

Energy performance of automatic icemakers and ice storage bins



Currently in preview, click buy full version

Legal Notice for Standards

Canadian Standards Association (CSA) standards are developed through a consensus standards development process approved by the Standards Council of Canada. This process brings together volunteers representing varied viewpoints and interests to achieve consensus and develop a standard. Although CSA administers the process and establishes rules to promote fairness in achieving consensus, it does not independently test, evaluate, or verify the content of standards.

Disclaimer and exclusion of liability

This document is provided without any representations, warranties, or conditions of any kind, express or implied, including, without limitation, implied warranties or conditions concerning this document's fitness for a particular purpose or use, its merchantability, or its non-infringement of any third party's intellectual property rights. CSA does not warrant the accuracy, completeness, or currency of any of the information published in this document. CSA makes no representations or warranties regarding this document's compliance with any applicable statute, rule, or regulation.

IN NO EVENT SHALL CSA, ITS VOLUNTEERS, MEMBERS, SUBSIDIARIES, OR AFFILIATED COMPANIES, OR THEIR EMPLOYEES, DIRECTORS, OR OFFICERS, BE LIABLE FOR ANY DIRECT, INDIRECT, OR INCIDENTAL DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES, HOWSOEVER CAUSED, INCLUDING BUT NOT LIMITED TO SPECIAL OR CONSEQUENTIAL DAMAGES, LOST REVENUE, BUSINESS INTERRUPTION, LOST OR DAMAGED DATA, OR ANY OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE), OR ANY OTHER THEORY OF LIABILITY, ARISING OUT OF OR RESULTING FROM ACCESS TO OR POSSESSION OR USE OF THIS DOCUMENT, EVEN IF CSA HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES.

In publishing and making this document available, CSA is not undertaking to render professional or other services for or on behalf of any person or entity or to perform any duty owed by any person or entity to another person or entity. The information in this document is directed to those who have the appropriate degree of experience to use and apply its contents, and CSA accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained in this document.

CSA is a private not-for-profit company that publishes voluntary standards and related documents. CSA has no power, nor does it undertake, to enforce compliance with the contents of the standards or other documents it publishes.

Intellectual property rights and ownership

As between CSA and the users of this document (whether it be in printed or electronic form), CSA is the owner, or the authorized licensee, of all works contained herein that are protected by copyright, all trade-marks (except as otherwise noted to the contrary), and all inventions and trade secrets that may be contained in this document, whether or not such inventions and trade secrets are protected by patents and applications for patents. Without limitation, the unauthorized use, modification, copying, or disclosure of this document may violate laws that protect CSA's and/or others' intellectual property and may give rise to a right in CSA and/or others to seek legal redress for such use, modification, copying, or disclosure. To the extent permitted by licence or by law, CSA reserves all intellectual property rights in this document.

Patent rights

Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. CSA shall not be held responsible for identifying any or all such patent rights. Users of this standard are expressly advised that determination of the validity of any such patent rights is entirely their own responsibility.

Authorized use of this document

This document is being provided by CSA for informational and non-commercial use only. The user of this document is authorized to do only the following:

If this document is in electronic form:

- load this document onto a computer for the sole purpose of reviewing it;
- search and browse this document; and
- print this document if it is in PDF format.

Limited copies of this document in print or paper form may be distributed only to persons who are authorized by CSA to have such copies, and only if this Legal Notice appears on each such copy.

In addition, users may not and may not permit others to

- alter this document in any way or remove this Legal Notice from the attached standard;
- sell this document without authorization from CSA; or
- make an electronic copy of this document.

If you do not agree with any of the terms and conditions contained in this Legal Notice, you may not load or use this document or make any copies of the contents hereof, and if you do make such copies, you are required to destroy them immediately. Use of this document constitutes your acceptance of the terms and conditions of this Legal Notice.



CANADIAN STANDARDS
ASSOCIATION

Update No. 1

C742-08

February 2010

Note: General Instructions for CSA Standards are now called Updates. Please contact CSA Information Products Sales or visit www.ShopCSA.ca for information about the **CSA Standards Update Service**.

Title: *Energy performance of automatic icemakers and ice storage bins* — originally published December 2008

The following revisions have been formally approved:

Revised	Outside front cover and title page
New	National Standards of Canada text
Deleted	None

CSA C742-08 originally consisted of **19 pages** (viii preliminary and 11 text), each dated **December 2008**. It now consists of the following pages:

December 2008	iii–viii and 1–11
February 2010	Cover, National Standards of Canada text, title page, and copyright page

- Update your copy by inserting these revised pages.
- Keep the pages you remove for reference.

Currently in preview, click buy full version

Energy performance of automatic icemakers and ice storage bins



Legal Notice for Standards

Canadian Standards Association (CSA) standards are developed through a consensus standards development process approved by the Standards Council of Canada. This process brings together volunteers representing varied viewpoints and interests to achieve consensus and develop a standard. Although CSA administers the process and establishes rules to promote fairness in achieving consensus, it does not independently test, evaluate, or verify the content of standards.

Disclaimer and exclusion of liability

This document is provided without any representations, warranties, or conditions of any kind, express or implied, including, without limitation, implied warranties or conditions concerning this document's fitness for a particular purpose or use, its merchantability, or its non-infringement of any third party's intellectual property rights. CSA does not warrant the accuracy, completeness, or currency of any of the information published in this document. CSA makes no representations or warranties regarding this document's compliance with any applicable statute, rule, or regulation.

IN NO EVENT SHALL CSA, ITS VOLUNTEERS, MEMBERS, SUBSIDIARIES, OR AFFILIATED COMPANIES, OR THEIR EMPLOYEES, DIRECTORS, OR OFFICERS, BE LIABLE FOR ANY DIRECT, INDIRECT, OR INCIDENTAL DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES, HOWSOEVER CAUSED, INCLUDING BUT NOT LIMITED TO SPECIAL OR CONSEQUENTIAL DAMAGES, LOST REVENUE, BUSINESS INTERRUPTION, LOST OR DAMAGED DATA, OR ANY OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE), OR ANY OTHER THEORY OF LIABILITY, ARISING OUT OF OR RESULTING FROM ACCESS TO OR POSSESSION OR USE OF THIS DOCUMENT, EVEN IF CSA HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES.

In publishing and making this document available, CSA is not undertaking to render professional or other services for or on behalf of any person or entity or to perform any duty owed by any person or entity to another person or entity. The information in this document is directed to those who have the appropriate degree of experience to use and apply its contents, and CSA accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained in this document.

CSA is a private not-for-profit company that publishes voluntary standards and related documents. CSA has no power, nor does it undertake, to enforce compliance with the contents of the standards or other documents it publishes.

Intellectual property rights and ownership

As between CSA and the users of this document (whether it be in printed or electronic form), CSA is the owner, or the authorized licensee, of all works contained herein that are protected by copyright, all trade-marks (except as otherwise noted to the contrary), and all inventions and trade secrets that may be contained in this document, whether or not such inventions and trade secrets are protected by patents and applications for patents. Without limitation, the unauthorized use, modification, copying, or disclosure of this document may violate laws that protect CSA's and/or others' intellectual property and may give rise to a right in CSA and/or others to seek legal redress for such use, modification, copying, or disclosure. To the extent permitted by licence or by law, CSA reserves all intellectual property rights in this document.

Patent rights

Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. CSA shall not be held responsible for identifying any or all such patent rights. Users of this standard are expressly advised that determination of the validity of any such patent rights is entirely their own responsibility.

Authorized use of this document

This document is being provided by CSA for informational and non-commercial use only. The user of this document is authorized to do only the following:

If this document is in electronic form:

- load this document onto a computer for the sole purpose of reviewing it;
- search and browse this document; and
- print this document if it is in PDF format.

Limited copies of this document in print or paper form may be distributed only to persons who are authorized by CSA to have such copies, and only if this Legal Notice appears on each such copy.

In addition, users may not and may not permit others to

- alter this document in any way or remove this Legal Notice from the attached standard;
- sell this document without authorization from CSA; or
- make an electronic copy of this document.

If you do not agree with any of the terms and conditions contained in this Legal Notice, you may not load or use this document or make any copies of the contents hereof, and if you do make such copies, you are required to destroy them immediately. Use of this document constitutes your acceptance of the terms and conditions of this Legal Notice.



CANADIAN STANDARDS
ASSOCIATION

The Canadian Standards Association (CSA), under whose auspices this National Standard has been produced, was chartered in 1919 and accredited by the Standards Council of Canada to the National Standards system in 1973. It is a not-for-profit, nonstatutory, voluntary membership association engaged in standards development and certification activities.

CSA standards reflect a national consensus of producers and users — including manufacturers, consumers, retailers, unions and professional organizations, and governmental agencies. The standards are used widely by industry and commerce and often adopted by municipal, provincial, and federal governments in their regulations, particularly in the fields of health, safety, building and construction, and the environment.

Individuals, companies, and associations across Canada indicate their support for CSA's standards development by volunteering their time and skills to CSA Committee work and supporting the Association's objectives through sustaining memberships. The more than 7000 committee volunteers and the 2000 sustaining memberships together form CSA's total membership from which its Directors are chosen. Sustaining memberships represent a major source of income for CSA's standards development activities.

The Association offers certification and testing services in support of and as an extension to its standards development activities. To ensure the integrity of its certification process, the Association regularly and continually audits and inspects products that bear the CSA Mark.

In addition to its head office and laboratory complex in Toronto, CSA has regional branch offices in major centres across Canada and inspection and testing agencies in eight countries. Since 1919, the Association has developed the necessary expertise to meet its corporate mission: CSA is an independent service organization whose mission is to provide an open and effective forum for activities facilitating the exchange of goods and services through the use of standards, certification and related services to meet national and international needs.

For further information on CSA services, write to Canadian Standards Association
5060 Spectrum Way, Suite 100
Mississauga, Ontario, L4W 5N6
Canada



Cette Norme nationale du Canada est offerte en anglais et en français.

Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users to judge its suitability for their particular purpose.

[®]Registered trade-mark of Canadian Standards Association

The Standards Council of Canada (SCC) is the coordinating body of the National Standards System, a coalition of independent, autonomous organizations working towards the further development and improvement of voluntary standardization in the national interest.

The principal objects of the SCC are to foster and promote voluntary standardization as a means of advancing the national economy, benefiting the health, safety, and welfare of the public, assisting and protecting the consumer, facilitating domestic and international trade, and furthering international cooperation in the field of standards.

A National Standard of Canada (NSC) is a standard prepared or reviewed by an accredited Standards Development Organization (SDO) and approved by the SCC according to the requirements of CAN-P-2. Approval does not refer to the technical content of the standard; this remains the continuing responsibility of the SDO. An NSC reflects a consensus of a number of capable individuals whose collective interests provide, to the greatest practicable extent, a balance of representation of general interests, producers, regulators, users (including consumers), and others with relevant interests, as may be appropriate to the subject in hand. It normally is a standard which is capable of making a significant and timely contribution to the national interest.

Those who have a need to apply standards are encouraged to use NSCs. These standards are subject to periodic review. Users of NSCs are cautioned to obtain the latest edition from the SDO which publishes the standard.

The responsibility for approving standards as National Standards of Canada rests with the Standards Council of Canada
270 Albert Street, Suite 200
Ottawa, Ontario, K1P 6N7
Canada



Standards Council of Canada
Conseil canadien des normes

Currently in preview, click buy full version

National Standard of Canada
(approved February 2010)

CAN/CSA-C742-08
**Energy performance of automatic
icemakers and ice storage bins**

Prepared by



**CANADIAN STANDARDS
ASSOCIATION**

® Registered trade-mark of Canadian Standards Association

Approved by
Standards Council of Canada



Published in December 2008 by Canadian Standards Association
A not-for-profit private sector organization
5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6
1-800-463-6727 • 416-747-4044

Visit our Online Store at **www.ShopCSA.ca**



The Canadian Standards Association (CSA) prints its publications on Rolland Enviro100, which contains 100% recycled post-consumer fibre, is EcoLogo and Processed Chlorine Free certified, and was manufactured using biogas energy.

To purchase CSA Standards and related publications, visit CSA's Online Store at www.ShopCSA.ca or call toll-free 1-800-463-6727 or 416-747-4044.

ISBN 978-0-55436-806-8

Technical Editor: Jeff Shikaze

© Canadian Standards Association — 2008

All rights reserved. No part of this publication may be reproduced in any form whatsoever without the prior permission of the publisher.

(Copyright page replaced February 2010)

Standards Update Service

C742-08

December 2008

Title: *Energy performance of automatic icemakers and ice storage bins*

Pagination: **19 pages** (viii preliminary and 11 text), each dated **December 2008**

To register for e-mail notification about any updates to this publication

- go to **shop.csa.ca**
- click on **CSA Update Service**

The **List ID** that you will need to register for updates to this publication is **2419523**.

If you require assistance, please e-mail techsupport@csagroup.org or call 416-747-2233.

Visit CSA Group's policy on privacy at csagroup.org/legal to find out how we protect your personal information.

CSA Standard

C742-08

***Energy performance of automatic icemakers
and ice storage bins***



**CANADIAN STANDARDS
ASSOCIATION**

®Registered trade-mark of Canadian Standards Association

*Published in December 2008 by Canadian Standards Association
A not-for-profit private sector organization
5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6
1-800-463-6727 • 416-747-4044*

Visit our Online Store at www.ShopCSA.ca



The Canadian Standards Association (CSA) prints its publications on Rolland Enviro100, which contains 100% recycled post-consumer fibre, is EcoLogo and Processed Chlorine Free certified, and was manufactured using biogas energy.

To purchase CSA Standards and related publications, visit CSA's Online Store at www.ShopCSA.ca or call toll-free 1-800-463-6727 or 416-747-4044.

ISBN 978-1-55436-806-8

Technical Editor: Jeff Shikaze

© Canadian Standards Association — 2008

All rights reserved. No part of this publication may be reproduced in any form whatsoever without the prior permission of the publisher.

Contents

Technical Committee on Heating, Ventilation, Air Conditioning, and Refrigeration v

Subcommittee on Ice-Making Machines vii

Preface viii

1 Scope 1

2 Reference publications 2

3 Definitions 2

4 General requirements 3

- 4.1 Design, construction, and assembly 3
- 4.2 Matched assemblies 3
- 4.3 Tolerances 3
 - 4.3.1 Icemakers 3
 - 4.3.2 Ice storage bins 3
- 4.4 Installation 4
 - 4.4.1 General 4
 - 4.4.2 Split systems 4
- 4.5 Voltage and frequency 4
- 4.6 Standard rating conditions 4

5 Rating and performance requirements 4

- 5.1 Standard ratings 4
 - 5.1.1 General 4
 - 5.1.2 Sampling 4
 - 5.1.3 Ratings for icemakers 4
 - 5.1.4 Ratings for ice storage bins 5
- 5.2 Application ratings 5
- 5.3 Published ratings 5
- 5.4 Performance requirements 6
 - 5.4.1 Maximum input energy for icemakers 6
 - 5.4.2 Minimum ice storage bin effectiveness 6
 - 5.4.3 High efficiency 6

6 Tests 6

- 6.1 Standard rating test for icemakers 6
- 6.2 Test method for ice storage bins 6
 - 6.2.1 Storage capacity 6
 - 6.2.2 Storage effectiveness test 6

7 Calculation of results 7

- 7.1 Icemakers 7
- 7.2 Ice storage bins 7
 - 7.2.1 Theoretical storage capacity 7
 - 7.2.2 Storage effectiveness 7

8 Reporting requirements 7

8.1 Icemakers 7

8.2 Ice storage bins 7

9 Marking 8**Annexes****A** (informative) — Sampling plan 10

Tables**1** — Ice storage bins — Tolerances 8**2** — Minimum efficiency requirements for commercial cube-type icemakers 8**3** — Ice storage bins — Minimum efficiency 9**4** — High-efficiency requirements for commercial cube-type icemakers 9

Technical Committee on Heating, Ventilation, Air Conditioning, and Refrigeration

B. Killins	Natural Resources Canada, Ottawa, Ontario	<i>Chair</i>
R. Cane	Caneta Research, Mississauga, Ontario	<i>Vice-Chair</i>
S. Cao	BC Hydro, Burnaby, British Columbia	
A. Carrier	Hydro-Québec, Montréal, Québec	
G. Cooke	Air Solutions Incorporated, Cambridge, Ontario	
K. Delves	Natural Resources Canada, Ottawa, Ontario	<i>Associate</i>
P. Duffy	Buchan Lawton Parent Limited, Toronto, Ontario	<i>Associate</i>
P. Edwards	Peter Edwards Co., Mississauga, Ontario	
D. Fugler	Canada Mortgage and Housing Corporation, Ottawa, Ontario	
P. Grinbergs	Nutech Brands Inc., London, Ontario	
E. Grzesik	Ontario Ministry of Energy, Toronto, Ontario	
J. Haysom	Ottawa, Ontario	<i>Associate</i>
A. Heffler	Ottawa, Ontario	
G. Henriques	Richmond, British Columbia	<i>Associate</i>
N. Hutchings	Ontario Power Authority Conservation Bureau, Toronto, Ontario	<i>Associate</i>
C. Kahramanoglu	Ontario Ministry of Municipal Affairs and Housing, Toronto, Ontario	
A. Kelly	Canadian Electricity Association, Ottawa, Ontario	<i>Associate</i>

C. Li	Hydro One Networks Inc., Toronto, Ontario	<i>Associate</i>
D. Li	CSA International, Toronto, Ontario	<i>Associate</i>
R. Lord	Carrier Corporation, Murfreesboro, Tennessee, USA	
R. Martin	California Energy Commission, Sacramento, California, USA	
V. Minea	LTE-Hydro-Québec, Shawinigan, Québec	<i>Associate</i>
T. Orris	AMCA International, Inc., Arlington Heights, Illinois, USA	<i>Associate</i>
P. Rhodes	Sears Canada Inc., Toronto, Ontario	
R. Storey	Heating, Refrigeration, and Air Conditioning Institute of Canada, Oakville, Ontario	
G. Todesco	Jacques Whitford and Associates Limited, Ottawa, Ontario	<i>Associate</i>
W. Vale	Lennox International Inc., Toronto, Ontario	
K. Veerman	FortisBC Inc., Kelowna, British Columbia	<i>Associate</i>
M. Hopkins	Canadian Standards Association, Mississauga, Ontario	<i>Project Manager</i>

Subcommittee on Ice-Making Machines

B. Killins	Natural Resources Canada, Ottawa, Ontario	<i>Chair</i>
E. Grzesik	Ontario Ministry of Energy, Toronto, Ontario	
A. Kelly	Canadian Electricity Association, Ottawa, Ontario	<i>Associate</i>
D. Lee	CSA International, Toronto, Ontario	
V. Minea	LTE-Hydro-Québec, Shawinigan, Québec	
R. Morrison	CSA International, Toronto, Ontario	
C. Murphy	Mile High Equipment Company, Denver, Colorado, USA	
S. Nanjundaram	Air-Conditioning, Heating, and Refrigeration Institute, Arlington, Virginia, USA	
M. Rice	Follet Corp., Easton, Pennsylvania, USA	
S. Schaefer	Hoshizaki America, Incorporated, Peachtree City, Georgia, USA	
C. Schlosser	Manitowoc Ice Inc., Manitowoc, Wisconsin, USA	
H. Tikiryan	Bodycote Materials Testing Canada Inc., Mississauga, Ontario	
J. Shikaze	Canadian Standards Association, Mississauga, Ontario	<i>Project Manager</i>

Preface

This is the third edition of CSA C742, *Energy performance of automatic icemakers and ice storage bins*. It supersedes the previous editions, published in 1998 and 1994 under the title *Performance of Automatic Ice-Makers and Ice Storage Bins*.

This Standard applies to factory-made ice storage bins and self-contained or split-system automatic icemakers that use air- or water-cooled condensers. It specifies rating and energy performance requirements and the tests necessary to ensure compliance.

This Standard is compatible with ARI 810, ARI 820, and ANSI/ASHRAE Standard 29.

CSA acknowledges that the development of this Standard was made possible, in part, by the financial support of Natural Resources Canada (NRCan), Manitoba Hydro, BC Hydro, and the Ontario Ministry of Energy (OME).

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 Ice-Making Machines, under the jurisdiction of the Technical Committee on Heating, Ventilation, Air Conditioning, and Refrigeration, 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.

December 2008

Notes:

- (1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
- (2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
- (3) *This publication was developed by consensus, which is defined by CSA Policy governing standardization — Code of good practice for standardization as “substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity”. It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this publication.*
- (4) *CSA Standards are subject to periodic review, and suggestions for their improvement will be referred to the appropriate committee.*
- (5) *All enquiries regarding this Standard, including requests for interpretation, should be addressed to Canadian Standards Association, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6.*
 - Requests for interpretation should*
 - (a) define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*
 - (b) provide an explanation of circumstances surrounding the actual field condition; and*
 - (c) be phrased where possible to permit a specific “yes” or “no” answer.*

Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization and are published in CSA's periodical Info Update, which is available on the CSA Web site at www.csa.ca.

C742-08

Energy performance of automatic icemakers and ice storage bins

1 Scope

1.1

This Standard applies to factory-made automatic icemakers with a capacity not exceeding 1814 kg/d, measured at standard rating conditions. These machines produce cube, flake, crushed, or fragmented ice in batches or in a continuous process. They are electrically operated and are designed for a 60 Hz operating current with nominal nameplate voltage.

1.2

This Standard applies to freestanding and integral factory-made manual-scoop-out ice storage bins.

1.3

This Standard specifies requirements and test procedures for energy and water consumption and storage effectiveness.

1.4

This Standard applies to

- (a) self-contained icemakers where the ice-making mechanism and storage compartment are integrated in one cabinet; and
- (b) split-system icemakers that have the ice-making mechanism and condensing unit in separate sections.

Condensers can be air- or water-cooled.

1.5

This Standard does not apply to

- (a) icemakers installed in
 - (i) household refrigerators;
 - (ii) refrigerator-freezers; or
 - (iii) freezers;
- (b) countertop models; or
- (c) cold-plate drink dispensers.

1.6

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

1.7

In CSA Standards, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; “may” is used to express an option or that which is permissible within the limits of the standard; and “can” is used to express possibility or capability. Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is