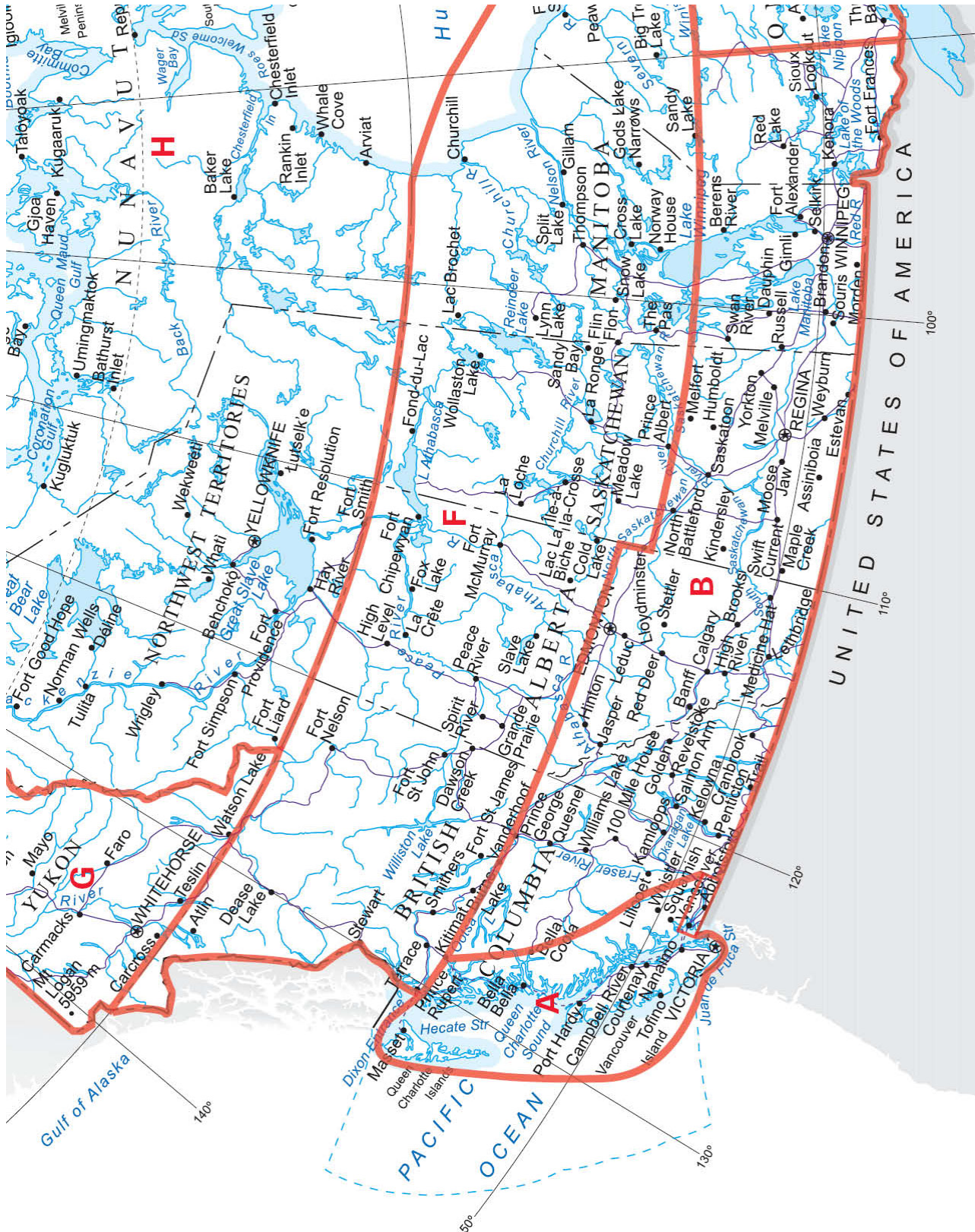


Figure 3 — Map of geographic zones — Eastern Canada

