

Innovative Design Request (IDR) for the Determination of Drain Water Heat Recovery (DWHR) System HERS Index Credits

Purpose:

The purpose of this Innovative Design Request (IDR) is to calculate energy savings for Drain Water Heat Recovery (DWHR) systems and provide an appropriate HERS Index score credit where these systems are properly installed in homes.

Background:

Over 35,000 DWHR units have been installed in homes in North America. Thousands of units are also in operation in commercial buildings such as multi-family residential, hotels, recreations facilities and restaurants. “IECC 2015 – Commercial” specifically provides for energy credit tradeoffs and IECC 2015 has performance requirements (e.g. maximum pressure loss) for vertically installed DWHR units. The Ontario Building Energy Code also provides for energy credit tradeoffs for DWHR and Natural Resources Canada has had credits for DWHR for more than 7 years.

Fostering innovation that reduces residential energy consumption is a key role that RESNET plays. Water heating is a large energy load in homes and its contribution to total home energy load has increased in recent years as building envelopes and mechanical systems improvements have resulted in significantly reduced energy consumption. However, Drain Water Heat Recovery (DWHR) systems have yet to be included in HERS.

Because of their longevity (50+ year life), DWHR systems are considered to be a part of the “infrastructure” of the home. For the purposes of this IDR, Drain Water Heat Recovery systems are defined as follows.

Drain Water Heat Recovery (DWHR) – The process of using warm drain water to pre-heat incoming cold freshwater. DWHR unit(s) are rated for efficiency and pressure loss according to CSA B55.1, and comply with CSA B55.2. Note: These two DWHR standards are referenced in IECC 2015.

DWHR System Minimum Requirements

To qualify for the proposed IDR, DWHR systems shall be tested and labeled in accordance with CSA B55.1-12 and installed in accordance with CSA B55.2-12. This implies that the DWHR systems are tested and installed vertically. Note that DWHR systems have not been proven for horizontal installation and there is no Standard for performance rating of horizontally installed DWHR systems. A full explanation can be provided upon request and was submitted as a public comment on Addendum A to ANSI/RESNET 301-2014.

Clauses from IECC 2015 on Drain Water Heat Recovery

A) Health, Safety and Quality Requirement:

"Drain water heat recovery units shall comply with CSA 55.2."

B) General Performance Standard Reference:

“Pressure loss and efficiency ratings of Drain Water Heat Recovery units shall be in accordance with CSA 55.1.”

C) Pressure Loss Limitations:

“Potable water-side pressure loss of drain water heat recovery units shall be less than 3 psi (20.7 kPa) for individual units connected to one or two showers. Potable water-side pressure loss of drain water heat recovery units shall be less than 2 psi (13.8 kPa) for individual units connected to three or more showers.”

DWHR HERS Index Score Credit Calculation Procedure

Until such time that DWHR system calculations have been implemented in RESNET-accredited HERS Software Tools, Certified Raters and their Quality Assurance Providers may use the following procedures to determine the HERS Index score credit for DWHR systems meeting the Minimum Requirements of this IDR.

Results data from a RESNET-accredited HERS Software Tool that does not contain DWHR calculations shall be used as input to the RESNET-approved DWHR HERS Credit Calculation Tool to determine the HERS Index score credit for DWHR systems.

For the Rated Home, the following data shall be required from the Rating Report(s):

- Name and RESNET ID of the Certified Rater
- Name and RESNET ID of the QA Provider
- Full physical address of the Rated home
- TMY city used in simulations of the Rated Home
- Annual average outdoor air temperature in °F for the TMY city used in simulations of the Rated Home
- Conditioned Floor Area (CFA) of the Rated Home
- Number of bedrooms (Nbr) of the Rated Home
- Number of conditioned floor levels, including conditioned basements, of the Rated Home
- Presence or absence of an unconditioned basement in the Rated Home
- Rated Home end use Energy Consumption (EC_x) in MBtu/y for heating, cooling, hot water, lighting, appliances and miscellaneous energy loads
- Rated Home Fuel type for heating, cooling and hot water equipment
- Rated Home Manufacturer’s Equipment Performance Rating (MEPR) for heating cooling and hot water equipment

For the HERS Reference Home, the following data shall be required from the Rating Report(s):

- Reference Home End Use Loads (REUL) for heating, cooling, hot water, lighting, appliances and miscellaneous energy loads
- Reference Home end use Energy Consumption (EC_r) for heating, cooling, hot water, lighting, appliances and miscellaneous energy loads

The following additional information on the DWHR system shall also be required

- Name of the DWHR manufacturer
- DWHR model number
- Tested DWHR Efficiency (% in accordance with CSA B55.1-12)
- DWHR installation specifications

The required data shall be entered into the approved DWHR HERS Credit Calculation Tool (download RESNET_DWHR_Tool.xlsx from RESNET web site), which will generate the DWHR HERS Index Credit Report (the Credit Report). The Credit Report shall be signed by the Certified Rater and submitted to the Rater's Quality Assurance Provider along with the standard Rating Report(s) for the Rated Home; a copy of the manufacturer's specifications (cut sheet) for the listed DWHR model number; and an executable copy of the DWHR HERS Credit Calculation Tool spreadsheet that generated the Credit Report.

The Quality Assurance Provider shall verify that the HERS Software Tool used for the Home Energy Rating does not implement DWHR system calculations, that the input values in the DWHR HERS Index Credit Calculation Tool are consistent with the Rating Reports and the manufacturer's DWHR model specifications and that the Credit Report submitted by the Certified Rater is in accordance with this IDR.

Normative References

- CSA B55.1-12, (2012). "Test method for measuring efficiency and pressure loss of drain water heat recovery units." CSA Group, Mississauga, Ontario, Canada L4W 5N6.
- CSA B55.2-12, (2012). "Drain water heat recovery units." CSA Group, Mississauga, Ontario, Canada L4W 5N6