Test method for determining the performance of combined space and water heating systems (combos)
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Preface

This is the first edition of CSA P.9, Test method for determining the performance of combined space and water heating systems (combos).

This Standard evaluates the performance of the water and space heating functions of a combo, determines the overall thermal performance of the system, and is intended to serve as a standalone document for use in Canada. All of the tests are performed using the same basic test set-up, ambient temperature, and control settings.

The performance of a combo is characterized by a new metric, the thermal performance factor (TPF), which is an aggregate thermal performance rating determined from the results of space heating and water heating tests. Minimum and premium performance requirements for combos are still under development.

Normal practice for P Standards is to provide minimum efficiency recommendations in the Standard. Current test data is insufficient to allow recommendations for minimum and premium requirements at the time of publication of this Standard, but may be added in future editions.

Annex A provides a performance specification summary template. Annex B describes the rationales behind the testing approaches used in this Standard. Annex C describes a procedure for determining the tank thermocouple positions on a probe in order to establish the mean temperature of the water in a storage tank. Its aim is to promote the repeatability of test results for storage-tank-based systems.

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

This Standard was prepared by the Subcommittee on Combined Space and Water Heating Systems, under the jurisdiction of the Technical Committee on Energy Efficiency and Related Performance of Fuel-Burning Appliances and Equipment and the Strategic Steering Committee on Fuel-Burning Equipment, and has been formally approved by the Technical Committee. This Standard will be submitted to the Standards Council of Canada for approval as a National Standard of Canada.

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P.9-11

Test method for determining the performance of combined space and water heating systems (combos)

1 Scope

1.1 This Standard describes the test procedures, test set-ups, and calculations required to determine the performance, capacities, energy consumption, and overall efficiency of gas-fired and oil-fired combined space and water heating systems (combos).

1.2 This Standard establishes laboratory methods for testing and rating the thermal performance and electrical energy use of a combo using a consistent test set-up and the same ambient temperature and control settings for all function tests.

1.3 In this Standard the performance of a combo is characterized by a thermal performance descriptor that consolidates measurements for space heating and water heating to provide an annual thermal performance rating. The water heating load that is incorporated into the thermal performance rating is standardized and the space heating load used in the overall rating is based on the space heating capacity of the combo.

1.4 This Standard applies to forced-air packaged combo systems and combo designs/configurations with heat inputs up to and including 87.9 kW (300 000 Btu/h) for boiler-based systems and a maximum input up to and including 73.2 kW (250 000 Btu/h) for water-heater-based systems that are intended for field assembly.

1.5 The following categories of combo systems are covered in this Standard:
   (a) Type A System: a combo with a fixed capacity for space heating;
   (b) Type B System: a combo equipped with controls that automatically adjust the space heating capacity based on the space heating load; and
   (c) Type C System: a combo with a thermal storage tank or equivalent that decouples the space heating load from the burner control.

1.6 This Standard does not apply to
   (a) electric- and solar-based combo systems;
   (b) solid-fuel-based combo systems; and
   (c) multi-family dwellings with a central heating plant.