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CAN/CGSB-3.516-2022

Supersedes CAN/CGSB-3.516-2017 and Amendment No. 1, July 2020

Denatured fuel ethanol for use in automotive spark-ignition fuels

Canadian General Standards Board CGSB

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NATIONAL STANDARD OF CANADA

CAN/CGSB-3.516-2022

Supersedes CAN/CGSB-3.516-2017
and Amendment No. 1, July 2020

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

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Preface

This National Standard of Canada CAN/CGSB-3.516-2022 supersedes the 2017 edition and amendment No. 1 published in July 2020. Changes in this edition were made to provide consistency with standards CAN/CGSB-3.5-2021 and CAN/CGSB-3.511-2021 and to update references to government regulations. No technical changes were made to the ethanol requirements.

Changes since the previous edition

- Addition of definition of pHe in section 3.
- Clarified language on additive requirements in 5.2.
- Addition of section 6.20 on the *Benzene in Gasoline Regulations* and *Sulphur in Gasoline Regulations*.
- Footnote d was incorporated into section 6.20.
- Update of effective dates for application of the *Sulphur in Gasoline Regulations* in 6.11 and 6.20.
- Update of references in B.3 Denaturant section.
- Update of information on regulations. See C.1.2, C.1.3, C.1.4, C.2.1, C.2.2, C.2.3, C.2.4, C.2.5 and C.2.6.

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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Denatured fuel ethanol for use in automotive spark-ignition fuels

1 Scope

This standard applies to denatured fuel ethanol, a blending component that is used solely as a component of automotive spark-ignition fuels.

These automotive spark-ignition fuels include:

CAN/CGSB-3.511 — *Oxygenated automotive gasoline containing ethanol (E1-E10 and E11-E15)*, and

CAN/CGSB-3.512 — *Automotive ethanol fuel (E50-E85 and E20-E25).*

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 in this standard are provided in metric 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 expression 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*

CAN/CGSB-3.511 — *Oxygenated automotive gasoline containing ethanol (E1 – E10 and E11 – E15)*

CAN/CGSB-3.512 — *Automotive ethanol fuel (E50 – E85 and E20 – E25)*

2.1.1 Contact information

The above may be obtained from the Canadian General Standards Board, Sales Centre. 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.

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, or from IHS Markit. Telephone: 613-237-4250 or 1-800-267-8220. Fax: 613-237-4251. Web site: www.global.ihs.com.

2.3 NACE International

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

2.3.1 Contact information

The above may be obtained from NACE International. Telephone: 281-228-6200. E-mail: customersupport@ampp.org. Web site: https://store.ampp.org/.

2.4 See Annex C for federal, provincial and territorial acts and regulations that apply to denatured fuel ethanol.

3 Terms and definitions

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

denaturant
material added to fuel ethanol to make it unsuitable for beverage or medicinal use but suitable for use in automotive engines. The only denaturants allowed are as required for grade DA-2C or DA-2F (see Annex C, C.1.5). The denaturant used in grade DA-2C is commonly referred to as natural gasoline, and the denaturant used in grade DA-2F is commonly referred to as gasoline or as a gasoline component.

denatured fuel ethanol
commercially manufactured ethanol containing denaturant as required by the *Denatured and Specially Denatured Alcohol Regulations* — SOR/2005-22, which makes the ethanol unsuitable for beverage or medicinal use. (See Annex C, C.1.5.)

ethanol
ethyl alcohol, the chemical compound CH_3CH_2OH.

impurities
in commercially produced ethanol, compounds other than ethanol or denaturants present, such as water, methanol and fusel oils (for example, amyl and isoamyl alcohols).

pHe
measure of acid strength of denatured fuel ethanol (see 6.14).

4 Classification

4.1 The denatured fuel ethanol shall be supplied in the following types, as specified (see 8.1).

4.1.1 Types

Type 1 — Intended for use in oxygenated automotive gasoline containing ethanol (E1 – E10 and E11 – E15) as defined in CAN/CGSB-3.511.

Type 2 — Intended for use in automotive ethanol fuel (E50 – E85 and E20 – E25) as defined in CAN/CGSB-3.512 and may also be used in oxygenated automotive gasoline containing ethanol (E1 – E10 and E11 – E15) as defined in CAN/CGSB-3.511.

5 General requirements

5.1 The denatured fuel ethanol shall be a stable homogeneous liquid free from foreign matter and dissolved material that can clog filters or screens (see Annex B).

5.2 The denatured fuel ethanol may contain additives designed to improve its characteristics. Additives include, but are not limited to, corrosion inhibitors, buffers, dispersants and 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 (see 9.4).

5.3 Impurities such as aldehydes, ketones, amines, acid esters and soluble polymers shall not be added to either the ethanol or the denaturant, except as functional components of additives (see 5.2). Halogenated compounds, silicon compounds, fusel oils, used lubricating oils and used solvents (including ethanol) or other such materials shall not be added to either the ethanol or the denaturant, except as normally occurring trace constituents.

5.3.1 The denaturant used in denatured fuel ethanol shall not contain materials, such as drag reducing additive or its degradation products, which can separate from solution at the expected temperatures of blending, storage and use.

5.3.2 Ethanol-blended gasoline contaminated with silicon has caused fouling of spark plugs, exhaust gas oxygen sensors and exhaust catalysts. ASTM D7757 is a standard test method for determining silicon content.

6 Detailed requirements

6.1 The denatured fuel ethanol 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.

6.1.1 For purposes of determining conformance with the specified limiting values, 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.

6.1.2 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 $P = 0.5$.

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

6.2 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. These are referred to as validated test methods.

6.2.1 Those validated test methods shall correlate with methods referenced in the standard. Differences in precision, sensitivity and bias between test methods referenced in the standard and the validated test methods shall be noted when using results from validated methods.

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

6.3 In the event of a dispute, the procedures given in 6.1.1 and 6.1.2 shall be used.

6.3.1 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.

	Specified limiting values				
	Property	Both types		Test methods	
		Min.	Max.	ASTM	CGSB/Others
6.4	Ethanol, % by volume	92.0	—	D5501	CAN/CGSB-3.0 No. 14.3[c]
6.5	Methanol content, % by volume	—	0.5	D5501	CAN/CGSB-3.0 No. 14.3[c]
6.6	Copper, mg/L • Type 1 • Type 2	—	 0.1 0.05	D1688 Method A, modified[a]	—
6.7	Total acidity, as acetic acid • mg/L • % by mass • mg/kg	—	 56 0.0070 70.	 D7795	—
6.8	Ethanol denaturant, % by volume[b] only • Grade No. DA-2F, or • Grade No. DA-2C	 0.99 1.96	 4.76 4.76	—	—
6.9	Water, % by volume	—	0.8	E203 E1064 D6304 D7923[c]	—
6.10	Chloride, inorganic, mg/kg • Type 1 • Type 2	—	 10. 1	 D7319[c] D7328	—
6.11	Sulphur content, mg/kg (See 6.20)	—	 12	D5453[c] D7039	—
6.12	Sulphate, mg/kg • Type 1 • Type 2	—	 4 1	D7318 D7319[c] D7328	—
6.13	Solvent washed gum content, mg/100 mL	—	5	D381[d]	—
6.14	pHe	6.5	9.0	D6423	—
6.15	Benzene, % by volume (See 6.20)	—	0.25	—	CAN/CGSB-3.0 No. 14.3
6.16	Aromatics, % by volume (See 6.20)	—	2.5	—	CAN/CGSB-3.0 No. 14.3

	Specified limiting values				
	Property	Both types		Test methods	
		Min.	Max.	ASTM	CGSB/Others
6.17	Steel corrosion, tested after blending with 90 % by volume reagent grade iso-octane	—	B+	D7548	NACE TM0172[c]
6.18	Phosphorus, mg/L	—	1.3	D3231	—
6.19	Conductivity, µS/m	—	500.	D1125	—

[a] The modifications of ASTM D1688, Test Method A (atomic absorption, direct), consist of mixing reagent grade ethanol, which may be denatured according to formula for specially denatured alcohol grade SDAG-1 or SDAG-2, in place of water as the solvent or diluent for the preparation of reagents and standard solutions. However, this shall not be done to prepare the stock copper solution described in ASTM D1688, because a violent reaction can occur between the acid and the ethanol. Use water, as specified, in the acid solution part of the procedure to prepare the stock copper solution. Use ethanol for the rinse and final dilution only. The precision of this modified method has not been determined, but it is expected to be similar to the precision of ASTM D1688, Test Method A.

[b] When reporting this parameter, metered (measured) volumes may be used in place of analytical tests when the component is added. Note that the denaturant limits are absolute (see *denatured fuel ethanol* in section 3 and Annex C, C.1.5). Ethanol denaturants shall consist of a hydrocarbon mixture with a final boiling point less than 225 °C (as determined by ASTM D86). Only Grades No. DA-2F or No. DA-2C as defined in *Denatured and Specially Denatured Alcohol Regulations* (see Annex C, C.1.5) meet these requirements.

[c] Referee method to be used in the event of a dispute.

[d] Solvent-washed gum content shall be determined using the “air jet apparatus” specified in ASTM D381.

6.20 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” under the *Sulphur in Gasoline Regulations*. If concentrations are greater than the limits of the above table, the finished fuel blend shall be tested to ensure compliance with both the *Benzene in Gasoline Regulations* and *Sulphur in Gasoline Regulations*.

6.20.1 Sulphur is controlled by the federal *Sulphur in Gasoline Regulations* (see Annex C, C.1.4). 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.

6.20.2 Benzene and BEN (benzene emissions number) are controlled by the federal *Benzene in Gasoline Regulations* (see Annex C, C.1.3). 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*.

7 Inspection

7.1 Sampling

7.1.1 Sampling equipment and procedures shall be designed and used to obtain representative samples of a product. Sample lines, hoses, etc. should be adequately flushed prior to taking a sample. Samples should be stored in a cool, dark place. Procedures shall be in accordance with ASTM D4057, D4177 or D5854.

7.1.2 Sample volume shall be consistent with the requirements of the testing laboratory, or the authority having jurisdiction, or both. Unless otherwise specified [see 8.1 b)], a sample of at least 1 L shall be taken (see 9.3).

8 Options

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

a) type (see 4.1);

b) sample size, if other than as specified (see 7.1.2).

9 Precautions

9.1 Health and safety

Users should refer to their supplier's Safety Data Sheet (SDS) for guidance on the safe handling of denatured fuel ethanol.

9.2 Equipment

The equipment in contact with denatured fuel ethanol shall 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.

9.3 Sampling containers

The sample shall be collected in containers that are compatible with denatured fuel ethanol. Where practical, denatured fuel ethanol should be sampled in glass containers. Plastic containers should be avoided. If the sample has to be collected in a metal container, do not use a soldered metal container, as the solder can contaminate the sample. ASTM D4306 provides general guidance on the selection of sampling containers for trace contamination analysis.

9.4 Incorporating additives

Users are cautioned against incorporating other additives in the denatured fuel ethanol unless detailed test data are first obtained, to confirm that performance is improved without harmful side effects.

9.5 Additional information

See Annex B for transportation, storage, handling and additional information.

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 D381 — Standard Test Method for Gum Content in Fuels by Jet Evaporation

ASTM D1125 — Standard Test Methods for Electrical Conductivity and Resistivity of Water

ASTM D1688 — Standard Test Methods for Copper in Water

ASTM D3231 — Standard Test Method for Phosphorus in Gasoline

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 D4057 — Standard Practice for Manual Sampling of Petroleum and Petroleum Products

ASTM D4177 — Standard Practice for Automatic Sampling of Petroleum and Petroleum Products

ASTM D4306 — Standard Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination

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 D5501 — Standard Test Method for Determination of Ethanol and Methanol Content in Fuels Containing Greater than 20% Ethanol by Gas Chromatography

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

ASTM D6304 — Standard Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration

ASTM D6423 — Standard Test Method for Determination of pHe of Denatured Fuel Ethanol and Ethanol Fuel Blends

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

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

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

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

ASTM D7757 — Standard Test Method for Silicon in Gasoline and Related Products by Monochromatic Wavelength Dispersive X-ray Fluorescence Spectrometry

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

ASTM D7923 — Standard Test Method for Water in Ethanol and Hydrocarbon Blends by Karl Fischer Titration

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

ASTM E203 — Standard Test Method for Water Using Volumetric Karl Fischer Titration

ASTM E1064 — Standard Test Method for Water in Organic Liquids by Coulometric Karl Fischer Titration

Annex B
(informative)

Transportation, storage, handling and additional information or precautions for denatured fuel ethanol

B.1 Storage and handling

Denatured fuel ethanol should be transported, stored and handled using equipment specifically designed for this purpose. Note that ethanol can corrode aluminum alloys. Since denatured fuel ethanol is an electrolyte (see B.2), it will promote the formation of galvanic corrosion cells when in contact with dissimilar metals. The galvanic reaction will introduce metallic compounds of the anodic metal into the fuel, which can result in plugged vehicle fuel filters. Brass in direct contact with aluminum in denatured fuel ethanol has resulted in galvanic corrosion, giving rise to fuel contamination.

B.2 Water

Denatured fuel ethanol is hygroscopic, and it can eventually absorb enough moisture from the ambient air to cause mixtures with gasoline to separate into two phases or layers. Separation can be avoided if care is taken during storage, distribution and use to prevent contact with water or humid air. Phase separation of gasoline-ethanol mixtures is a greater risk as ambient temperatures drop.

B.3 Denaturant

The choice of a suitable denaturant (see 5.3 and 6.8) is impacted by the *Benzene in Gasoline Regulations* and *Sulphur in Gasoline Regulations* (see 6.11, 6.15 and 6.16). The only denaturants allowed are those used in grades DA-2C and DA-2F (see C.1.5).

B.3.1 No industry standard method for quantification of denaturant content has been established. However, it is recognized that the purchaser of the product often requests quantification of denaturant. For this purpose denaturant content can be approximated by the following equation subject to the agreement of purchaser and seller:

$$Dn = 100 - (E + M + W + H)$$

where,

Dn = Denaturant content volume %;

E = Ethanol content volume % as measured by methods listed in 6.4;

M = Methanol content volume % as measured by methods listed in 6.5;

W = Water content volume % as measured by methods listed in 6.9;

H = Higher alcohol (C3+) content as measured by CAN/CGSB-3.0 No. 14.3[1] or other appropriate method.

B.4 Steel corrosion protection

For further information, refer to the document *Evaluation Protocol for Corrosion Inhibitors for Fuel Ethanol* available from the Renewable Fuels Association (https://ethanolrfa.org/file/1180/RFA-Evaluation-Protocol-for-Corrosion-Inhibitors-for-Fuel-Ethanol_V073010a.pdf).

[1] CAN/CGSB-3.0 No. 14.3 is the referee method.

Annex C
(informative)

Federal, provincial and territorial acts and regulations applicable to denatured fuel ethanol[2]

C.1 Federal acts and regulations[3]

C.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).

C.1.2 *Transportation of Dangerous Goods Regulations* (SOR/2001-286)

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

C.1.3 *Benzene in Gasoline Regulations* (SOR/97-493)

These regulations establish the limits for benzene and BEN in gasoline and benzene in oxygenates (see 6.15 and 6.16).

C.1.4 *Sulphur in Gasoline Regulations* (SOR/99-236)

These regulations establish the limits for sulphur in gasoline and in oxygenates (see 6.11).

C.1.5 *Denatured and Specially Denatured Alcohol Regulations* (SOR/2005-22)

The denaturants used in grades DA-2C and DA-2F are defined in these Regulations as:

DA-2C, “Petroleum Derivative: A volatile, highly flammable liquid that has the characteristic odour of light petroleum distillate. Upon distillation, a maximum of 10% by volume of the liquid shall pass over at or below 35 °C, or the liquid shall have a vapour pressure at 37.8 °C (at a vapour-to-liquid ratio of 4:1) that is less than or equal to 105 kPa, and a minimum of 95 % by volume of the liquid shall pass over at or below 225 °C. Petroleum derivative does not include gasoline, petroleum naphtha or solvent naphtha.”

DA-2F, “Gasoline: A petroleum distillate — or a mixture of petroleum distillates, oxygenates or additives — that is suitable for use in a spark ignition engine and that has the following characteristics, as determined by the applicable test method listed in the Canadian General Standards Board Standard CAN/CGSB-3.5-2004, entitled *Unleaded Automotive Gasoline*, published November 2004, as amended from time to time:

a) a vapour pressure of at least 38 kPa;

b) an antiknock index of at least 80;

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[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] Federal acts and regulations can be obtained from the Department of Justice Canada, Communications Branch, 284 Wellington Street, Ottawa, Canada K1A 0H8. Web site: http://laws-lois.justice.gc.ca/eng/index.html. If this Web site becomes inoperative, regulations can also be found at www.canlii.org.

c) a distillation temperature, at which 10% of the fuel has evaporated, of not less than 35 °C and not greater than 70 °C; and

d) a distillation temperature, at which 50% of the fuel has evaporated, of not less than 65 °C and not greater than 120 °C."

These regulations govern the composition and concentration of materials used to denature ethanol:

SOR/2005-22, February 1, 2005, made under the *Excise Act, 2001*, *Denatured and Specially Denatured Alcohol Regulations*, P.C. 2005-45, February 1, 2005, http://laws-lois.justice.gc.ca/eng/regulations/SOR-2005-22/FullText.html.

SOR/2006-103 [Vol. 139, No. 4 — February 23, 2005].

Denatured Alcohol Regulations, C.R.C., c. 568 — Schedule (Sections 5 and 7), Specifications for the Composition and Authority for Use of Specially Denatured Alcohol.

SOR/2006-103, May 18, 2006 [Vol. 140, No. 11 — May 31, 2006].

Excise Act, 2001.

Regulations Amending the Denatured and Specially Denatured Alcohol Regulations, P.C. 2006-402, May 18, 2006.

C.2 Provincial and territorial regulations

C.2.1 Alberta

C.2.1.1 Renewable fuels requirements

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

C.2.2 British Columbia

C.2.2.1 ***Renewable content and carbon intensity requirements regulation*** (BC Reg. 320/2009)

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].

C.2.3 Manitoba

C.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.

[4] Available from the BC Laws site at http://www.bclaws.gov.bc.ca.

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

C.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.

C.2.4 Ontario

C.2.4.1 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*[6]. 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.

C.2.5 Quebec

C.2.5.1 General requirements

The general requirements are controlled under the *Loi sur les produits pétroliers,* RLRQ, c. P-30.01, *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.2)[7]. 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 du 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/transition-energetique/.

C.2.6 Saskatchewan

C.2.6.1 Ethanol requirements

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

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[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/.