Manitoba Hydro

Sample Heat Loss Calculation

Design conditions

Building location			
Name		Phone no.	
Address	City/town	Province	Postal code

Contractor *(contact name)*	Company	Phone no.
Year of construction	Size of house ft²	Type of house *(i.e. one storey)*
Indoor design temperature °F	Outdoor design temperature – °F	Design ΔT =
Indoor design temperature °F	Mean soil temperature – °F	Basement Δ =

Conductive heat loss (Btuh)

	Type	Net Area (ft²)	R-Value (R)	Area / R-Value (ft² / R)	Design ΔT	Heat Loss (Btuh = FT² / R x ΔT)
ABOVE GRADE WALLS						
WINDOWS						
DOORS						
HEADER						
CEILINGS						
OTHER						

Below grade basement heat loss

Linear ft of Wall (Perimeter)	Basement (ΔT)	Below Grade Heat Loss Factor (HLFbgw)	Soil Conductivity Factor (Fsc)	Below Grade Wall Heat Loss (P x ΔT x HLFbgw x Fsc)

Floor Area (ft²)	Basement (ΔT)	Below Grade Heat Loss Factor (HLFbgf)	Soil Conductivity Factor (Fsc)	Below Grade Floor Heat Loss (ft² x ΔT x HLFbgf x Fsc)

TOTAL CONDUCTIVE HEAT LOSS ▶

Infiltration heat loss

Infiltration Rate (AC/hr)	Whole House Volume (ft³)	Design ΔT	Infiltration Heat Loss (AC/hr x ft³ / 60 x ΔT x 1.08)

Ventilation heat loss

Ventilation Rate (cfm)	Design ΔT	Ventilation Heat Loss (cfm x ΔT x 1.08)

TOTAL HOUSE HEAT LOSS ▶

Available in accessible formats upon request.

Manitoba Hydro

Contractor: Below is an example of the **type** of Start-up Verification Report to be provided to the customer and Manitoba Hydro. Complete one form for each operating heat pump.

Start-up Verification Report

INSTALLATION DATE	yyyy mm dd

Owner's name		Owner's phone no.	
Owner's address	City/town	Province	Postal code
Contractor's name		Contractor's phone no.	
Contractor's address	City/town	Province	Postal code

System type

Heat pump no. or onsite label *(e.g. HP-1)*			Type of distribution system ☐ Forced air ☐ Hydronic ☐ Forced air and hydronic	
Make	Model		Serial no.	
Rated **heating** capacity Btuh @ design EWT of °F			Rated **cooling** capacity Btuh @ design EWT of °F	
Design COP	Design EER	Reynolds no.	Calculated fluid pressure drop psi	Domestic hot water load *(if applicable)* Btuh
ANTIFREEZE	Type	Freezing point °F	Concentration %	Flow constant
STATIC SOURCE LOOP PARAMETERS		Static pressure psi		Static temperature * °F

* Closed loop: Circulating fluid temperature without compressor.

Source Loop Parameters (measure after 10 mins of run time)	Heating (°F)	Cooling (°F)	Source Loop Parameters (measure after 10 mins of run time)	Heating (°F)	Cooling (°F)
Entering fluid pressure	psi	psi	Fluid temperature difference (ΔT)	(2)	(6)
Leaving fluid pressure	psi	psi	Voltage	(3) volts	(7) volts
Fluid pressure difference (ΔP)	psi	psi	Amperage	(4) amps	(8) amps
Flow rate from ΔP chart	(1) USGPM	(5) USGPM	Entering air temperature		
Entering fluid temperature			Leaving air temperature		
Leaving fluid temperature			Air temperature difference		

Heat transferred (Btuh) = USGPM x ΔT x FC

Where: USGPM = Manufacturer's USGPM rating from ΔP measured across heat exchanger
ΔT = Temperature difference across coil
FC = Flow constant *(e.g. 490 for 20% methanol/500 for water) (varies based on type and percentage of antifreeze)*

HEATING

Heat transferred = **USGPM** (1) _____ x **fluid ΔT** (2) _____ x **FC** _____ = **Btuh** _____ (A)

Power input *(watts)* = **Volts** (3) _____ x **amps** (4) _____ x 0.90 (assumed power factor) = **Watts** _____ (B)

Power input *(Btuh)* = **Watts** (B) _____ x 3.412 = _____ (C) **Btuh**

Total Btuh = **Heat transferred** (A) _____ + **Power input in Btuh** (C) _____ = Total Btuh _____ (D)

Instantaneous COP = **Total Btuh** (D) _____ / **Power input in Btuh** (C) _____ = **Instantaneous COP** _____

COOLING

Heat transferred = **USGPM** (5) _____ x **fluid ΔT** (6) _____ x **FC** _____ = **Btuh** _____ (E)

Power input *(watts)* = **Volts** (7) _____ x **amps** (8) _____ x 0.90 (assumed power factor) = **Watts** _____ (F)

Power input *(Btuh)* = **Watts** (F) _____ x 3.412 = _____ (G) **Btuh**

Total Btuh = **Heat transferred** (E) _____ – **Power input in Btuh** (G) _____ = **Total Btuh** _____ (H)

Instantaneous EER = **Total Btuh** (H) _____ / **Power input in Watts** (F) _____ = **Instantaneous EER** _____

(continued on reverse)

Geothermal Commissioning Checklist

- ☐ Copy of the Start-up Verification Report has been provided to the Owner and Manitoba Hydro
- ☐ Supply and return valves marked accordingly
- ☐ Dimensioned site plan provided to Owner *(including dimensions/locations of all piping, diameter, depths and lengths of loops, septic systems, water inlet lines, lot lines, telephone, hydro, gas, etc.)*
- ☐ Label at loop charging valve showing antifreeze type, concentration, contractor information
- ☐ Manufacturer documentation and warranty on system provided to Owner
- ☐ Inform Owner of possible effects on supply water well of open-loop systems *(water quality, quantity, etc.)*
- ☐ Bore holes grouted and sealed in accordance with approved construction practices
- ☐ All interior pipes are insulated to prevent sweating
- ☐ P/T plugs are installed as close as possible to the entering and return water ports on the cabinet
- ☐ Air filter has been installed
- ☐ Trapped condensate drain has been installed in accordance with applicable plumbing codes
- ☐ Flushing and purging ports installed
- ☐ System has been reverse flushed to remove air
- ☐ Tracer wire has been installed on all buried horizontal piping for ease of location
- ☐ System has been pressure tested per CSA and Manufacturer recommendations

Start-up Verification Report completed and signed by	yyyy mm dd
Name *(please print)*	

Note: The contractor shall review all commissioning aspects with the Owner prior to commencement of the project to clarify the level of commissioning to be completed.