



Bulletin

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Document(s): W&M Regs, section 270; SVM-2	Issue Date: 2013-03-14	Effective Date: 2013-03-14
	Supersedes: V-18 (rev. 7)	

Selection of Volume Correction Factor Tables and Standard Density Values for Some Common Products

1.0 Purpose

This bulletin provides an index of volume correction factor reference tables, standard densities and density ranges for some common products. Additionally, it states Measurement Canada's policy regarding the use of standard densities and actual product densities.

2.0 Scope

This bulletin is applicable to all electronic registers which employ automatic temperature correction.

3.0 Terminology

Bio-diesel

Bio-diesel refers to a fuel produced from vegetable oil or animal fat consisting of long-chain alkyl (methyl, propyl or ethyl) esters meeting the specifications of ASTM D 6751. It is produced through a process known as transesterification. It is also referred to as Fatty Acid Methyl Esters or FAME.

HDRD

Hydrogenation Derived Renewable Diesel is a fuel produced from vegetable oil or animal fat by a hydro-treating process. HDRD meets the petroleum diesel ASTM specification. It is also referred to as Hydrotreated Vegetable Oil or HVO.

4.0 Policy

4.1 For the purposes of performing volume correction on liquids being sold or offered for sale to end consumers (retail sales), traders and devices shall use the appropriate standard density found in the second column of Table 1. For the purpose of SVM 2 part 14, printed tickets must show either the standard density or the common product name.

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4.1.1 For more information on printed ticket requirements, refer to Measurement Canada's [Bulletin V-20, "Printer Requirements for Volumetric Liquid Meters Equipped with Automatic Temperature Compensation \(ATC\)"](#)^[link 1] and [Bulletin V-27, "Content and Suggested Format for Retail Printed Receipts"](#)^[link 2].

4.2 Actual product densities may be used to perform volume correction of liquids in all trade transactions other than those noted in item 4.1 and 4.3, (retail sales to end users and sales of bio-diesel). Traders choosing to use the actual density of the product will use appropriate means to determine the density ($\pm 5 \text{ kg/m}^3$) which could include but are not limited to thermometers, hydrometers, pycnometers and scales, densitometers and Coriolis meters. For the purpose of SVM 2 part 14, printed tickets must show the actual density used to perform the volume correction.

Note: The rationale for allowing the use of actual densities at the wholesale trade level, and not at the retail level, is premised on the idea that the wholesale purchaser is typically a more sophisticated buyer and has the potential to verify the density used. The retail buyer is wholly dependant on the integrity of the trader and his device.

4.3 Blends of bio-diesel with petroleum diesel greater than 20% (>B20) bio-diesel and blends of HDRD with petroleum diesel greater than 50% HDRD do not expand and contract in the same manner as petroleum diesel of the same density and may only be volume corrected using the standard density value stated in Table 1, in conjunction with the API table 54 B, at the retail level trade.

4.3.1 Except for product sold at the retail level, blends of bio-diesel 20% or less and blends of HDRD 50% and less with petroleum diesel may be volume corrected using the actual product densities, in conjunction with the API table 54 B and, as determined in section 4.2.

4.3.2 Except for product sold at the retail level, blends of biodiesel greater than 20%, and blends of HDRD greater than 50%, with petroleum diesel may be volume corrected for temperature using API table 54C and an alpha factor determined following prescribed API methods.

4.4 The temperature correction of chemical products should reference Measurement Canada's [Bulletin V-10, "Volume Correction Factors of Non-Petroleum Products Authorized For Use With Liquid Measuring Meters"](#)^[link 3].

4.5 Subject to subsection 270(1)(a)(i) of the *Weights and Measures Regulations*, [Extrapolated Tables](#)^[link 4] of volume correction factors for use during the temperature compensation of gasoline and diesel fuels with densities of 730 kg/m^3 and 840 kg/m^3 can be found under the Laws and Requirements section of the Measurement Canada web site.

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5.0 Revisions

5.1 The purpose of revision 1 was to include the volume correction tables for gasoline and diesel oil.

5.2 The purpose of revision 2 was to change the values of the mean density and density range for some of the products and to reference new bulletin numbers.

5.3 The purpose of revision 3 was to correct some mistakes in the tables.

5.4 The purpose of revision 4 was to identify the conditions of using the actual product density for temperature correction purposes.

5.5 The purpose of revision 5 was to add bio-diesel and section 3.3. Table 1 was revised to include bio-diesel and all blends of bio-diesel and also bunker fuel oils. The water mixture of Isopropyl Alcohol was removed from the list of products identified in Table 1. The term "standard density" replaces the original term "mean density" throughout the bulletin. Associated volume correction tables (refer section 4.1 & 3.5) were removed from the bulletin and relocated to the Measurement Canada web site. The format was updated to include the purpose, scope, and policy sections.

5.6 The purpose of revision 6 was intended to simplify requirements regarding traders who may want to use the actual density of the product to perform volume correction of liquids. (PRE-2008)

5.7 The purpose of revision 7 was to allow for the use of actual densities for the purposes of volume correction for blends up to 20% bio-diesel (reference section 3.3). Reference to a Volume Information Page was updated to the Laws and Requirements section of MC's website. As well, the Table 1 was revised to: a) establish the product name "Distillates" to cover all middle petroleum fractions, including diesel fuels, fuel oils and stove oils and, b) correct the density range for bio-diesel and all blends with petroleum diesel.

5.8 The purpose of revision 8 is to provide volume correction factors for blends of HDRD with petroleum diesel; to provide terminology in section 3.0 to define biodiesel and HDRD and, to further define that appropriate means to determine density, for the purposes of temperature compensation, should be accurate to within 5 kg/m³.

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6.0 Additional Information

For additional information regarding this bulletin, please contact the Senior Program Officer responsible for volume measurement. For more information regarding Measurement Canada and its programs, [visit our website](#)^[link 5].

Dennis Beattie
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[link 1] <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00107.html>

[link 2] <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00114.html>

[link 3] <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00100.html>

[link 4] <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00115.html#tables-of-correction-factors>

[link 5] <http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/Home>

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Table 1: Selection of Volume Correction Factor Table for Some Common Products			
Product Name	Standard Density (kg/m³) @ 15 °C	Density Range (kg/m³) @ 15 °C	Volume Correction Factor Reference Table
Note: This list is not exhaustive.			
Liquefied Petroleum Gas (LPG) Butane	510 580	495-520 564-585	ASTM-IP, Table 54
Gasoline: all grades	730	640-780	API Chapter 11.1, Table 54B
Gasoline: Alcohol Blends (15% alcohol max)	730	653-780	
Aviation Fuels - (Kerosene based): Jet A, A1, Jet Kerosene, Turbine Fuel	800	780-840	
Aviation Gasoline	710	654-727	
Distillates: Diesel Fuels, Fuel Oils Stove Oils	840	830-900	
Bio-diesel¹ (B100) and all blends with petroleum diesel	840	830-900	
Hydrogenation Derived Renewable Diesel (HDRD or HVO) all blends with petroleum diesel	840	775-900	
Jet B (Naptha based)	760	750-770	API Chapter 11.1, Table 54A
Lubricating Oils (SAE Grades)	880	850-905	API Chapter 11.1, Table 54D
Alcohols: Methanol, Ethanol, Isopropyl Alcohol Hexylene Glycol	Refer to bulletin V10 for coefficients of expansion and specific tables.		API Chapter 11.1, Table 54C
Acetone Methyl Ethyl Ketone Methyl Isobutyl Carbinol	Refer to bulletin V10 for coefficients of expansion and specific tables		
Anhydrous Ammonia	617.7	-	
Toluene	870	869-873	Refer to Bulletin V10 for specific tables
Xylene	870	865-875	

¹ Includes only products meeting ASTM standard D6751. This does not cover used unprocessed vegetable oils or animal fats.