CSA S500:14

National Standard of Canada

(reaffirmed 2019)

Thermosyphon foundations for buildings in permafrost regions

Standards Council of Canada
Conseil canadien des normes

REVISED AUGUST 2014

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Revision History

CSA S500:14, Thermosyphon foundations for buildings in permafrost regions

National Standard of Canada — August 2014
Outside front cover, National Standard of Canada text, title page, and preface.

Standards Update Service

CSA S500:14
June 2014

Title: *Thermosyphon foundations for buildings in permafrost regions*

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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.

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Published in June 2014 by CSA Group
A not-for-profit private sector organization
178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3

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ICS 91.120.99
ISBN 978-1-77139-604-2

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Preface

This is the first edition of CAN/CSA-S500, *Thermosyphon foundations for buildings in permafrost regions*.

Previous to this Standard, there have been no guidelines or standards for the design, construction, and maintenance for thermosyphon supported foundations.

CSA Group received funding for the development of this Standard from Standards Council of Canada, as part of the Northern Infrastructure Standardization Initiative, supported by the Government of Canada's Clean Air Agenda.

This Standard was developed by the Working Group on Thermosyphon Foundations for New Buildings in Permafrost Regions, under the jurisdiction of the Technical Committee on Northern Built Infrastructure and the Strategic Steering Committee on Construction and Civil Infrastructure, and has been formally approved by the Technical Committee.

This standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Notes:

1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
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   c) *wording of the proposed change; and*
   d) *rationale for the change.*

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Thermosyphon foundations for buildings in permafrost regions

1 Scope, objectives, and application

1.1 Scope

This Standard provides requirements for all life-cycle phases of thermosyphon foundations for new buildings on permafrost, including site characterization, design, installation, and commissioning phases as well as for monitoring and maintenance phases. This Standard is meant to ensure the long-term performance of thermosyphon-supported foundation systems under changing environmental conditions.

1.2 Objectives

The objectives of this Standard are to

a) describe performance expectations for thermosyphon foundations together with monitoring requirements necessary to support an appropriate maintenance program;
b) specify the materials to be used in thermosyphon foundations;
c) foster an awareness and understanding of application technology, with a focus on factors that could compromise the functionality of foundation systems reliant on thermosyphons;
d) describe the typical phases of the life cycle of thermosyphon foundations for buildings on permafrost, including design, installation, commissioning, monitoring, and maintenance;
e) provide guidance to maximize the long-term viability of thermosyphon-supported foundation systems under changing environmental conditions; and
f) describe performance expectations for thermosyphon foundations together with monitoring requirements necessary to support a maintenance program.

1.3 Application

This Standard is intended to be used by designers, contractors, building owners, and operators. For owners, it provides an understanding of the design and construction processes required to permit verification that adequate measures are taken during these phases. The Standard also sets out monitoring and maintenance expectations for building operators.

This Standard is applicable to new buildings on permafrost sites. It is not intended to provide guidance for initial selection of the most appropriate foundation type for any particular structure on a permafrost site. It is assumed that a thorough review of alternative foundation systems has been undertaken and that that the site has been categorized as potentially thaw-unstable. Preservation of the permafrost for support of the structure has been identified as a design objective before this Standard is implemented.

1.4 Exclusions

This Standard does not cover

a) abandonment/demolition of buildings with thermosyphon foundations;
b) thermosyphons in areas of non-permafrost or retrofitting thermosyphons to existing buildings; and
c) thermosyphons used for infrastructure other than buildings.

