CONTENTS

ANSI/ASHRAE Standard 194-2025
Method of Test for Direct-Expansion Ground-Source Heat Pumps

SECTION		PAGE
Foreword		2
1	Purpose	2
2	Scope	2
3	Definitions and Symbols	2
4	Classifications	4
5	Test Requirements	7
6	Method of Testing and Calculations	10
7	Measurements	18
8	Reference Properties and Data	18
9	References	18
10	Informative Bibliography	20
Normative Appendix A: Commissioning, Setup, and Start-Up Procedure for Testing Samples		21
Normative Appendix B: Determination of Airflow Rate and External Static Pressure for DX-to-Air Ducted Samples		22

NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE website at www.ashrae.org/technology.

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FOREWORD

ASHRAE Standard 194 provides a method of test for rating residential, commercial, and industrial direct-expansion (DX) ground-source heat pumps (GSHPs).

This is a revision of Standard 194-2017. This standard was prepared under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). It may be used, in whole or in part, by an association or government agency with due credit to ASHRAE. Adherence is strictly on a voluntary basis and merely in the interests of obtaining uniform standards throughout the industry.

The 2025 revision includes the following changes:

- *References have been updated and renumbered*
- *Minor editorial changes*

1. PURPOSE

The purpose of this standard is to provide test procedures for rating factory-made residential, commercial, and industrial direct-expansion (DX) ground-source heat pumps (GSHPs), as defined in Section 3.

This standard addresses heat-pump capacity ranges of 3.5 through 52.8 kW (12,000 through 180,000 Btu/h) and all standard voltage and frequency ratings.

2. SCOPE

2.1 This standard provides test procedures for determining heating capacity, cooling capacity, coefficients of performance (COPs), and energy efficiency ratios (EERs) for systems, as defined in Section 3.

2.2 This standard applies only to electrically driven, mechanical vapor-compression refrigeration systems.

2.3 This standard applies to the testing of heat pumps with an outdoor refrigerant to test liquid heat exchanger utilized to condition the refrigerant entering the system under test. This standard does not apply to individual assemblies for separate use.

3. DEFINITIONS AND SYMBOLS

3.1 Definitions. All terms in this document shall follow the standard industry definitions in the current edition of *ASHRAE Terminology of Heating, Ventilating, Air Conditioning and Refrigeration* [1] unless otherwise defined in this section.

coefficient of performance, cooling (COP_c): ratio of net total cooling capacity to the effective power input of the heat pump (in watts per watts) at any given set of test conditions.

coefficient of performance, heating (COP_h): ratio of net heating capacity to the effective power input of the heat pump (in watts per watts) at any given set of rating conditions.

direct-expansion (DX) ground-source heat exchanger (GSHE): continuous sealed-tube heat exchanger with refrigerant supply and refrigerant return. DX-GSHEs may comprise several tubes, be supplied with each heat pump, and be factory or field assembled. For purposes of testing in accordance with this standard, the DX-GSHE (ground loop) is simulated by a refrigerant-to-test liquid heat exchanger (earth loop simulator).

direct-expansion (DX) ground-source heat pump (GSHP): heat pump consisting of (a) one or more factory-made assemblies that normally include an indoor conditioning coil with air- or water- moving means, (b) one or more compressor, and (c) a subsurface refrigerant piping loop system that functions as a heat exchanger, including the means to provide a heating function, cooling function, or both. The separate assemblies shall be designed to be used together. In this standard, the term "heat pump" may be used to refer to either DX-to-air or DX-to-water heat pumps.

For purposes of testing, an outdoor refrigerant used to test a liquid heat exchanger shall be used with other matched system assemblies. The heat exchanger energy calculations shall be determined by means of the outdoor test liquid-enthalpy method detailed in Section 6.

DX-GSHPs shall provide the function of circulating air or water cooling and/or heating with controlled temperature and may include the functions of potable water heating, air cleaning, humidifying, and dehumidifying.

Models designated as cooling-only units need not include the heating function, and models designated heating-only units need not include the cooling function.