CSA SPE-10:24

Test and rating procedures for split-system air-to-water heat pump systems intended for domestic hot water service

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CSA SPE-10:24
July 2024

Title: *Test and rating procedures for split-system air-to-water heat pump systems intended for domestic hot water service*

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Published in July 2024 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.

ISBN 978-1-4883-5135-8

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Preface

This is the first edition of CSA SPE-10, *Test and rating procedures for split-system air-to-water heat pump systems intended for domestic hot water service*.

This is a non-consensus product; that is, it is not an accredited standard, and it has not been formally reviewed or approved by a CSA Technical Committee.

This Technical Specification document presents an alternative approach to testing the performance of split-system air-to-water heat pump systems intended for domestic hot water service. Given current market trends toward variable capacity systems that are much more capable of excellent performance in more extreme climatic conditions, there is a need for test and rating procedures that can differentiate system performance across the broad range of ambient conditions encountered by a split-system outdoor unit.

This document can be used to characterize the energy performance of any commercially available air-to-water heat pump designed for use in the residential sector throughout its expected range of operating ambient and load conditions.

The proposed testing and rating procedure is intended to complement CSA C745 , providing an annualized rating that can be compared to the ratings provided for other water heaters using C745.

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

This document has been prepared and reviewed by the SPE-10 Development 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 document is stated in its Scope, it is important to note that it remains the responsibility of the users of the document to judge its suitability for their particular purpose.*
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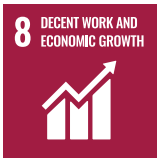
Through a robust mapping process, connections between CSA SPE-10:24 and the following SDGs have been identified:

SDG					
Targets	7.3, 7.a	8.4	9.b	11.3	12.2

CSA SPE-10:24 has notable linkages with the following SDGs:

- SDG 7: *Affordable and Clean Energy*
- SDG 8: *Decent Work and Economic Growth*
- SDG 9: *Industry, Innovation, and Infrastructure*
- SDG 11: *Sustainable Cities and Communities*
- SDG 12: *Responsible Consumption and Production*

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1 Scope

1.1 Equipment type

This document provides a method for determining the seasonal energy performance of air-source split-heat pump systems designed to provide residential hot water service using an outdoor unit with a separate indoor storage tank, with or without electric resistance back-up heating capacity.

The test and rating procedures contained in this document are load-based performance tests conducted under a set of outdoor ambient and cold water supply temperature conditions that enable the calculation of a seasonal performance rating in up to eight climate zones (see Table 5).

1.2 Application

These procedures apply to air-source split-heat pump systems that use either refrigerant or water/brine solution between the outdoor unit and the indoor storage tank, and have the following characteristics:

a) rated storage tank volumes of 7.6 to 454 L (2 to 120 gal);
b) electric heater elements with power inputs ≤12 kW;
c) designed to heat and store water at a thermostatically controlled temperature ≤82 °C (180 °F);
d) a maximum current rating of ≤24 A (including the compressor and all auxiliary equipment such as fans, pumps, controls, and, if on the same circuit, any electric resistance elements);
e) a maximum wattage rating of ≤15 kW; and
f) a single-phase maximum voltage of ≤250 V.

1.3 Terminology

In this document, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the document; “should” is used to express a recommendation or that which is advised but not required; and “may” is used to express an option or that which is permissible within the limits of the document.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.