

ANSI/AHRI Standard 870 (formerly ARI Standard 870)

2005 Standard for Performance Rating of Direct GeoExchange Heat Pumps



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AHRI STANDARD 870-2005 (formerly ARI Standard 870-2005) WITH ADDENDUM 1, **Performance Rating of Direct GeoExchange Heat Pumps**

June 2009

AHRI Standard 870-2005 with Addendum 1, *Performance Rating of Direct GeoExchange Heat Pumps*, is comprised of only the shaded portions shown. The June 2009 Addendum 1 has been incorporated into the already published 2005 version of AHRI Standard 870 to avoid confusion.

Particular additions (shown shaded in the standard), deletions (~~shown with a strikethrough and shaded in the standard~~), and corrections (shown shaded in the standard) are as follows:

- 1 In Appendix C, equation C2 was corrected.

$$\text{System Capacity} = q_{\text{hx}} - (3.412) (W_c \pm W_{\text{ah}}) = q_{\text{cooling}}$$

IMPORTANT

SAFETY DISCLAIMER

ARI does not set safety standards and does not certify or guarantee the safety of any products, components or systems designed, tested, rated, installed or operated in accordance with this standard/guideline. It is strongly recommended that products be designed, constructed, assembled, installed and operated in accordance with nationally recognized safety standards and code requirements appropriate for products covered by this standard/guideline.

ARI uses its best efforts to develop standards/guidelines employing state-of-the-art and accepted industry practices. ARI does not certify or guarantee that any tests conducted under its standards/guidelines will be non-hazardous or free from risk.

ARI CERTIFICATION PROGRAM PROVISIONS

Scope of the Certification Program

The certification program includes all factory made residential, commercial and industrial Direct Geoexchange Heat Pumps as defined in Section 3. It does not apply to the rating and testing of retrofit units.

Certified Ratings

The following certification program ratings are verified by test at the Standard Rating Conditions:

1. Cooling Capacity, Btu/h
2. Energy Efficiency Ratio, EER, Btu/W · h
3. Heating Capacity, Btu/h
4. Coefficient of Performance, COP

Note:

This standard supersedes ARI Standard 870-2001.

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PERFORMANCE RATING OF DIRECT GEOEXCHANGE HEAT PUMPS

SECTION 1. PURPOSE

1.1 Purpose. The purpose of this standard is to establish for Direct Geoexchange Heat Pumps: definitions; classification; test and rating requirements; minimum data requirements for Published Ratings; operating requirements; marking and nameplate data; and conformance conditions.

1.1.1 Intent. This standard is intended for the guidance of the industry, including manufacturers, engineers, installers, contractors and users.

1.1.2 Review and Amendment. This standard is subject to review and amendment as technology advances.

SECTION 2. SCOPE

2.1 Scope. This standard applies to factory made residential, commercial and industrial Direct Geoexchange Heat Pumps, as defined in Section 3.

2.1.1 Energy Source. This standard applies only to electrically-driven, mechanical compression type systems.

2.1.2 Alternative Applications. Equipment designed for rating under this standard may not be suitable for alternative applications covered in ISO 13256-1.

2.2 Exclusions. This standard applies to the rating and testing of complete refrigeration systems and does not apply to individual assemblies for separate use.

SECTION 3. DEFINITIONS

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

3.1 Coefficient of Performance (COP). A ratio of the Cooling/Heating Capacity in watts [W] to the power input values in watts [W] at any given set of Rating Conditions expressed in watts/watt [W/W]. For heating COP, supplementary resistance heat shall be excluded.

3.1.1 Standard Coefficient of Performance. A ratio of the capacity to power input value obtained at Standard Rating Conditions.

3.2 Cooling Capacity. The capacity associated with the change in air enthalpy which includes both the Latent and Sensible Capacities expressed in Btu/h [W].

3.2.1 Latent Capacity. Capacity associated with a change in humidity ratio.

3.2.2 Sensible Capacity. Capacity associated with a change in dry-bulb temperature.

3.3 Direct Geoexchange Heat Exchanger. A continuous sealed underground closed loop heat exchanger with one refrigerant supply tube and one refrigerant return tube. More than one such Direct Geoexchange Heat Exchanger may be supplied with each heat pump and the Direct Geoexchange Heat Exchanger(s) may be factory or field assembled.