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Kerosene

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NATIONAL STANDARD OF CANADA **CAN/CGSB-3.3-2014**

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Kerosene

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

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Contents

Page

Kerosene

1 Scope

This National Standard of Canada applies to two types of petroleum distillates intended for use in applications as described below.

Type No. 1-K Kerosene is intended for use in unvented space heaters as described in CAN3-B140.9.3, when used in well-ventilated surroundings, and in wick-fed illuminating lamps.

Type No. 2-K Kerosene is intended for use in flue-connected stoves and heaters and should not be used in unvented applications.

NOTE The term “kerosene” also describes products used for other purposes not covered by this standard.

The testing and evaluation of a product against this standard may require the use of materials and 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. However, parties to agreements based on this National Standard of Canada are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below.

2.1 Canadian General Standards Board (CGSB)

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

No. 28.8 — *Visual haze rating of distillate fuel oils.*

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 http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/

2.2 Canadian Standards Association (CSA)

CAN3-B140.9.3 — *Portable kerosine-fired heaters*.

2.2.1 Source

The above may be obtained from the Canadian Standards Association, Sales, 5060 Spectrum Way, Suite 100, Mississauga, ON L4W 5N6, telephone 416-747-4044, 1-800-463-6727, fax 613-747-2510, e-mail sales@csgroup.org, Web site www.csagroup.org.

2.3 ASTM International

Annual Book of ASTM Standards (Annex A).

2.3.1 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.

3 Classification

3.1 Types

The kerosene shall be supplied in the following types, as specified (see 7.1):

Type No. 1-K

Type No. 2-K.

4 General requirements

4.1 Kerosene composition

The kerosene shall be a homogeneous blend of hydrocarbons and shall be visually clear, free from undissolved water (see 8.5), sediment and suspended matter (see 8.4) under the temperature and conditions of custody transfer. The use of fatty acid alkyl esters in this fuel is not recommended due to possible effects on cold weather properties and storage stability.

4.2 Dye

Type No. 1-K kerosene shall not be dyed (see. 5.1.7 and 8.2).

4.3 Canadian regulations

See Annex B for federal, provincial and other regulations applicable to kerosene.

5 Detailed requirements

5.1 Specified limiting values

5.1.1 The kerosene 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.

5.1.2 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. There is one exception (see 5.1.10).

5.1.3 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 fixed at $P = 0.5$.

		Specified limiting values		
	Properties	**Minimum**	**Maximum**	**ASTM test method**
5.1.4	Sulphur, % by mass			D1266, D2622, D4294, D5453[2], D7039
	a. Type No. 1-K Kerosene	—	0.04	
	b. Type No. 2-K Kerosene	—	0.30	
5.1.5	Mercaptan sulphur[3], % by mass (see 7.2) Type No. 1-K Kerosene	—	0.003	D3227
5.1.6	Low-temperature flow properties[4], one of the following: (see 5.12)			
	a. Cloud point, ºC or	—	-40	D2500 or D5773
	b. Freezing point, ºC	—	-40	D2386 or D5972
5.1.7	Colour (Saybolt) (see also 4.2 and 8.2)			D156[2] or D6045
	a. Type No. 1-K Kerosene	+20	—	
	b. Type No. 2-K Kerosene[5]	report	—	
5.1.8	Copper strip corrosion, 3 h at minimum temperature of 50ºC	—	No. 1	D130
5.1.9	T10 recovered, ºC	—	205	D86[6]
	Distillation, end point, ºC	—	300	
5.1.10	Flash point[7], ºC	38.0	—	D56, D93 or D3828
5.1.11	Smoke point[8], mm	19.0	—	D1322

[2] The referee method to be used in the event of a dispute.

[3] The mercaptan sulphur determination may be waived (see 7.2) if the fuel is considered negative (“sweet”) in accordance with ASTM D4952.

[4] The kerosene may be tested according to cloud point or freezing point. ASTM D2500 shall be the referee test method for determining low-temperature flow properties.

[5] Colour shall be determined before the addition of a dye.

[6] In the event of a dispute, the automated test method of ASTM D86 shall be used as the referee method.

[7] The test values shall be reported to the nearest *0.5 ºC* in accordance with ASTM D56 or D3828, Method B. The results obtained by ASTM D93 or D3828 may be up to *2 °C* lower than those obtained by ASTM D56.

[8] A comparison of ASTM D187 and ASTM D1322 has shown that the minimum limit of *19.0 mm* specified by ASTM D1322 is equivalent to the 16 h requirement using ASTM D187, as required in ASTM D3699.

		Specified limiting values		
	Properties	**Minimum**	**Maximum**	**ASTM test method**
5.1.12	Electrical conductivity, at point, time and temperature of delivery to purchaser, pS/m (see 8.1)	25	—	D2624
5.1.13	Kinematic viscosity, at 40 °C, mm²/s (cSt)[9]	0.9	1.9	D3699

6 Inspection

6.1 Sampling

6.1.1 Sampling equipment and procedures shall be designed and used to obtain representative samples of the product. Sampling 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 and D5854.

6.1.2 Sample volume shall be consistent with the requirements of the testing laboratory or the authority having jurisdiction or both. Unless otherwise specified (see 7.2), a sample of at least 3 L shall be collected.

7 Options

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

a. Type of kerosene (see 3.1).

7.2 The following options may be specified if the requirements are more stringent than stipulated in this standard:

a. Mercaptan sulphur limit, if this option is specified then use of ASTM D4952 is no longer allowed (see 5.1.5)

b. Sample size (see 6.1.2).

8 Precautions

8.1 Conductivity depletion

Due to the normal depletion of fuel electrical conductivity during commingling, storage and distribution, or at low temperatures, the kerosene should be treated with sufficient conductivity-improver additive to ensure that the electrical conductivity requirement in 5.1.12 is met. The temperature at the point of use and the method of distribution could require a substantially higher conductivity level than 25 pS/m at the point of additive treatment. For more information on this subject, refer to ASTM D4865 and D2624.

[9] The SI unit for kinematic viscosity is the square metre per second. The preferred multiple for fluids in this viscosity range is the square millimetre per second, which is equivalent to one centiStokes (i.e. *1 mm²/s* = 1 cSt).

8.2 Fuel colour

Although type No. 2-K does not have a colour requirement, colour can be a useful indicator of fuel quality or contamination. Normally, fuel colour ranges from water white (colourless) to a pale straw yellow. Other colours can be the result of crude oil characteristics or refining processes. A darkening or a change in colour can be the result of product contamination and can indicate that the kerosene is off-specification, which could render it unfit and unacceptable for use. Undyed kerosene having various shades of colour such as pink, red, green, blue or a change in colour from the supply source should be investigated to determine the cause of the colour change to ensure suitability for its application.

8.3 Additives

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

8.4 Manufacturing processes

Contamination from manufacturing processes or treatments can be carried over in trace quantities into the fuel and cause unexpected problems. Moreover, these contaminants might not be detected by the requirements listed in this standard. It is recommended that adequate quality assurance procedures be put in place to ensure that manufacturing processes capable of such contamination are identified and controlled. Sodium, calcium, chlorides, sulphates, clay, sand, acids, caustic, soaps, and amine process additives are examples of possible contaminants or potential precipitates.

8.5 Visual haze

The solubility of water in fuel is a function of temperature. When fuel is exposed to low ambient temperature, water can separate causing a haze or cloudy appearance. For information on testing for visual haze, refer to CAN/CGSB-3.0 No. 28.8 or ASTM D4176.

Annex A
(normative)

Referenced ASTM publications (see 2.5)

Annual Book of ASTM Standards

D56 Standard Test Method for Flash Point by Tag Closed Cup Tester

D86 Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure

D93 Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester

D130 Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test

D156 Standard Test Method for Saybolt Color of Petroleum Products (Saybolt Chromometer Method)

D187 Standard Test Method for Burning Quality of Kerosine

D1266 Standard Test Method for Sulfur in Petroleum Products (Lamp Method)

D1322 Standard Test Method for Smoke Point of Kerosine and Aviation Turbine Fuel

D2386 Standard Test Method for Freezing Point of Aviation Fuels

D2500 Standard Test Method for Cloud Point of Petroleum Products

D2622 Standard Test Method for Sulphur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry

D2624 Standard Test Methods for Electrical Conductivity of Aviation and Distillate Fuels

D3227 Standard Test Method for (Thiol Mercaptan) Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method)

D3244 Standard Practice for Utilization of Test Data to Determine Conformance with Specifications

D3699 Standard Specification for Kerosine

D3828 Standard Test Methods for Flash Point by Small Scale Closed Cup Tester

D4057 Standard Practice for Manual Sampling of Petroleum and Petroleum Products

D4176 Standard Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)

D4177 Standard Practice For Automatic Sampling of Petroleum and Petroleum Products

D4294 Standard Test Method for Sulphur in Petroleum and Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectrometry

D4865 Standard Guide for Generation and Dissipation of Static Electricity in Petroleum Fuel Systems

D4952 Standard Test Method for Qualitative Analysis for Active Sulfur Species in Fuels and Solvents (Doctor Test)

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

D5854 Standard Practice For Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products

D5773 Standard Test Method for Cloud Point of Petroleum Products (Constant Cooling Rate Method)

D5972 Standard Test Method for Freezing Point of Aviation Fuels (Automatic Phase Transition Method)

D6045 Standard Test Method for Colour of Petroleum Products by the Automatic Tristimulus Method

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

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

Annex B
(informative)

Federal, provincial and other regulations applicable to kerosene (see 2.4)[10,11]

B1. Federal regulations

B1.1 Transportation of dangerous goods regulations (SOR/DORS/2001-286)

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

B1.2 The following federal regulations have been enacted under the *Canadian Environmental Protection Act*:

B1.2.1 Fuels information regulations, No. 1 (C.R.C. c. 407 amended by SOR/DORS/79-280, 80-138 and 2000-104)

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

B1.2.2 Contaminated fuel regulations (SOR/DORS/91-486)

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

B2. Provincial regulations

B2.1 Ontario

General requirements

Safety related requirements are controlled under the *Technical Standards and Safety Act*, 2000, c. 16, approved March 5, 2001. Under this Act, the *Liquid Fuels Handling Code*, June 1st, 2007, was published by the Technical Standards and Safety Authority.

B2.2 Quebec

B2.2.1 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, 1244B[12]. 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.

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[10] 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.

[11] The requirements in jurisdictions other than those listed will be added as information becomes available in future revision or amendments to this standard. This list is provided for information only and may not be complete. Please advise the CGSB of any other regulation that could apply to this standard.

[12] Available from Les Publications du Québec, telephone 1-800-463-2100 or 418-643-5150. Also available online at www2.publicationsquebec.gouv.qc.ca/home.php.

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 des Ressources naturelles is responsible for the application and revision of this regulation. Web site www.mrn.gouv.qc.ca/english/energy/ index.jsp.

B3. Other regulations

A number of municipalities have regulations governing the maximum allowable sulphur content; check with local authorities.