CSA A440S1:19

Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-17, *North American Fenestration Standard/Specification for windows, doors, and skylights*

Legal Notice for Standards

Canadian Standards Association (operating as "CSA Group") develops standards 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 Group 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 Group does not warrant the accuracy, completeness, or currency of any of the information published in this document. CSA Group makes no representations or warranties regarding this document's compliance with any applicable statute, rule, or regulation.

IN NO EVENT SHALL CSA GROUP, 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 GROUP HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES.

In publishing and making this document available, CSA Group 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 Group accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained in this document.

CSA Group is a private not-for-profit company that publishes voluntary standards and related documents. CSA Group 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 Group and the users of this document (whether it be in printed or electronic form), CSA Group 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 Group's and/or others' intellectual property and may give rise to a right in CSA Group and/or others to seek legal redress for such use, modification, copying, or disclosure. To the extent permitted by licence or by law, CSA Group 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 Group 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 Group 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 printed or paper form may be distributed only to persons who are authorized by CSA Group 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 Group; 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 thereof, 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.

CSA Group

Standards Update Service

CSA A440S1:19
March 2019

Title: *Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-17, North American Fenestration Standard/Specification for windows, doors, and skylights*

To register for e-mail notification about any updates to this publication
- go to **store.csagroup.org**
- click on **CSA Update Service**

The **List ID** that you will need to register for updates to this publication is **2126384**.

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

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

CSA A440S1:19

Canadian Supplement to AAMA/ WDMA/CSA 101/I.S.2/A440-17, North American Fenestration Standard/Specification for windows, doors, and skylights

Published in March 2019 by CSA Group
A not-for-profit private sector organization
178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3

*To purchase standards and related publications, visit our Online Store at **store.csagroup.org***
or call toll-free 1-800-463-6727 or 416-747-4044.

ISBN 978-1-4883-2024-8

Contents

Technical Committee on Performance Standards for Windows *2*

Preface *6*

1 Scope *7*

2 Reference publications *8*

3 Definitions *9*

4 Loads and product selection *9*
4.1 Reference climate loads *9*
4.2 Calculation of specified loads *9*
4.2.1 Calculation of specified DRWP *9*
4.2.2 Calculation of specified wind load *12*
4.2.3 Importance factor for wind *18*
4.2.4 Calculation of specified snow load *20*
4.3 Calculation of design pressure *21*
4.4 Product selection *21*

5 Performance requirements *21*
5.1 General *21*
5.2 Insect screen serviceability test *21*
5.3 Operating force requirements *21*
5.4 Air leakage performance *22*
5.5 Water penetration resistance test *22*

6 Prescriptive requirements *22*
6.1 General *22*
6.2 Steel *22*
6.2.1 Steel door facings *22*
6.2.2 Steel door frames *22*
6.2.3 Sashes and frames for steel windows, doors, and unit skylights *22*
6.3 Aluminum *23*
6.4 Lock blocks *23*
6.5 Marking *23*
6.5.1 Product manufacturer *23*
6.5.2 Performance rating *23*

Annex A (informative) — Commentary *24*
Annex B (informative) — Climate change effects on the durability of fenestration products *56*
Annex C (informative) — Bibliography *66*

Technical Committee on Performance Standards for Windows

J. Baker	WESTLab Canada, Ottawa, Ontario, Canada *Category: User Interest*	*Chair*
G. Hildebrand	exp Services Inc., Brampton, Ontario, Canada *Category: User Interest*	*Vice-Chair*
J. Marois	Energi Fenestration, Laval, Québec, Canada *Category: Producer Interest*	*Vice-Chair*
E. Alkhoury	Can-Best Testing Laboratories, Brampton, Ontario, Canada *Category: User Interest*	
A. Becker	National Certified Testing Laboratories, York, Pennsylvania, USA	*Non-voting*
L. Bergeron	Jeld-Wen, Inc., St-Apollinaire, Québec, Canada *Category: Producer Interest*	
G.J. Blad	Loewen Windows, Steinbach, Manitoba, Canada *Category: Producer Interest*	
B.T. Breen	Golden Windows Limited, Kitchener, Ontario, Canada	*Non-voting*
J.F. Chainey	P.H. Tech inc., Lévis, Québec, Canada *Category: Producer Interest*	
D. Chalest	NRCan, Ottawa, Ontario, Canada	*Non-voting*
P. Ciantar	Flynn Canada Ltd., Woodbridge, Ontario, Canada *Category: General Interest*	

F. D'Amours	Masonite International, Lévis, Québec, Canada	*Non-voting*
M.L. Diallo	CSA Group Testing & Certification Inc., Toronto, Ontario, Canada	*Non-voting*
F. DiFolco	CSA Group Testing & Certification Inc., Toronto, Ontario, Canada	*Non-voting*
I.E. El-Hajj	McIntosh Perry, Woodbridge, Ontario, Canada	*Non-voting*
D. Feil	Vision Extrusions Ltd, Woodbridge, Ontario, Canada	*Non-voting*
V. Fernandes	Intertek, Mississauga, Ontario, Canada	*Non-voting*
B. Fevold	Marvin Windows and Doors, Warroad, Minnesota, USA *Category: Producer Interest*	
D. Friesen	Berdick Windows and Door Winnipeg, Manitoba, Canada *Category: Producer Interest*	
F. Fulton	Fultech Fenestration Consulting, Guelph, Ontario, Canada *Category: User Interest*	
M. Glover	Fortay Inc., Perth, Ontario, Canada *Category: General Interest*	
D. Goldsmith	Ply Gem Canada, Calgary, Alberta, Canada *Category: Producer Interest*	
J. Grandoni	Alumicor Limited, Toronto, Ontario, Canada	*Non-voting*
K. Habib	CSA Group, Edmonton, Alberta, Canada	*Non-voting*

J.A. Hayden	Pella Corporation, Pella, Iowa, USA	*Non-voting*
S. Hopwood	Natural Resources Canada, Ottawa, Ontario, Canada *Category: User Interest*	
B. Hubbs	RDH Building Engineering Limited, Vancouver, British Columbia, Canada *Category: User Interest*	
G.B. Hughes	Lifestyle Oasis, Aurora, Ontario, Canada *Category: Producer Interest*	
A. Jaugelis	RDH Building Science Inc., Burnaby, British Columbia, Canada *Category: Producer Interest*	
J. Jensen	Building and Safety Standards Branch – Government of BC, Victoria, British Columbia, Canada	*Non-voting*
R. Jutras	CLEB Consulting Inc., Varennes, Québec, Canada *Category: User Interest*	
D.D. Kerr	GRG Building Consultants, Newmarket, Ontario, Canada *Category: General Interest*	
A. Kogovsek	Maxxer, Saint-Bruno, Québec, Canada	*Non-voting*
J.F. Kogovsek	Gestion Maxam Inc., Saint-Bruno, Québec, Canada	*Non-voting*
M. Koszel	WESTLab, Edmonton, Alberta, Canada	*Non-voting*
K. Kuperman	Pro-Active Fenestration Solutions Inc., Richmond Hill, Ontario, Canada	*Non-voting*
A.M. Lakhdhir	Westech Building Products, Calgary, Alberta, Canada *Category: Producer Interest*	

M.T. Mikkelson	Andersen Corporation, Bayport, Minnesota, USA	*Non-voting*
E. Pivniceru	Burlington, Ontario, Canada *Category: General Interest*	
D.T. Prohaska	Prohaska engineering Inc., Brechin, Ontario, Canada *Category: User Interest*	
P. Richards	Waterloo, Ontario, Canada	*Non-voting*
R. Rinka	American Architectural Manufacturers Association (AAMA), Schaumburg, Illinois, USA	*Non-voting*
C. Sacilotto	Sunview Patio Doors Ltd., Vaughan, Ontario, Canada	*Non-voting*
J. Singh	Allan Windows Inc., Concord, Ontario, Canada	*Non-voting*
H. Soghrati	UL CLEB building science, Toronto, Ontario, Canada	*Non-voting*
L. Szczepanski	Building Envelope Engineering, Oakville, Ontario, Canada	*Non-voting*
A. Walker	Pollard Windows Incorporated, Burlington, Ontario, Canada	*Non-voting*
R. Warren	Tremco Limited, Toronto, Ontario, Canada	*Non-voting*
M. Webb	IGMA, Ottawa, Ontario, Canada *Category: General Interest*	
A. Kwong	CSA Group, Toronto, Ontario, Canada	*Project Manager*

Preface

This is the fourth edition of CSA A440S1, *Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-17, North American Fenestration Standard/Specification for windows, doors, and skylights.* It supersedes the third edition, published in 2017 under the title *Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-11 NAFS-11 — North American Fenestration Standard/Specification for windows, doors, and skylights;* the second edition, published in 2009 under the title *Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-08, Standard/Specification for windows, doors, and skylights;* and the first edition, published in 2007 under the title *Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-05, Standard/Specification for windows, doors, and skylights.*

The requirements set forth in this Supplement are applicable to Canada only and are in addition to the requirements in AAMA/WDMA/CSA 101/I.S.2/A440-17. Canadian requirements were deemed necessary to establish loads and procedures and to ensure accepted minimum levels of performance.

Additional information on the requirements in this Supplement is provided in Annex A.

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

This Supplement was developed by CSA with input and comments from the American Architectural Manufacturers Association (AAMA) and the Window and Door Manufacturers Association (WDMA).

This Supplement was prepared by the Technical Committee on Performance Standards for Windows, under the jurisdiction of the Strategic Steering Committee on Construction and Civil Infrastructure, and has been formally approved by the Technical Committee.

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 Supplement is stated in its Scope, it is important to note that it remains the responsibility of the users of the Supplement to judge its suitability for their particular purpose.*
3) *This Supplement 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 Supplement.*
4) *To submit a request for interpretation of this Supplement, please send the following information to inquiries@csagroup.org and include "Request for interpretation" in the subject line:*
   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) *where possible, phrase the request in such a way that a specific "yes" or "no" answer will address the issue.*

   Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization *and are available on the* Current Standards Activities *page at standardsactivities.csa.ca.*
5) *This Supplement is subject to review within five years from the date of publication. Suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquiries@csagroup.org and include "Proposal for change" in the subject line:*
   a) *Standard designation (number);*
   b) *relevant clause, table, and/or figure number;*
   c) *wording of the proposed change; and*
   d) *rationale for the change.*

CSA A440S1:19
Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-17, North American Fenestration Standard/Specification for windows, doors, and skylights

1 Scope

1.1
This Supplement is for use in conjunction with AAMA/WDMA/CSA 101/I.S.2/A440-17 and contains additional requirements for Canada.

1.2
This Supplement provides simplified methods to calculate the minimum performance levels for resistance to water penetration, wind loads, and snow loads for fenestration products on buildings in Canada.

This Supplement includes a simplified procedure in Clause 4.2 for calculating the minimum performance levels for resistance to winds and snow loads. Clause 4.2 of this Supplement also allows the use of more detailed procedures specified in the *National Building Code of Canada (NBC)* for determining the coefficients C_e, C_t, C_q, and C_p.

Note: *The edition of the* NBC *in effect can vary by jurisdiction.*

In some cases, the simplified procedure specified in Clause 4.2 of this Supplement can result in higher values than those attained by using the procedures in the building code.

The simplified procedure to calculate specified wind load in Clause 4.2.2 applies only to buildings on level terrain, having a slope no greater than 1:10. For buildings that do not meet this criteria (e.g., buildings on steeper slopes, hills, or escarpments) wind load values are calculated in accordance with the requirements of the building code.

The simplified procedure to calculate specified snow load in Clause 4.2.4 applies only to small, simple, light-frame buildings. For buildings that do not meet this criteria, snow load values are calculated in accordance with the requirements of the building code.

Calculating wind load value using Tables 1 to 5 in Clause 4.2 can result in a higher wind load value than if the calculation is done using the formula in Clause 4.2. The higher wind load can result in a higher performance grade product being specified than is required by the applicable building code.

1.3
Annex B introduces the issue of climate change and its associated effects on fenestration in buildings. It is anticipated that fenestration designers will need to incorporate changes in climate loads resulting from climate change into the fenestration product design. Annex B provides some information on this