CSA SPE-07:23

Load-based and climate-specific testing and rating procedures for heat pumps and air conditioners

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.

Standards Update Service

CSA SPE-07:23
January 2023

Title: *Load-based and climate-specific testing and rating procedures for heat pumps and air conditioners*

To register for e-mail notification about any updates to this publication
- go to **www.csagroup.org/store/**
- click on **Product Updates**

The **List ID** that you will need to register for updates to this publication is **2430142**.

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.

IMPORTANT: READ BEFORE USING THIS STANDARD

SPE-07 SCOP Calculator Tool

This standard includes a SCOP calculation tool to support the calculation as provided in:

- **Annex B.3.1.1.1** – Rated seasonal cooling COP
- **Annex B.3.2.1** – Rated seasonal heating COP
- **Annex E**

Instructions on how to use the calculator tool are provided in the calculator under the "instructions" tab.

Access to the calculator tool can be found at the following link:
CSA_SPE-07_SCOP-Calculator-V1.0.xlsm

CSA SPE-07:23

Load-based and climate-specific testing and rating procedures for heat pumps and air conditioners

Published in January 2023 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 www.csagroup.org/store/
or call toll-free 1-800-463-6727 or 416-747-4044.

ICS 19.080; 19.060; 19.040
ISBN 978-1-4883-4639-2

Contents

SPE-07 Development Committee

G. Hamer	BC Hydro, Vancouver, BC, Canada	*Chair*
R. Andrushuk	Manitoba Hydro, Winnipeg, Manitoba, Canada	*Vice-Chair - Canada*
M. Hunt	Consultant, Pacific Gas & Electric, Sacramento, California, USA	*Vice-Chair - USA*
N. Bigras	Hydro-Québec, Montreal, Québec, Canada	
P. Craig	Department of Energy and Mines, Government of Nova Scotia, Halifax, Nova Scotia, Canada	
B. Harley	Bruce Harley Energy Consulting, Stamford, Vermont, USA	
B. Le Lostec	Hydro-Québec, Montreal, Québec, Canada	
C. Li	Hydro One, Toronto, Ontario, Canada	
J. Peterson	Contractor, Bonneville Power Administration, Portland, Oregon, USA	
C. Stephens	Systems Consulting, Sisters, Oregon, USA	
M. Suami	Natural Resources Canada, Ottawa, Ontario, Canada	
T. Wong	CSA Group, Toronto, Ontario, Canada	*Project Manager*

SPE-07 Testing Task Group

C. Stephens	Systems Consulting, Sisters, Oregon, USA	*Chair*
B. Harley	Bruce Harley Energy Consulting, Stamford, Vermont, USA	*Vice-Chair*
J. Braun	Purdue University, West Lafayette, Indiana, USA	*Lab Technical Advisor*
M. Chowdhury	CSA Group, Toronto, Ontario, Canada	*Technical Advisor*
R. Davis	Pacific Gas & Electric, Sacramento, California, USA	*Lab Technical Advisor*
G. Hamer	BC Hydro, Vancouver, British Columbia, Canada	
M. Hunt	Consultant, Pacific Gas & Electric, Sacramento, California, USA	*Lab Technical Advisor*
W. Hunt	Electric Power Research Institute, Washington, DC, USA	*Lab Technical Advisor*
M. Kegel	Natural Resources Canada (CanmetENERGY), Ottawa, Ontario, Canada	*Lab Technical Advisor*
L. Ling	CSA Group, Toronto, Ontario, Canada	
T. Mackintosh	Natural Resources Canada (CanmetENERGY), Ottawa, Ontario, Canada	*Lab Technical Advisor*
J. Sager	Natural Resources Canada (CanmetENERGY), Ottawa, Ontario, Canada	*Lab Technical Advisor*
M. Suami	Natural Resources Canada, Ottawa, Ontario, Canada	

B. Xiao	Gree Electric Appliances Inc. of Zhuhai, Zhuhai, Guangdong, China	*Lab Technical Advisor*
T. Wong	CSA Group, Toronto, Ontario, Canada	*Project Manager*

SPE-07 Technical Review Task Group

B. Harley	Bruce Harley Energy Consulting, Stamford, Vermont, USA	*Co-Chair*
C. Stephens	Systems Consulting, Sisters, Oregon, USA	*Co-Chair*
R. Andrushuk	Manitoba Hydro, Winnipeg, Manitoba, Canada	
M. Baines	Underwriters Laboratory, Plano, Texas, USA	
E. Berg	Lennox, Carrollton, Texas, USA	
J. Braun	Purdue University, West Lafayette, Indiana, USA	
R. Davis	Independent (Ret. Pacific Gas & Electric), Sacramento, California, USA	
D. Denton	Trane, Jacksonville, Texas, USA	
P. Dhillon	Purdue University, West Lafayette, Indiana, USA	
C. Dymond	Northwest Energy Efficiency Alliance (NEEA), Portland, Oregon, USA	
G. Hamer	BC Hydro, Vancouver, British Columbia, USA	
T. Horton	Purdue University, West Lafayette, Indiana, USA	
M. Hunt	Consultant, Pacific Gas & Electric, Sacramento, California, USA	
M. Kegel	Natural Resources Canada (CanmetENERGY), Ottawa, Ontario, Canada	

A. C. Kirkwood	Carrier Corporation, Indianapolis, Indiana, USA	
K. McFadden	2050 Partners, Atlanta, Georgia, USA	
J. Sager	Natural Resources Canada (CanmetENERGY), Ottawa, Ontario, Canada	
Mike Stem	Stem Integration, McKinney, Texas, USA	
M. Suami	Natural Resources Canada, Ottawa, Ontario, Canada	
T. Wong	CSA Group, Toronto, Ontario, Canada	*Project Manager*

Preface

This is the first edition of CSA SPE-07, *Load-based and climate-specific testing and rating procedures for heat pumps and air conditioners*. It supersedes the document CSA EXP07 of the same name.

This Document is not a consensus product; that is, it is not a Standard and it has not been formally reviewed or approved by a CSA Technical Committee.

This Document presents an alternative approach to testing the performance of heat pumps and air conditioners. In the past, most performance test procedures have required the monitoring of equipment while operating under steady state conditions, at a fixed capacity, while subjected to specific and fixed indoor and outdoor air conditions. This Document uses a load-based test approach in which the indoor room is subjected to a simulated load and the equipment is allowed to respond accordingly as it tries to maintain the desired indoor conditions while outdoor room conditions are held constant. This allows the actual behaviour of the equipment and controls to be measured in the test facility in a manner much more representative of in situ performance. For those portions of the test procedure where the simulated load might exceed the equipment capacity, more conventional full-load testing is used.

This Document has been prepared and reviewed by the SPE-07 Development Committee.

CSA acknowledges that the development of this Standard was made possible, in part, by the financial support of BC Hydro, Efficiency Manitoba, Efficiency Nova Scotia, FortisBC Inc., Hydro-Québec, Independent Electricity System Operator (IESO), Natural Resources Canada, Nova Scotia Department of Natural Resources and Renewables, and Northwest Energy Efficiency Alliance (NEEA).

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 Standard 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 Standard.*
4) *To submit a request for interpretation of this Standard, 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 Standard 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.*