

# Excise Duty Memoranda Series

## 1.1.5 Instrument Certification

March 2006

Overview	This memorandum lists various specifications and explains the procedures for the examination or re-examination of instruments that are designed to measure the volume and absolute ethyl alcohol content of alcohol for purposes of the <i>Excise Act, 2001</i> (the “Act”).
Disclaimer	The information in this memorandum does not replace the law found in the Act and its Regulations. It is provided for your reference. As it may not completely address your situation, you may wish to refer to the Act or its Regulations, or contact any Canada Revenue Agency (CRA) regional excise duty office for additional information.
[Proposed amendments]	This memorandum reflects proposed amendments to the Act announced by the Minister of Finance on June 24, 2003. [Where information reflects proposed amendments, the information is enclosed in square brackets]. Any commentary in this memorandum should not be taken as a statement by the CRA that such amendments will in fact be enacted in their current form.

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La version française de ce document est intitulée *Certification d'instruments*.

**Canada**

## 1.1.5 Instrument Certification

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### General

- Volume and alcohol content ss 148(1)
1. The volume and absolute ethyl alcohol content of alcohol must be determined in a manner specified by the CRA using approved instruments.
- Types of approved instruments
2. In this memorandum, an instrument means a digital density meter, a digital thermometer, a hydrometer, a pycnometer, a glass thermometer, a mass flow measuring system or a tank scale. The specifications and processes for the examination, re-examination and approval of these instruments are set out further in this memorandum.
3. The requirement to determine the volume of alcohol and its absolute ethyl alcohol content under the Act is necessary to ensure that the duty on alcohol can be properly calculated. Excise duty on spirits or wine is calculated based on both the ethyl alcohol content and volume of the product at 20°C.
- Laboratory and Scientific Services Directorate
4. The Laboratory and Scientific Services Directorate (LSSD) of the Canada Border Services Agency has been delegated the responsibility of certifying instruments used for alcohol determination.
- Explanation of terms
5. The following list explains some of the terms used in this memorandum.
- “alcoholometric tables” means the *Canadian Alcoholometric Tables, 1980*, copyright by the Minister of Supply and Services, published under the authority of the Minister of National Revenue.
- “approved digital density meter” means a digital density meter that the LSSD has examined and approved as meeting the specifications set out in this memorandum.
- “approved digital thermometer” means a digital thermometer that the LSSD has examined and approved as meeting the specifications set out in this memorandum.
- “approved glass thermometer” means a glass thermometer that the LSSD has examined and approved as meeting the specifications set out in this memorandum.
- “approved hydrometer” means a hydrometer that the LSSD has examined and approved as meeting the specifications set out in this memorandum.
- “approved mass flow measuring system” means a mass flow measuring system whose test results the LSSD has examined and approved as meeting the specifications set out in this memorandum.
- “approved pycnometer” means a pycnometer that the LSSD has examined and approved as meeting the specifications set out in this memorandum.
- “approved tank scale” means a scale whose test results the LSSD has examined and approved as meeting the specifications set out in this memorandum.
- “Certificate of Approval” means a certificate issued by the LSSD denoting that an instrument meets the specifications set out in the appropriate paragraphs in this memorandum.

“completely obscured spirits” means spirits that contain 10g/L or more of dissolved solids and contain no material having a volatility that is similar to, or higher than, the volatility of absolute ethyl alcohol or water.

“dissolved solids” means any material that remains after the evaporation of a solution.

“laboratory table” means the *Canadian Alcoholometric Laboratory Table, 1996*, copyright by the Minister of Public Works and Government Services, published under the authority of the Minister of National Revenue;

“obscuration tables” means the *Canadian Alcoholometric Obscuration Equivalent Tables, 1993*, copyright by the Minister of Supply and Services, published under the authority of the Minister of National Revenue.

“partially obscured spirits” means spirits that contain 0.3 g/L or more of dissolved solids and less than 10 g/L of dissolved solids, and contain no other material having a volatility that is similar to, or higher than, the volatility of absolute ethyl alcohol or water.

“temperature of measurement” means the temperature at which an instrument reading is taken.

“unobscured spirits” means spirits that contain less than 0.3 g/L of dissolved solids and contain no other material having a volatility that is similar to, or higher than, the volatility of absolute ethyl alcohol or water.

Meaning of “alcohol licensee”  
s 2

6. “Alcohol licensee” means a person who is a spirits licensee or a wine licensee. Additional information concerning these types of licensees is available in Excise Duty Memoranda 3.1.1, *Producers and Packagers of Spirits* and 4.1.1, *Producers and Packagers of Wine*.

Meaning of “licensed user”  
para 14(1)(c)

7. “Licensed user” means a person who holds a user's licence issued under the Act. A licensed user is authorized to possess and use bulk alcohol, non-duty-paid packaged alcohol [or a restricted formulation] for specific purposes. Information on the obligations and entitlements of licensed users is available in Excise Duty Memorandum 3.1.2, *Licensed Users*.

**Note**

In this memorandum, the term “licensee” will be used to incorporate both “alcohol licensee” and “licensed user” when discussing the examination or re-examination procedures for instruments.

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### Examination of instruments

Indicating instrument is approved ss 148(5)

8. Where an instrument mentioned in paragraph 2 of this memorandum has been approved as meeting the appropriate specifications, the LSSD will issue a certificate of approval with respect to that instrument, and will
- in the case of a digital density meter, digital thermometer, mass flow measuring system or tank scale, record the serial number of the instrument and issue a label to be affixed to the instrument showing the last two digits of the year of the examination and the symbol of approval shown in paragraph 27 of this memorandum;
  - in the case of a hydrometer or glass thermometer, record the serial number of the instrument and mark the instrument with the last two digits of the year of the examination and the symbol of approval shown in paragraph 27 of this memorandum; and
  - in the case of a pycnometer, only record the serial number of the instrument
9. The LSSD will send the certificate of approval to the licensee and send a copy to the regional excise duty office.

Submitting a written request

10. All requests for instrument examination or re-examination are to be submitted, in writing, to the Chief of the Alcohol and Tobacco Section of the LSSD at the following address:

Laboratory and Scientific Services Directorate  
Attention: Chief, Alcohol and Tobacco Section  
Industrial Commodities Division  
79 Bentley Avenue  
Ottawa ON K2E 6T7

Contacting LSSD by telephone

11. Licensees may wish to contact the Chief of the Alcohol and Tobacco Section of the LSSD by telephone at (613) 954-9944 or by fax at (613) 952-7825.
12. Additional information on the LSSD will be available in Excise Duty Memorandum 1.1.4, *The Laboratory and Scientific Services Directorate*.

### Submission of a new class, type or design of instruments

Approval of a new class, type or design of instruments ss 148(2)

13. Where a licensee submits a new class, type or design of instrument to the LSSD, the approval of such new instruments only ensures that the specifications of this new class, type or design of instruments are acceptable. It does not constitute the approval of a specific instrument.
14. When a new class, type or design of instruments is submitted for examination, the LSSD may examine such instruments or the data provided by the licensee submitting it to determine if the accuracy and precision of the instrument are acceptable.
15. When a licensee submits an instrument for examination and provides the LSSD with the equipment and the means to perform the necessary tests and measurements to prove the accuracy and precision of this new class, type or design of instruments, the LSSD may initiate a formal examination.

16. However, where the LSSD is not able to determine to its own satisfaction the accuracy and precision of this new class, type or design of instruments, the LSSD may refuse examination.

17. If the accuracy and precision of this new class, type or design of instruments are acceptable, the LSSD will provide a description of the class, type or design of instruments to be used, as well as the requirements for the accuracy, precision, proper use and any other requirement that the LSSD determines as necessary. This information will also be added to this Excise Duty memorandum for future reference.

18. It should be noted that once the LSSD has approved a new class, type or design of instrument, a licensee who wishes to use an instrument of this class, type or design will still be required to submit the instrument for examination and approval by the LSSD.

**Re-examination of instruments**

Re-examination of instruments ss 148(3)

19. The CRA may direct in writing that any instrument previously examined and approved, or of a class, type or design previously examined and approved, be submitted for re-examination. Where a previously approved instrument is re-examined, and is approved as continuing to meet the specifications set out in this memorandum, the LSSD will issue a new certificate of approval and will

Approval of instruments

- in the case of a digital density meter, a digital thermometer, a mass flow measuring system or tank scale, record the serial number of the instrument and issue a new label to be affixed to the instrument showing the last two digits of the year of the re-examination and the symbol of approval shown in paragraph 27 of this memorandum;
- in the case of an hydrometer or a glass thermometer, record the serial number of the instrument and mark the instrument with the last two digits of the year of the re-examination; and
- in the case of a pycnometer, only record the serial number of the instrument.

20. The re-examination of a previously approved instrument will follow the same procedures as the examination of a new instrument. The LSSD will send the new certificate of approval to the licensee and send a copy to the regional excise duty office.

Revocation of approval of instruments after re-examination ss 148(4)

21. Where as a result of the re-examination of a previously approved instrument, the approval of the instrument is revoked, the LSSD will cancel in writing the certificate of approval and

- in the case of a digital density meter, a digital thermometer, a mass flow measuring system or a tank scale, record the serial number of the instrument and remove the label already issued or advise the responsible regional excise duty office to remove the label already issued;
- in the case of an hydrometer or a glass thermometer, record the serial number of the instrument and obliterate from the instrument the symbol of approval and the last two digits of the year of any previous examination; and
- in the case of a pycnometer, only record the serial number of the instrument.

### Fees for the examination of instruments

*Regulations Respecting the Fees for the Examination of Instruments and the Provision of Tables*

22. The fee for examining an instrument or a new class, type or design of instruments is \$25. The LSSD sends the Notice of Billing to the licensee's regional excise duty office which in turn invoices the licensee for the examination on a form K23. Payment for the examination must be remitted to that office. Regional offices are listed in Excise Duty Memorandum 1.1.2, *Regional Excise Duty Offices*.

No fee for re-examination ss 148(3)

23. Where a licensee is directed in writing to submit any previously approved instrument or class, type or design of instruments for re-examination, no fee will be charged for that re-examination.

*Regulations Respecting the Fees for the Examination of Instruments and the Provision of Tables*

24. The LSSD provides paper copies of various tables that are used in conjunction with approved instruments. The fees for the provision of copies of tables are as follows:

- (a) \$50 for alcoholometric tables;
- (b) \$15 for a laboratory table;
- (c) \$15 for obscuration tables; and
- (d) \$10 for all tables referred to in items (a) to (c) on compact disc.

The regional excise duty office will invoice the licensee for the fee and the payment must be remitted to that office.

Time of initial licensing

25. At the time of initial licensing, every licensee has the option of receiving a paper copy of the alcoholometric tables, laboratory table, obscuration tables or a compact disc containing all the tables, free of charge. The regional excise duty office responsible for the licensing process provides this service.

Web site information

26. Every licensee also has the option of downloading and printing the tables of alcoholometry directly from the Excise Act, 2001 – Technical Information web page at [www.cra-arc.gc.ca/tax/technical/act2001-e.html](http://www.cra-arc.gc.ca/tax/technical/act2001-e.html).

### Symbol of approval

Red maple leaf symbol

27. The maple leaf symbol is sandblasted on every approved hydrometer and glass thermometer together with the two last digits of the year.



The red maple leaf symbol is also applied on every label to be affixed to approved digital density meters, digital thermometers, mass flow measuring systems and tank scales.

### Digital density meter

General

28. A digital density meter is an instrument that is designed to measure and display in numerical digits the density (i.e., mass per volume) of a liquid.

**Specifications for a digital density meter**

Scale	29. A digital density meter must display the density of a liquid in units of g/cm <sup>3</sup> .
Range	30. The minimum range for a digital density meter must be from 0.00000 to 1.00000 g/cm <sup>3</sup> at 20°C.
Reference temperature	31. A digital density meter must be standardized and used to determine the density of a liquid at the standard reference temperature of 20°C with a maximum permissible error of ±0.01°C.
Accuracy	32. A digital density meter must display the density of a liquid with a maximum permissible error of ±0.00001 g/cm <sup>3</sup> .
Serial number	33. Each digital density meter must have indelibly marked on the body of the instrument a serial number that is legible and unique.

**Examination procedures for a digital density meter**

	34. A licensee wishing to use a digital density meter must notify in writing their regional excise duty office who will notify the LSSD.
Documentation sent to licensee	35. Upon notification, the LSSD will send the licensee <ul style="list-style-type: none"> <li>• a letter stating the general procedure for examination of the digital density meter;</li> <li>• a copy of this memorandum; and</li> <li>• three quality control spirit samples to be used in the examination.</li> </ul> <p>The licensee must arrange with the regional excise duty office for an excise duty officer to witness the examination.</p>
Testing alcohol strength	36. The licensee will submit to the LSSD the alcohol strength results obtained on the three quality control spirit samples. The officer witnessing the examination must sign the results. The LSSD will compare the licensee's results to the certified values of the samples. If the results are within ±0.05% absolute ethyl alcohol by volume at 20°C of the certified value for each of the samples, the LSSD will approve the digital density meter.
Failure and request for new examination	37. Where any of the average values varies by more than ±0.05% absolute ethyl alcohol by volume at 20°C of the value of the quality control spirit samples, the LSSD will reject the results. In order to apply for a new examination, the licensee must provide written confirmation to the regional excise duty office that corrective measures have been taken to remedy the erroneous readings obtained. This information will be sent to the LSSD. Corrective measures may include servicing of the digital density meter by a qualified technician. When the LSSD is satisfied that the corrective measures may have corrected the erroneous readings, the LSSD will advise the licensee that the digital density meter may be submitted for another round of examinations. The LSSD will then send three new quality control spirit samples to the licensee for the new examination.

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Failure of new examination 38. If any of the average values of this new examination still do not meet the required specifications, the licensee will be informed that the digital density meter has failed again and that corrective measures must be taken before they can apply for another examination. Proof of corrective measures is mandatory following every failed examination if the licensee wishes to have the digital density meter approved for excise duty purposes.

### Approval of a digital density meter

39. The examination procedures are repeated until the digital density meter meets the required specifications. Approval of a digital density meter is based on all of the above-mentioned results as well as information provided by the regional excise duty office during the examination process.

### Re-examination of an approved digital density meter

Frequency 40. A digital density meter is a very precise instrument and may over time give erroneous readings for a variety of reasons. Therefore, it is necessary to re-examine a digital density meter every two years after the last approval date to ensure that it can accurately determine alcoholic strength for excise duty purposes. The LSSD will inform the licensee in writing when a re-examination is required. Notwithstanding the two-year time period, the regional excise duty office may request the re-examination of a previously approved digital density meter at any time.

## Digital thermometer

General 41. A digital thermometer is an instrument that is designed to measure and display in numerical digits the temperature in accordance with the Celsius scale, as defined in the definition of the *International Temperature Scale of 1990* adopted by the *Comité international des poids et mesures*, and in accordance with the *International System of Units*.

### Specifications for a digital thermometer

Scale 42. A digital thermometer must have the following characteristics:

- a minimum range from  $-25^{\circ}\text{C}$  to  $+45^{\circ}\text{C}$ ; and
- a digital display with incremental steps of not more than  $0.1^{\circ}\text{C}$ .

Accuracy and testing 43. Where the temperature is measured by means of a digital thermometer, the maximum permissible error is  $\pm 0.3^{\circ}\text{C}$ , between  $-25^{\circ}\text{C}$  and  $+45^{\circ}\text{C}$ .

Maximum permissible difference 44. Where the digital thermometer is examined for compliance with the specifications set out in this memorandum, the maximum permissible difference between errors of any two points that are  $25^{\circ}\text{C}$  apart is not more than  $0.4^{\circ}\text{C}$ .

Serial number – main part 45. A digital thermometer must have indelibly marked on the main part of the instrument a serial number that is legible and unique.

Serial number – removable parts 46. Any removable part, attachment or accessory of a digital thermometer must bear either the same serial number as the main part of the instrument or a unique serial number.

**Examination and approval procedures for a digital thermometer**

47. When a licensee purchases a suitable digital thermometer for excise duty purposes, the licensee must send it directly to the LSSD for examination. The LSSD will examine the digital thermometer to ensure it meets the required specifications.
- Certificate of approval 48. If the digital thermometer meets all the required specifications, the LSSD will approve the digital thermometer and issue a label that is to be affixed to the instrument showing the year of examination and the symbol of approval. If necessary, the LSSD will issue a second label to be affixed to any attachment or accessory of the digital thermometer that is removable.
- Failure and request for new examination 49. If the digital thermometer fails to meet the required specifications, the LSSD will return the digital thermometer to the licensee. In order to apply for a new examination, the licensee must provide written confirmation to the LSSD that corrective measures have been taken to ensure the digital thermometer meets the required specifications. Corrective measures may include servicing of the digital thermometer by a qualified technician. When the LSSD is satisfied that such measures may have corrected the erroneous readings, the LSSD will advise the licensee that the digital thermometer may be submitted for another round of examinations.

**Approval of a digital thermometer**

50. The examination procedures are repeated until the digital thermometer meets the required specifications.

**Re-examination of an approved digital thermometer**

- Frequency 51. A digital thermometer that has been previously approved is re-examined every two years after the last approval date. The LSSD will advise the licensee in writing when a re-examination is required. Notwithstanding the two-year time period, the regional excise duty office may request the re-examination of a previously approved digital thermometer at any time.

**Hydrometer**

- General 52. A hydrometer is an instrument that is designed to measure the density of liquids.

**Specifications for a hydrometer**

53. A hydrometer must be:
- a glass hydrometer that is designed to measure the density of mixtures of water and absolute ethyl alcohol;
  - graduated and calibrated in units of density (kg/m<sup>3</sup>) at the standard reference temperature of 20°C; and
  - graduated for reading at the level of the free horizontal surface of the liquid.

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Description	<p>54. A hydrometer must consist of a cylindrical body:</p> <ul style="list-style-type: none"><li>• of which the bottom is constructed, in either a cone or hemispherical shape, so as to prevent effectively the entrapment of air bubbles;</li><li>• of which the upper part is fused to a hollow cylindrical stem of which the top is sealed;</li><li>• where the entire external surface is symmetrical about its vertical axis;</li><li>• where the loading material for adjusting the mass is fixed in the bottom of the hydrometer; and</li><li>• where there is no loose material in any part of the hydrometer.</li></ul>
Scale	<p>55. The stem of a hydrometer must contain a graduated scale marked on a strip of material, which is securely fastened to the interior of the stem;</p> <ul style="list-style-type: none"><li>• datum marks must be provided on the graduated scale strip and on the glass stem so that any displacement of the scale strip are readily apparent;</li><li>• there must not be more than one graduated scale;</li><li>• the nominal range must be 20 kg/m<sup>3</sup>; and</li><li>• the scale must be graduated in units of 0.2 kg/m<sup>3</sup>.</li></ul>
Dimensions	<p>56. A hydrometer must have the following dimensions:</p> <ul style="list-style-type: none"><li>• it must not exceed 300 mm in total length;</li><li>• the diameter of the cylindrical body must not exceed 40 mm;</li><li>• the volume below the lower nominal scale limit must not exceed 125 ml; and</li><li>• the diameter of the stem must not be less than 4 mm.</li></ul>
Accuracy and testing	<p>57. A hydrometer must:</p> <ul style="list-style-type: none"><li>• have a maximum permissible error of <math>\pm 0.2</math> kg/m<sup>3</sup>;</li><li>• be used to determine the density of a liquid at the temperature of measurement with a maximum permissible error of <math>\pm 0.5^{\circ}\text{C}</math>.</li></ul> <p>58. Where it is examined for compliance with the specifications set out in this memorandum, at least three points evenly distributed over the nominal scale are to be tested.</p>
Serial number	<p>59. A hydrometer must have a unique serial number legibly and indelibly marked on its graduated scale strip.</p>

Density and surface tension data

60. A hydrometer must have the following values of density at 20°C that correspond to the surface tension values at 20°C of ethyl alcohol and water solutions:

Density at 20°C kg/ m <sup>3</sup>	Surface tension at 20°C mN/m	Density at 20°C kg/ m <sup>3</sup>	Surface tension at 20°C mN/m	Density at 20°C kg/ m <sup>3</sup>	Surface tension at 20°C mN/m
780	21.1	854	25.3	930	29.4
786	22.3	860	25.6	934	29.8
790	22.4	866	25.9	940	30.4
794	22.7	870	26.1	946	31.3
800	22.9	874	26.3	950	32.1
806	23.2	880	26.5	954	32.9
810	23.4	886	26.8	960	34.7
814	23.5	890	27.0	966	37.1
820	23.8	894	27.1	970	39.1
826	24.1	900	27.5	974	41.7
830	24.3	906	27.8	980	46.2
834	24.4	910	28.0	986	51.9
840	24.7	914	28.2	990	56.5
846	25.0	920	28.6	994	62.0
850	25.2	926	29.0	1000	80.5

#### Examination and approval procedures for a hydrometer

61. When a licensee purchases a hydrometer for excise duty purposes, the licensee must arrange for the supplier of the hydrometer to send it directly to the LSSD for examination. The LSSD will examine the hydrometer to ensure that it meets the required specifications.

Certificate of approval

62. If the hydrometer meets all the required specifications, the LSSD will approve the hydrometer and mark the last two digits of the year of the examination, apply the symbol of approval and issue a certificate of approval. The LSSD will send the hydrometer to the licensee.

Failure and request for new examination

63. If the hydrometer fails to meet the required specifications, the LSSD will return the hydrometer to the supplier. The supplier must send another hydrometer to the LSSD for examination. If the second hydrometer meets all the required specifications, the LSSD will approve the hydrometer. If the second hydrometer fails to meet the required specifications, the LSSD will again return the hydrometer to the supplier and the supplier must send a third hydrometer to the LSSD for examination.

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### Approval of a hydrometer

64. The examination procedures are repeated until a new hydrometer meets the required specifications. Only then is a final approval given to a hydrometer.

### Re-examination of an approved hydrometer

Frequency 65. A hydrometer that has been previously approved is to be re-examined every five years after the last approval date. The LSSD will inform the licensee in writing when a re-examination is required. Notwithstanding the five-year time period, the regional excise duty office may request the re-examination of a previously approved hydrometer at any time.

## Pycnometer

General 66. A pycnometer is an instrument that is designed for measuring the density of a liquid as a function of temperature.

### Specifications for a pycnometer

67. A pycnometer must be

- a glass pycnometer;
- designed to determine the mass of a liquid at 20°C; and
- of a nominal capacity of 25 or 50 mL.

Description 68. A pycnometer must consist of a bottle:

- the bottom of which is flat;
- the upper part of which has an elongated neck;
- the top of the elongated neck of which is closed with a removable, tightly fitted stopper.

69. A pycnometer must be constructed so as to prevent effectively the entrapment of air bubbles.

Reference temperature 70. A pycnometer must be calibrated and used to determine the mass of a liquid at the standard reference temperature of 20°C with a maximum permissible error of  $\pm 0.05^\circ\text{C}$ .

Accuracy 71. The maximum permissible error of a pycnometer is  $\pm 0.0001 \text{ g/cm}^3$  at the standard reference temperature of 20°C.

Serial number 72. A pycnometer must have a unique serial number legibly and indelibly marked on the bottle and its stopper.

### Examination procedures for a pycnometer

73. A licensee wishing to use a pycnometer must notify in writing their regional excise duty office who will notify the LSSD.

- Documentation sent to licensee
74. Upon notification, the LSSD will send to the licensee:
- a letter stating the general procedure for the examination of a pycnometer;
  - a copy of Excise Duty Memorandum 1.1.5, *Instrument Certification*; and
  - three quality control spirit samples to be used in the examination.
- The licensee must arrange with the regional excise duty office for an officer to witness the examination.
- Testing alcoholic strength
75. The alcoholic strength results obtained by the licensee on the three quality control spirit samples are to be submitted to the LSSD. The officer witnessing the examination must sign the results. The LSSD will compare the results to the certified values of the samples. If the results are within  $\pm 0.1\%$  absolute ethyl alcohol by volume at 20°C of the certified value for each of the samples, the LSSD will approve the pycnometer.
- Failure and request for new examination
76. Where any of the average values vary by more than  $\pm 0.1\%$  absolute ethyl alcohol by volume at 20°C of the certified value of the quality control spirit samples, the LSSD will reject the results. In order to reapply for a new examination, the licensee must provide written confirmation to the regional excise duty office that corrective measures have been taken to remedy the erroneous readings obtained. The regional excise duty office will forward this information to the LSSD. Corrective measures may include servicing of the pycnometer by a qualified technician. When the LSSD receives the written confirmation that corrective measures have been taken and is satisfied that such measures may have corrected the erroneous readings, the LSSD will inform the licensee that the pycnometer may be submitted for another round of examinations. The LSSD will then send three new quality control spirit samples to the licensee for the new examination.
- Failure on new examination
77. If any of the average values of this examination still do not meet the required specifications, the licensee will be advised that the pycnometer has failed again and that corrective measures must be taken before they can reapply for a new another examination. Proof of corrective measures is mandatory following every failed examination if the licensee wishes to have the pycnometer approved for excise duty purposes.

### **Approval of a pycnometer**

78. The examination procedures are repeated until the pycnometer meets the required specifications. Approval of a pycnometer is based on all of the above-mentioned results as well as information provided by the regional excise duty office during the examination process.

### **Re-examination of an approved pycnometer**

- Frequency
79. A pycnometer is a very delicate instrument. It may, over time, give erroneous readings for a variety of reasons. It is therefore necessary to re-examine a pycnometer every two years after the last approval date to ensure that it can accurately determine alcoholic strength for excise duty purposes. The LSSD will advise the licensee in writing when a re-examination is required. Notwithstanding the two-year time period, the regional excise duty office may request the re-examination of a previously approved pycnometer at any time.

## 1.1.5 Instrument Certification

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### Glass thermometer

General 80. A glass thermometer is an instrument designed to measure temperature. It includes a graduated glass tube with a small bore containing mercury or alcohol, which expands when heated.

#### Specifications for a glass thermometer

Type 81. A glass thermometer must be of the solid-stem type, graduated in accordance with the Celsius scale, as defined in the definition of the *International Temperature Scale of 1990* adopted by the *Comité international des poids et mesures*, and in accordance with the *International System of Units*.

Construction 82. A glass thermometer must be constructed in such a manner that the reading is correct when the glass thermometer is immersed at least to the top of the mercury column in the medium, the temperature of which is being measured.

83. A glass thermometer must be straight and its external cross-section must be approximately circular.

Glass 84. A glass thermometer

- must be made of suitable thermometric glass; and
- the stress in the glass of the bulb and the stem must have been reduced to a level sufficient to minimize the possibility of fracture owing to thermal or mechanical shock.

Liquid and gas filing 85. A glass thermometer

- must contain mercury of a reagent grade as the liquid filling; and
- the space above the mercury must be filled with a dry inert gas.

Scale 86. The scale of a glass thermometer must be marked so that it can easily be read through the wall of a glass jar that contains a liquid, and have the following characteristics:

- a minimum range from  $-25^{\circ}\text{C}$  to  $+45^{\circ}\text{C}$ ; and
- a smallest increment of not more than  $0.5^{\circ}\text{C}$ .

Accuracy and testing 87. Where a glass thermometer is

- used to measure the temperature, the maximum permissible error is  $\pm 0.3^{\circ}\text{C}$  between  $-25^{\circ}\text{C}$  and  $+45^{\circ}\text{C}$ ; and
- examined for compliance with the specifications set out in this memorandum, the maximum permissible difference between errors of any two points which are  $25^{\circ}\text{C}$  apart is not more than  $0.4^{\circ}\text{C}$ .

Serial number 88. A unique serial number must be legibly and indelibly marked on every glass thermometer.

### Examination and approval procedures for a glass thermometer

89. When a licensee purchases a suitable glass thermometer for excise duty purposes, the licensee must arrange for the supplier of the glass thermometer to send it directly to the LSSD for examination. The LSSD will examine the glass thermometer to ensure it meets the required specifications.
- Certificate of approval 90. If the glass thermometer meets all the required specifications, the LSSD will approve the glass thermometer and mark on it the last two digits of the year of the examination, apply the symbol of approval and issue a certificate of approval. The LSSD will send the glass thermometer to the licensee.
- Failure and request for new examination 91. If the glass thermometer fails to meet the required specifications, the LSSD will return the glass thermometer to the supplier. The supplier must send a second glass thermometer to the LSSD for examination. If the second glass thermometer meets all the required specifications, the LSSD will approve the glass thermometer. If the second glass thermometer fails to meet the required specifications, the LSSD will again return the glass thermometer to the supplier and the supplier must send a third glass thermometer to the LSSD for examination.

### Approval of a glass thermometer

92. The examination procedures are repeated until a new glass thermometer meets the required specifications. Only then is a final approval given to a glass thermometer.

### Re-examination of an approved glass thermometer

- Frequency 93. A glass thermometer that has been previously approved is re-examined every five years after the last approval date. The LSSD will advise the licensee in writing when a re-examination is required. Notwithstanding the five-year time period, the regional excise duty office may request the re-examination of a previously approved glass thermometer at any time.

### Mass flow measuring system

- General 94. A mass flow measuring system is designed to measure the density of a liquid when moving through an element. It consists of a mass flow meter and an approved, compatible, electronic register.

### Specifications for a mass flow measuring system

95. A mass flow measuring system (MFMS) is established for the determination of alcoholic mass and may be further examined for excise duty purposes only if it:
- is of a class, type or design that is approved by the Minister of Industry Canada under the *Weights and Measures Act*;
  - is of a class, type or design which meets all of the requirements stipulated in the *Weights and Measures Regulations* under the *Weights and Measures Act* and operates within the appropriate limits of error prescribed by the *Weights and Measures Regulations* or Ministerial Specifications;

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- measures the mass in grams or kilograms of ethyl alcohol of a strength of 95% by volume or more as stated in the *Weights and Measures Regulations*;
- is located in an environment protected from the elements and under other such conditions as to prevent the degradation of its metrological characteristics;
- has all the necessary devices to ensure an acceptable level of accuracy and precision (e.g. an air eliminator or de-aerator, alcohol cooling systems);
- has a measuring capacity that is optimum for the average flow rate of alcohol of that particular system;
- is a tamper-proof system (e.g. there is no sampling valve or other opening before the alcohol passes through it);
- is a closed unit to prevent unhooking or any unauthorised alteration or degradation of its metrological characteristics or fraudulent use of the MFMS; and
- is set up to allow for re-examination every two years by an inspector. For example, a sealed pipe may be opened for the weighing of the alcohol measured by the MFMS and subsequently re-sealed by an officer for normal operation of the MFMS.

### Examination procedures for a mass flow measuring system

	<p>96. A licensee will advise its regional excise duty office that it has acquired a MFMS that is approved by Measurement Canada and they have made arrangements with Measurement Canada for its installation and examination for approval for excise duty purposes.</p>
Licensee's responsibilities	<p>97. Prior to contacting the regional excise duty office and scheduling an officer to witness the installation and an examination, the licensee must ensure that all of the specifications for the MFMS set out in paragraph 95 of this memorandum are met.</p>
Examination of the system	<p>98. An officer must be present during the testing of the MFMS to ensure that the basic specifications for the MFMS are met. The Measurement Canada inspector will perform the examination in the presence of the officer and do all the necessary tests required under the <i>Weights and Measures Act</i>. The officer will note the measuring data provided by the inspector and send these notes to the LSSD for examination of the test results and either approval or rejection of the MFMS.</p>
Analysis of a system examination results	<p>99. The MFMS must meet all the required specifications at various flow rates as stated in the <i>Weight and Measures Regulations</i> or as specified in the Ministerial Specifications. At each flow rate, tests are repeated three times and averaged in order to obtain statistically valid results.</p>
Failure of system and request for new examination	<p>100. If the MFMS fails to meet the required specifications as stated above, the LSSD will inform the regional excise duty office. The regional excise duty office will inform the licensee that the MFMS has failed and that corrective measures must be taken before the licensee can apply for a new examination. In order to apply for another examination, the licensee must provide written confirmation to the regional excise duty office that corrective measures have been taken to remedy the erroneous readings obtained from the MFMS. The regional excise duty office will forward this information to the LSSD. Corrective measures may include servicing of the system by a qualified technician, re-calibration, etc.</p>

New examination after corrective measures 101. When the LSSD is satisfied that such measures may have corrected the erroneous readings, they will advise the licensee via the regional excise duty office that the MFMS may be submitted for another round of examinations. The new examination and treatment of these test results follow the same procedures described previously. Proof of corrective measures is mandatory for every failed examination if the licensee wishes to have the MFMS approved for excise duty purposes.

### Approval of a mass flow measuring system

102. The LSSD may approve the use of the MFMS for the determination of alcoholic mass for excise duty purposes only if both the inspector and the regional excise duty office are satisfied that the MFMS will operate properly.

Excise duty seal 103. When the MFMS is approved, the officer will place an excise duty seal on each of the components of the MFMS to prevent tampering. The LSSD will issue and send a label to the regional excise duty office to be affixed to the MFMS by the officer. The approval is for a two-year time period.

### Re-examination of a mass flow measuring system

Frequency 104. A MFMS that has been previously approved is re-examined every two years after the last approval date. The LSSD will advise the licensee in writing when a re-examination is required. Notwithstanding the two-year time period, the regional excise duty office may request the re-examination of a previously approved MFMS at any time.

Fees for the examination or re-examination 105. Under the *Weights and Measures Act*, an inspector may charge a fee for the examination or the re-examination of the MFMS. The licensee pays all fees and charges for the examination or the re-examination of the MFMS directly to the inspector.

## Tank scale

General 106. A tank scale is designed for measuring the mass of liquids. The scale may be mechanical or fully electronic. In the case of an electronic scale, load cells that are mounted in compression or in tension sense the weight of a liquid.

### Specifications for a tank scale

107. A tank scale (scale) is established for the determination of the alcoholic mass and may be further examined for excise duty purposes only if it:

- is of a class, type or design that is approved by the Minister of Industry Canada under the *Weights and Measures Act*;
- is of a class, type or design which meets all of the requirements as stated in the *Weights and Measures Regulations* under the *Weights and Measures Act* and operates within the appropriate limits of error as prescribed by the *Weights and Measures Regulations*;
- measures the mass in grams or kilograms of ethyl alcohol of a strength of 95% by volume or more;

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- is located in an environment protected from the elements and under other such conditions as to prevent the degradation of its metrological characteristics;
- has all the necessary devices to ensure an acceptable level of accuracy and precision;
- has a measuring capacity that is optimum for the alcohol of that particular scale;
- is a closed unit to prevent tampering or any unauthorised alteration or degradation of its metrological characteristics or fraudulent use of the scale; and
- is set up to allow for re-examination every two years by an inspector.

#### Examination procedures for a tank scale

108. A licensee should advise its regional excise duty office and Measurement Canada that they wish to have a scale examined for approval for excise duty purposes.
- Licensee's responsibility 109. Prior to contacting the regional excise duty office, the licensee must ensure that all of the specifications for the scale set out in paragraph 107 of this memorandum are met.
- Examination of the scale 110. An officer must be present during the testing of the scale to ensure that the basic specifications for the scale are met. The Measurement Canada inspector will perform the examination in the presence of the officer and carry out all the tests required under the *Weights and Measures Act*. The officer will note the measuring data provided by the inspector and send these notes to the LSSD for examination of the test results and either approval or rejection of the scale.
- Required specifications 111. The scale must meet all the required specifications stipulated in the *Weight and Measures Regulations*. Tests are repeated at least three times and averaged in order to obtain statistically valid results.
- Failure of scale and request for new examination 112. If the scale fails to meet the required specifications as stated above, the LSSD will inform the regional excise duty office. The regional excise duty office will inform the licensee that the scale has failed and that corrective measures must be taken before the licensee can apply for a new examination. In order to apply for a another examination, the licensee must provide written confirmation to the regional excise duty office that corrective measures have been taken to remedy the erroneous readings obtained from the scale. The regional excise duty office will forward this information to the LSSD. Corrective measures may include servicing of the scale by a qualified technician, re-calibration, etc.
- New examination after corrective measures 113. When the LSSD is satisfied that such measures may have corrected the erroneous readings, they will advise the licensee via the regional excise duty office that the scale may be submitted for another round of examinations. The new examination and treatment of these test results follows the same procedures described previously. Proof of corrective measures is mandatory following every failed examination if the licensee wishes to have the scale approved for excise duty purposes.

#### Approval of a tank scale

114. The LSSD may approve the use of the scale for the determination of alcoholic mass for excise duty purposes only if both the inspector and the regional excise duty office are satisfied that the scale will operate properly.

Excise duty seal      115.      When the scale is approved, the officer will place an excise duty seal on each of the components of the scale to prevent tampering. The LSSD will issue and send a label to the regional excise duty office to be affixed to the scale by the officer. The approval is for a two-year time period.

**Re-examination of a tank scale**

Frequency      116.      A scale that has been previously approved is re-examined every two years after the last approval date. The LSSD will advise the licensee in writing when a re-examination is required. Notwithstanding the two-year time period, the regional excise duty office may request the re-examination of a previously approved scale at any time.

Fees for the examination or re-examination      117.      Under the *Weights and Measures Act*, an inspector may charge a fee for the examination or the re-examination of the scale. The licensee pays all fees and charges for the examination or the re-examination of the scale directly to the inspector.

**Contraventions and Penalties**

Failure to comply      118.      Where a licensee fails to use and maintain an approved instrument for excise duty purposes and does not comply with the above-mentioned examination or re-examination procedures, they may be subject to a penalty under the Act.

Enforcement Part 6      119.      Additional information on contraventions and penalties will be provided in Excise Duty Memorandum 11.2.1, *Contraventions and Penalties*.

All of the memoranda in the Excise Duty Memoranda Series will be available on the CRA Web site at [www.cra-arc.gc.ca/tax/technical/act2001-e.html](http://www.cra-arc.gc.ca/tax/technical/act2001-e.html).