BC Housing Recommendations – Thru Wall Heat Pump (TWHP) Design

As TWHP (Thru Wall Heat Pump) products are relatively new in the current Canadian market, there is the possibility of performance issues arising – particularly in colder climates if the construction documents are not clear and/or the installation is not properly executed on site. Thus, it is important that the Mechanical Engineer of Record (EOR) for the project is fully informed and knowledgeable about the equipment, the climate zone it is specified for and its functionality.

In an effort to mitigate design and installation issues on site and improve product performance for TWHP, **the following shall be added and specified in the mechanical design documents by the Mechanical Engineer:**

1. **Unit Specifications & Controls:**

. 1 Calculate heating/cooling load, select equipment, and specify the required size of the electric resistance heater within TWHP.

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~~. 2 Consider additional supplementary heating such as Electric Baseboard Heater (EBH) for colder climate if the specified TWHP is not capable of providing the required heat in the space. Thus, an additional level of safety during extreme weather events if the TWHP compressor were to fail.~~

. 2 For **colder climate zones in the Lower Mainland (e.g. Chilliwack, Hope, etc.)**; consider providing built-in integral electric resistance heat and/or additional auxiliary backup heating such as an Electric Baseboard Heater (EBH) if the specified TWHP is not capable of providing the required heat in the space.

. 3 For **Northern and Interior B.C.**, provide built-in integral electric resistance heat and additional auxiliary backup heating such as an Electric Baseboard Heater (EBH). Thus, an additional level of safety during extreme weather events if the TWHP were to fail.

. 4 If additional auxiliary backup heating such as an EBH is provided, consult with supplier if a multi-stage T-stat is available that can accommodate the interlock and sequence of operation between the TWHP and auxiliary heating such that there are 3 stages of heat (TWHP heating mode, built-in integral electric resistance heat and auxiliary heating) and do not run at the same time to ensure the overall electrical demand for the building is not overloaded. Also, confirm if the multi-stage T-stat interface is part of the unit or an accessory that needs to be added to the specifications. TWHP heating and cooling modes to be controllable from T-stat. TWHP controls option to be specified if available.

. 5 If a multi-stage T-stat is not available, a separate T-stat for the auxiliary heating is acceptable or a Toggle Switch between the TWHP and auxiliary heating as a last resort – avoid when possible. Ensure the Toggle Switch can accommodate the interlock and sequence of operation between the TWHP and auxiliary heating such that the TWHP (including built-in integral electric resistance heat) and auxiliary heating do not run at the same time to ensure the overall electrical demand for the building is not overloaded.

. 6 Ensure that shop drawings are correct and verify on site that the required electric resistance heater sizes are installed. TWHP power connection to be hard wired not plug-in.

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~~. 7 Clearly state the defrost temperature of the specified TWHP at the 50% Construction Document. Defrost mode for these TWHP's typically starts between 5°C to 7°C. Discuss with the Manufacturer to confirm this defrost temperature set point.~~

~~. 8 Customized Sequence of Controls specific to the project; including:~~

~~a. The specific set point temperature when heat pump mode switches to integral electric resistance heat as ambient temperature drops to avoid defrost cycle.~~

~~a. Disabling heat pump mode when integral electric resistance heat is enabled to avoid defrost cycle.~~

~~b. Interlock with supplementary EBH such that the heat pump cooling and built-in integral electric resistance heat do not occur at the same time.~~

. 7 Include Sequence of Controls in the Mechanical Specifications and a schematic is to be included in the Mechanical drawing set at 50% and IFT construction documents.

. 8 As per BC Housing requirements, remote wireless controllers are not allowed. All thermostats shall be hard-wired, wall mounted, non-programmable and easy to operate.

. 9 Confirm wire type with T-stat manufacturer (stranded or solid core), coordinate requirements with Electrical Consultant and include in specifications.

2. Condensate Drainage & Piping:

. 1 Heat tracing of the condensate drain pan as per ASHRAE 62.1 Section 5.10 & BCBC 2024 Note A-6.3.2.2.

. 2 Condensate drainage to be rigid pipe sloped at 2% minimum and drained by gravity – avoid using condensate pumps. As per BCH Design Guidelines and Construction Standards Section 4- Division 230000 – HVAC.

. 3 Condensate pipe to be c/w pipe insulation.

. 4 Condensate pipe to be installed on warm side of building insulation.

. 5 P-trap is typically not required. If a P-trap is provided for any reason, an air vent is required to prevent air locks.

. 6 If the condensate branch extends horizontally so that the fall of the pipe is greater than the diameter of the pipe; an air vent should be provided to ensure proper drainage.

. 7 Fire stopping as required as per ASHRAE 62.1 Section 5.10, BCBC 2024 Note A-6.3.2.2 & BCH Design Guidelines and Construction Standards.

. 8 A 'TWHP Condensate Drainage Detail' is to be included in the Mechanical drawing set.

. 9 Condensate pipe routing and connection to the building drainage system to be shown on plumbing drawings.

3. Airtightness, Venting & Wall Caps:

. 1 Hoods or wall caps other than what is supplied by the manufacturer. Hood or wall caps shall be primex style and/or constructed of sheet metal. Review hood pressure drop with the supplier to ensure compatibility. Also consider accumulation of snow or snow drifts around openings.

. 2 Manufacturer to supply rings/flanges for air openings at the back of the unit to minimize air leakage; contractor to install properly.

. 3 Specify insect screens and that the contractor is to supply and install. (If not included with the TWHP unit package.)

. 4 Any blockage due to the accumulation of snow or snow drifts needs to be considered. Units on lower floors may require regular clearing or additional maintenance.

4. Mock-up Requirements

. 1 Specify a site mock up of the first TWHP unit installed on site. Mock up is to be reviewed by the Supplier, Mechanical Engineer, Mechanical Contractor, General Contractor, and potentially also the Owner or Client, BC Housing, and the Architect.

. 2 Specify mock up is to incorporate the following items:

a. Ensure correct unit specified has been delivered to site. (Unit size, heating load, cooling load, built-in integral electric resistance heat load, defrost temp, operational temp is suitable for climate zone).
b. Equipment supplier to conduct a two (2) hour training session to go over the unit components, unit controls, and maintenance requirements.
c. Review of product type and installation of wall caps.
d. Review manufacturer supplied rings/flanges are installed at the back of the unit to minimize air leakage.
e. Review of condensate drainage (pipe slope, drainage test, pipe insulation, fire stopping, venting). Ensure water in the drain pan drains immediately.
f. Review of quality of installation, including air leakage check around the units and confirmation that flanges/rings around the air openings has been installed.
g. Testing of the controls and the heating and cooling mode.
h. Sign off and approval from the Supplier and Mechanical Engineer, including any items that should be rectified or improved for the mock up or future unit installations on the site.

It is important to note that the Mechanical Engineer of Record is responsible for all heating/cooling load calculations, selection and sizing of the equipment, including the controls sequence, temperature set-points and any interlocking required if the TWHP unit comes with electric resistance heat and/or supplementary EBH is provided. The Mechanical Consultant is also responsible for full coordination of the mechanical design with other disciplines such as Electrical, Architectural and Building Envelope and ensuring the above items are shown on the completed set of 50% and IFT contract documents.

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