



September 13, 2024

Natural Resources Canada
Office of Energy Efficiency
580 Booth Street
Ottawa, ON, K1A 0E4

(Submitted via email to EEregulations-reglementEE@nrcan-rncan.gc.ca)

RE: Joint AHRI-CIPH-HRAI Comments Regarding NRCan Pre-consultation for Energy Efficiency Regulations (Amendment 19)

Dear NRCan Staff:

The Air-Conditioning, Heating and Refrigeration Institute (AHRI), the Canadian Institute for Plumbing and Heating (CIPH), and the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI), collectively referred to here as the “Joint Commenters,” respectfully submits this letter in response to Amendment 19 pre-consultation documents issued by the Natural Resources Canada (NRCan) in June 2024.

AHRI is the trade association representing over 330 manufacturers of commercial refrigeration equipment, water heaters, heating, ventilating, and air-conditioning equipment. It is an internationally recognized advocate for the heating, ventilation, air conditioning and refrigeration (HVACR) and water heating industry and certifies the performance of many of the products manufactured by its members. In North America, the annual economic activity resulting from the HVACR industry is more than \$211 billion.

Founded in Montréal in 1933, the CIPH is a pan-Canadian not-for-profit trade association. The Mission of CIPH is to promote the responsible growth and prosperity of members: manufacturers, wholesaler distributors, manufacturers' agents and associates in the plumbing, heating, hydronics, industrial PVF, waterworks and water systems industry in Canada.

Founded in 1968, HRAI is Canada’s national non-profit trade association for the HVACR industry, representing over 1,150 member companies across the country. Our members include manufacturers, wholesalers and contractors who collectively employ tens of thousands of skilled trade professionals across the country and contribute more than \$12B annually to the Canadian economy

These comments are in response to June 2024 Technical Bulletin on amending the standards for

ground-source heat pumps (including water/brine-to-water) and water heaters (heat pump and commercial water heaters).

The Joint Commenters appreciate the efforts made by NRCAN to further efficiency standards for ground-source heat pumps and water heaters; however, as explained below, there are issues with these proposals that require further adjustment and coordination.

General Comments

The Joint Commenters are supportive of NRCAN adopting fully harmonized test procedures and energy efficiency minimums with the U.S. Department of Energy (DOE), well in advance of compliance deadlines. Predictability and regulatory certainty benefits manufacturers, regulators, citizens, and businesses. We have feedback and several recommendations regarding commercial and household water heaters and ground-source heat pumps.

Commercial Water Heaters:

The Joint Commenters are generally supportive of NRCAN's intent to harmonize definitions, test procedures, and standards for commercial water heaters with those of the United States. However, we have several recommendations to improve implementation proposed in the technical bulletin.

Product descriptions:

Current DOE and NRCAN definitions indicate the capacity cutoffs between consumer and commercial products. However, existing NRCAN definitions for commercial water heaters (gas-fired storage water heater, oil-fired water heater, gas-fired instantaneous water heater, and electric water heater) should include the word "commercial" and input capacity descriptors to differentiate these from household water heaters, like is done by DOE. Harmonizing with product definitions in 10 CFR 431.102 is important to ensure energy efficiency standards are likewise fully harmonized.

Testing Standard

The Joint Commenters support incorporating the DOE test procedure by reference.

Energy Efficiency Standard

The Joint Commenters support aligning energy efficiency standards with the United States.

Import Dates

The Joint Commenters support aligning the compliance dates with the United States.

Heat pump water heaters:

The Joint Commenters are generally supportive of NRCAN's intent to harmonize household heat pump water heater definitions, test procedures, and standards with those of the United States. The Joint Commenters are also generally supportive of NRCAN's intent to harmonize commercial heat pump water heater definitions and test procedures with those of the United States. However, we have a few recommendations to improve implementation.

Product Description

The Joint Commenters support NRCan’s proposal to differentiate household from commercial heat pump water heaters in the product description name. The Joint Commenters support a greater alignment of definitions for commercial heat pump water heaters with 10 CFR 431.102 “Commercial heat pump water heater (CHPWH)” and recommends the inclusion of the bracketed, bold text below:

“A commercial heat pump water heater **[that uses a refrigeration cycle, such as vapor compression, to transfer heat from a low-temperature source to a higher-temperature sink and]** having a maximum current rating greater than 24 amperes or a voltage greater than 250 volts. Such equipment includes, but is not limited to, air-source heat pump water heaters, water-source heat pump water heaters, and direct geo-exchange heat pump water heaters.”

Energy Efficiency Standard

The Joint Commenters recommend removing “except for small heat pump water heaters” in the product category characterization as presented in Table 2 of the [Technical Bulletin](#). This language is not necessary.

Table 2: Energy efficiency standards for heat pump water heaters being considered

Product	Effective Storage Volume, Litres (U.S. Gallons)	Draw Pattern	Minimum Required Uniform Energy Factor (UEF)	Period of Manufacture
Household Heat Pump Water Heaters, except for small heat pump water heaters	≥ 76 L (20 gal) and ≤ 208 L (55 gal)	Very Small	UEF ≥ 2.30	On or after May 6, 2029
		Low		
		Medium		
		High		
Household Heat Pump Water Heaters	> 208 L (55 gal) and ≤ 454 L (120 gal)	Very Small	UEF ≥ 2.50	On or after May 6, 2029
		Low		
		Medium		
		High		

Ground-source heat pumps (GSHP) (including water/brine-to-water)

The Joint Commenters agree that using “GSHPs for heating and cooling Canadian buildings could substantially reduce energy demand and help Canada reach its decarbonization goals,” as stated in NRCan’s technical bulletin.¹ To achieve these goals, it is critical for minimum

¹ <https://natural-resources.canada.ca/energy-efficiency/energy-efficiency-regulations/ground-source-heat-pumps/25956>

efficiency standards to be lower than ENERGY STAR® energy efficiency levels. The installation price of a geothermal system can be several times greater than that of an air-source system of the same heating and cooling capacity.² Setting national standards at an advanced specification level may trigger increases to the ENERGY STAR specification, making GSHP less cost effective for Canadian consumers.

NRCan currently regulates water/brine-to-air ground-source heat pumps less than 40 kW (135,000 Btu/h). Different minimum efficiencies are established for open loop and closed loop systems, for both cooling and heating full load efficiency. The prescribed test standard for equipment manufactured after June 1, 2006, is CSA C13256-1.³ In the technical bulletin, NRCan notes CSA C13256-1 “only applies to water-to-air GSHPs.”⁴ Hence, water-to-water GSHPs have been excluded from the Regulations since 2006. With Amendment 19 pre-consultation, NRCan is considering setting energy efficiency standards for water-to-water GSHPs and increasing the stringency of energy efficiency standards for water-to-air GSHPs.

The Joint Commenters note that separately, in Subdivision B, Section 191, NRCan regulates internal water loop heat pumps, defined as a “water-source single package or split-system heat pump that is factory-built, is intended for installation in an internal water loop system and has a cooling or heating capacity of not more than 40 kW (135,000 Btu/h).”⁵ Ratings for internal water loop heat pumps are also derived from CSA C13256-1. Full load performance is established at 30 °C inlet water for cooling and 30 °C inlet water for heating. Different energy efficiency minimums are established for equipment less than 5kW and equipment greater than or equal to 5 kW and less than or equal to 40 kW. NRCan has not proposed changes to internal water loop heat pumps in Amendment 19; however, this is the same equipment as GSHPs, just in a different application.

On December 4, 2023, the DOE issued a final rule amending its test procedure for water-source heat pumps (WSHPs) to expand the scope of applicability of the test procedure, incorporate by reference a new industry consensus test standard for water-source heat pumps, adopt a seasonal cooling efficiency metric, and specify more representative test conditions used for measuring heating performance.⁶

² <https://www.energy.gov/energysaver/geothermal-heat-pumps>

³ <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2016-311/page-11.html#docCont>

⁴ <https://natural-resources.canada.ca/energy-efficiency/energy-efficiency-regulations/ground-source-heat-pumps/25956>

⁵ <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2016-311/page-12.html#docCont>

⁶ <https://www.regulations.gov/document/EERE-2017-BT-TP-0029-0030>

Table 1. Current DOE Standards for WSHP (Table 5 to [10 CFR 431.97\(c\)](#))

Cooling capacity	Minimum efficiency	Compliance date: equipment manufactured starting on . . .
WATER-SOURCE HEAT PUMPS (WATER-TO-AIR, WATER-LOOP)		
<17,000 Btu/h	EER = 12.2 COP = 4.3	October 9, 2015.
≥17,000 Btu/h and <65,000 Btu/h	EER = 13.0 COP = 4.3	October 9, 2015.
≥65,000 Btu/h and <135,000 Btu/h	EER = 13.0 COP = 4.3	October 9, 2015.

In 2020, DOE initiated an energy conservation standards rulemaking by issuing a request for information to help determine whether amending the energy efficiency requirements for WSHPs would result in significant energy savings and whether such standards would be technologically feasible and economically justified.⁷ DOE noted that the estimated annual shipments in 2017 were 206,752 in the US.⁸ With such a small U.S. market, the Joint Commenters are concerned that setting national standards harmonized with the province of Ontario, as contemplated in the Amendment 19 pre-consultation documents, may not be representative of the water-to-water GSHP market. Additional market data should be collected. In the Spring 2024 Unified Agenda, DOE moved the standards rulemaking to a long-term action, indicating that a proposed standard is anticipated to be issued in July 2025, providing time for ongoing work to amend standards in ASHRAE 90.1.⁹

Additionally, the test procedures and rating metrics for GSHP are evolving. In 2023, AHRI published AHRI 600 (I-P): Performance Rating of Water/Brine to Air Heat Pump Equipment. Work is currently ongoing to develop residential metrics in AHRI 600 and AHRI 660 to address water-to-water WSHPs for commercial and residential applications.

Lastly, Addendum ba to ANSI/ASHRAE/IES Standard 90.1-2022, *Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings* was recently released for advisory public review. This proposed Addendum sought feedback regarding proposed minimum efficiency levels for air-to-water WSHPs in ASHRAE 90.1. The technical support document for the

⁷ 85 FR 27929 (May 12, 2020)

⁸ <https://www.energy.gov/sites/prod/files/2020/04/f74/wshp-ecs-rfi-faq.pdf>

⁹ <https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202404&RIN=1904-AE74>

addenda provides details on the development of the new metric, the crosswalk, and efficiency improvements.¹⁰

The Joint Commenters recommend that NRCan adopt the minimum efficiencies consistent with levels adopted by ASHRAE 90.1, after DOE adopts these standards, and cite adopted U.S. federal test procedures.

The Joint Commenters support the Amendment 19 pre-consultation, where NRCan is considering expanding the scope by introducing energy efficiency and testing standards for direct-exchange GSHPs (DGX).

Product descriptions:

The Joint Commenters recommend NRCan review the internal water loop heat pumps (in Subdivision B, Section 191) and ground-source heat pump regulations (as proposed) and combine, if possible. As noted above, these are the same equipment, and therefore there should be one minimum efficiency standard.

To facilitate the direction of industry in the future, the Joint Commenters recommend NRCan adopt the following product definitions:

Water Source Heat Pump: means commercial package air-conditioning and heating equipment that is a single-phase or three-phase reverse-cycle heat pump that uses a circulating water loop as the heat source for heating and as the heat sink for cooling. The main components are a compressor, refrigerant-to-water heat exchanger, refrigerant-to-air heat exchanger, refrigerant expansion devices, refrigerant reversing valve, and indoor fan (except that coil-only units do not include an indoor fan). Such equipment includes, but is not limited to, water-to-air water-loop heat pumps.

Ground Source Heat Pump: means residential package or split air-conditioning and heating equipment that is a single-phase reverse-cycle heat pump that uses a circulating brine, circulating refrigerant, or ground water loop as the heat source for heating and as the heat sink for cooling. The main components are a compressor, refrigerant-to-water or refrigerant-to-brine heat exchanger, refrigerant-to-air or refrigerant-to-water heat exchanger, refrigerant expansion devices, refrigerant reversing valve, and indoor fan (except that coil-only, water-to-water, or DGX-to-water units do not include an indoor fan).

Testing Standard

In 2023, AHRI published AHRI 600 (I-P): Performance Rating of Water/Brine to Air Heat Pump Equipment.¹¹ This new standard improves on the testing standard by increasing in external rating static from the current ISO 13256-1 (CSA C13256-1) standard that requires ratings to be based

¹⁰ https://ashraeorg-my.sharepoint.com/:p:/g/personal/etoto_ashrae_org/EW1j6QNfuUdJII9toYRc0FgB_1fKt4MNqF9S_0HerIrRug?rti=9_0WfDfJ3Eg

¹¹ <https://www.ahrinet.org/system/files/2023-10/ANSI%20AHRI%20Standard%20600-2023%20I-P.pdf>

on zero external static. Other key improvements include a change in condenser pump efficiency, adjustment for testing with methanol to remove the impact for ratings with water, and the addition of cooling tower fan power and tower loop pump power. Because of all the changes, the full load metric name for cooling is being changed from *EER* to *AEER* (applied *EER*), and the full load *COP* is being changed to *ACOPH* (applied heating *COPH*).

The Joint Commenters support NRCAN expanding the scope to include DGX and recommend that AHRI 870-2016 (R2-2023) (I-P) – *Performance Rating of Direct Geoexchange Heat Pumps* be the cited test procedure.¹²

Energy Efficiency Standard

The Joint Commenters recommend NRCAN set energy efficiency levels for water/brine-to-air water-source heat pumps, DGX-to-air, DGX-to-water at levels harmonized with the DOE, after it adopts standards.

The Joint Commenters are concerned that NRCAN's review of the EPA Energy Star qualifying product list has skewed the analysis. Energy Star's specification scope for GSHPs is limited to single-phase (i.e. household units). EPA's specification is limited to equipment designed specifically for residential use "due to design and application complexity of equipment built for and operated in commercial settings (i.e., three-phase units) as well as lack of performance data."¹³ It is not appropriate to extend the analysis of single-phase units to include commercial equipment.

Summary

The Joint Commenters appreciate the opportunity to provide these comments. Please feel free to contact us with any questions or for further discussion.

Sincerely,

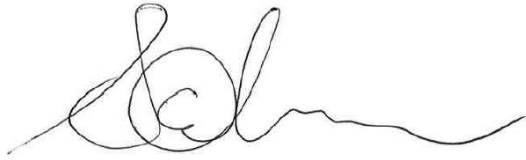


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¹² <https://www.ahrinet.org/search-standards/ahri-870-i-p-and-871-si-performance-rating-direct-geoexchange-heat-pumps>

¹³

https://www.energystar.gov/sites/default/files/specs//private/ES_V3.0_Geothermal_Heat_Pump_Cover_Memo.pdf



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