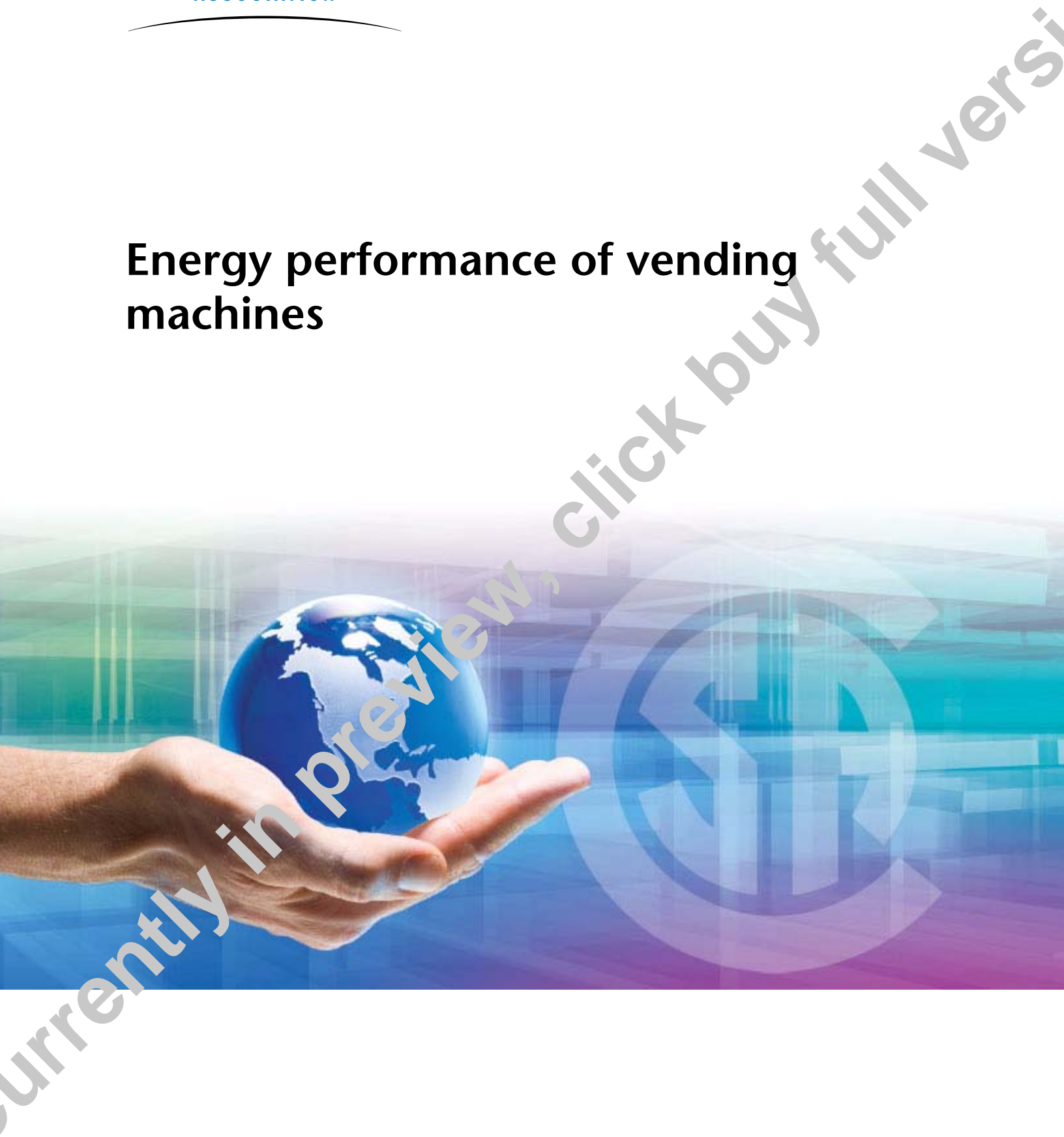


Energy performance of vending machines



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Update No. 1

C804-09

July 2011

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Revised	Outside front cover, title page, and Clauses 4 and 8(a)
New	National Standards of Canada text
Deleted	None

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Type E (frozen food) — a vending machine that stores perishable food in a frozen state.

Type F (refrigerated food served hot) — a vending machine that stores perishable food under refrigeration until selected; once selected, the food is heated and served hot.

Type G (hot beverage) — a vending machine that dispenses hot beverages.

Δ 4 General requirements

General requirements related to design, construction, and assembly of vending machines are provided in CSA B52 and CSA C22.2 No. 128.

5 Rating and performance requirements

5.1 Maximum daily energy consumption

The maximum daily energy consumption at standard rating conditions for Types A, B, C, D, E, F, and G vending machines shall be not more than the values shown in Table 1, when tested in accordance with Clause 6 and calculated in accordance with Clause 7.1.

The maximum daily energy consumption shall be expressed in multiples of 0.1 kW•h.

5.2 Published ratings

5.2.1

The maximum daily energy consumption shall be published in literature that makes reference to application ratings or other energy consumption ratings.

5.2.2

Published energy consumption ratings shall be based on data obtained in accordance with the provisions of this Standard.

5.2.3

To comply with this Standard, the published daily energy consumption rating, as calculated in Clause 7.1, shall be such that any vending machine, when tested, shall have the measured ratings equal to or better than the published ratings. There shall be allowance to cover testing and manufacturing variations that in no case shall result in a measured rating being less than 95% of the unit's published rating.

6 Energy consumption test

6.1 General

6.1.1 Standard rating conditions

The ambient test conditions used to determine standard ratings for Types A, B, C, D, E, F, and G vending machines shall be

- (a) 24 ± 1 °C (75°F); and
- (b) 45 ± 5 % relative humidity.

The product temperatures for the standard rating tests shall be as specified in Table 1.

6.1.2 Voltage and frequency

The standard rating tests shall be performed within $\pm 2\%$ of the nameplate rated voltage and $\pm 1\%$ of the rated frequency.

For vending machines with dual nameplate voltages, the standard rating test shall be performed at both voltages or at the lower of the two voltages.

6.1.3 Measurements

Accuracy of measurements shall be as follows:

- (a) ± 0.5 °C (± 1 °F) for temperature measurements;
- (b) $\pm 3\%$ for relative humidity measurements;
- (c) $\pm 1.0\%$ for voltage and watt•hour measurements;
- (d) $\pm 0.1\%$ of the interval measured for time measurements; and
- (e) ≤ 1 W•h resolution for watt•hour meters.

6.1.4 Installation

The vending machine shall be

- (a) installed in accordance with manufacturer's instructions;
- (b) installed in a level position unless the manufacturer's instructions state otherwise;
- (c) located on the floor or countertop as it would be in service;
- (d) operated with normal lighting and control settings, using only those energy management controls that are permanently operational and not capable of being adjusted by the machine owner;
- (e) protected against radiant effects from nearby heating or cooling equipment; and
- (f) protected from air moving at more than 0.25 m/s (50 ft/min).

6.1.5 Circulation of air

To restrict the circulation of air at the rear of the vending machine, a vertical partition or wall shall be located 150 mm (6 in) from the rear of the cabinet and extend at least 300 mm (12 in) beyond each side of the cabinet from the floor or countertop to not less than 300 mm (12 in) above the top of the cabinet.

6.1.6 Measurement of ambient temperature

The ambient temperature shall be measured by one sensor located 300 mm (12 in) in front of the vending machine, at approximately the midpoint of the cabinet.

6.1.7 Measurement of product temperature

6.1.7.1

The product temperature for

- (a) Types A, B, C, D, E, and F vending machines shall be determined by averaging the temperatures measured in standard test packages loaded into the machine during the test; and
- (b) Type G vending machines shall be measured using one temperature sensor located adjacent to the hot water storage vessel temperature control sensor.

6.1.7.2

Standard test packages shall be

- (a) placed in each of the next-to-be-vended positions in Types A and B vending machines; and positioned to measure the full range of top-to-bottom, side-to-side, and front-to-back product temperature variations in Types C, D, E, and F vending machines.

6.2 Test method

6.2.1

The vending machine shall be fully loaded to the rated capacity, as specified by the manufacturer. The machine shall then be operated for a period of at least 24 h under standard rating conditions, as specified in Clause 6.1.1.

6.2.2

The temperature control of the vending machine shall be adjusted to achieve the average product temperature specified in Table 1. The vending machine shall be allowed to operate under standard test conditions until stabilized. Temperature stabilization shall be considered to be achieved 24 h after the average product temperature reaches the specified value (see Table 1) and the energy consumption for two successive 6 h periods are within 2% of each other.

6.2.3

After temperature stabilization has been achieved, the following shall be recorded for at least 24 consecutive hours:

- (a) ambient temperature;
- (b) relative humidity;
- (c) average product temperature;
- (d) energy consumption in W•h;
- (e) input voltage; and
- (f) duration of test.

7 Calculation of daily rated energy consumption

7.1 Calculation

The daily rated energy consumption of each basic model of Types A, B, C, D, E, F, and G vending machines shall be determined as follows:

$$E_D = \frac{E_T}{t_T} \times \frac{24}{1000}$$

where

E_D = daily rated energy consumption, kW•h/d

E_T = energy consumed during the test, W•h

t_T = duration of the test, h

24 = the number of hours per day

1000 = conversion factor from W to kW

7.2 Applicability

The value of E_D that is determined by the test for rated capacity of a vending machine may be applied to other versions of the same basic model without further testing. Alternatively, the reconfigured machine may be retested at the request of the manufacturer.

8 Marking

In addition to the marking required by CSA C22.2 No. 128, vending machines shall have a marking that is permanent, easily readable, and accessible. The marking shall include

- Δ (a) "CSA C804";
(b) the machine type (see Table 1); and
(c) the daily rated energy consumption.

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C804-09

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Preface

This is the second edition of CSA C804, *Energy performance of vending machines*. It supersedes the first edition, published in 1996.

This Standard specifies maximum daily energy consumption for vending machines and provides a uniform procedure to test compliance. This edition includes

- (a) modification of the calculation of energy efficiency to include a volumetric measurement of refrigerated space;
- (b) revised levels of minimum energy consumption; and
- (c) addition of high efficiency levels for Type A and Type B vending machines.

CSA gratefully acknowledges the financial contributions of Natural Resources Canada, the Ontario Ministry of Energy, BC Hydro, Manitoba Hydro, and Conserve Nova Scotia towards the development of this Standard.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard

This Standard was prepared by the Subcommittee on Energy Performance of Vending Machines, under the jurisdiction of the Technical Committee on Heating, Ventilation, Air Conditioning, and Refrigeration and the Strategic Steering Committee on Performance, Energy Efficiency, and Renewables, and has been formally approved by the Technical Committee. It will be submitted to the Standards Council of Canada for approval as a National Standard of Canada.

March 2009

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C804-08

Energy performance of vending machines

1 Scope

1.1

This Standard specifies energy performance requirements for self-contained vending machines that actively cool or heat, or both, the product to be vended.

1.2

This Standard specifies

- (a) uniform procedures for measuring energy consumption; and
- (b) maximum daily energy consumption levels.

1.3

This Standard applies to Types A, B, C, D, E, F, and G vending machines, as defined in [Clause 3](#).

1.4

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1.5

The values given in SI (metric) units are the standard. The values given in parentheses are for information only.

2 Reference publications

This Standard refers to the following publications and where such reference is made, it shall be to the edition listed below, including all amendments published thereto:

CSA (Canadian Standards Association)

B52-05

Mechanical refrigeration code

C22.2 No. 128-95 (R 2004)

Vending machines