Section II. Technical Requirements for Building Designers

1. Preliminary Design & DP Phases

1.1 General Access and Space Requirements

Building requirements for DE Service

The customer will provide suitable space for the installation of the DEU ETS, including space for service lines and interconnecting piping, in a mechanical room in an agreed upon location. General requirements include:

- The ETS room is to be located as close as possible to the DEU branch pipeline entering the building – generally on an exterior wall in the basement or ground floor of the building. The DEU will provide a drawing showing the location of the branch line for coordination purposes.
- The ETS room shall be ventilated and maintained at a temperature between 15°C and 35°C.
- A floor drain connected to the sanitary sewer system shall be provided in the ETS room, as well as a domestic water source.
- A dedicated 15A 120V electrical service, with a lockable breaker, is required to power the ETS control panel; connected to emergency power service, if available.
- Double doors access into the mechanical room must be maintained at a minimum of 1.5 metres (5 feet) wide to allow entry of the ETS equipment and piping.
- Access for ETS equipment must be allowed for through corridors to the double doors of the mechanical room.
- The footprint of an ETS depends on a number of factors, including customer load, number of heat exchangers, configuration of the hydronic heating and DHW systems, and specific restrictions within the customer building. An ETS sized to serve the typical range of multi-unit residential buildings expected in RD requires between 6 and 12 m^2 of floor space, with a minimum ceiling height of 2.7 m (~9 ft). This area includes access and maintenance space. The size, number of heat exchangers and general configuration impact the overall footprint of the ETS.
- A concrete housekeeping pad of the required size, on which the ETS heat exchangers will be installed. DEU will provide a housekeeping pad layout drawing with locations and dimensions during the detailed design stage. The DEU has the option of prefabricating the ETS off site on a skid. In this case, the housekeeping pad would not be required. This will be determined at the detail design stage on a building-by-building basis.
- Allowance should be made in the customer building automation system (BAS), if applicable, to provide heating pump on/off status to the ETS control panel. If a BAS is not planned for the building then the DEU will directly monitor the heating pump on/off status via a hardwire connection. As well, one 20 mm (3/4”) electrical metallic tubing (EMT) conduit from the ETS room to a north facing exterior wall may be required for the outdoor air temperature sensor wiring, to be determined at the detail design stage.
- The customer is responsible for the DEU service line building or foundation penetration, which meets the requirements of the DEU (size of opening, etc), in a mutually agreeable location. The DEU will produce the required penetration drawing during the detailed design stage. The penetration may be a core drill (after the foundation is poured) or a sleeve installed prior to foundation pouring. The DEU will install and maintain the service line and seal the opening

between the pipe and the core drill or sleeve. If a sleeve is installed the customer is responsible for maintaining the seal between the building structure and the sleeve.

- The DEU will install one or more plastic (PVC or PE) conduits into the customer building for remote communication with the ETS. Communication allows for remote controls and monitoring of the ETS, as well as remote reading of the energy meter. The customer is also responsible for providing the penetration(s) for communication conduit(s).

The DEU requires uninterrupted access to the ETS and service line within a customer's building for installation, regular maintenance and repairs. This will be defined by an easement.

1.2 Heating Systems – Strategies and Requirements

The following table identifies the key elements or strategies that should be followed when designing the building heating system.

Strategy
Centralized Hydronic System
Low[1] Supply Temperatures
Large Temperature Differentials
Variable Flow with Variable Frequency Drives
Two-Way Control Valves
Seasonal Reset of Supply Temperatures
Return Temperature Limiting
Hybrid heat pumps

1.2.1 Pumping and Control Strategy

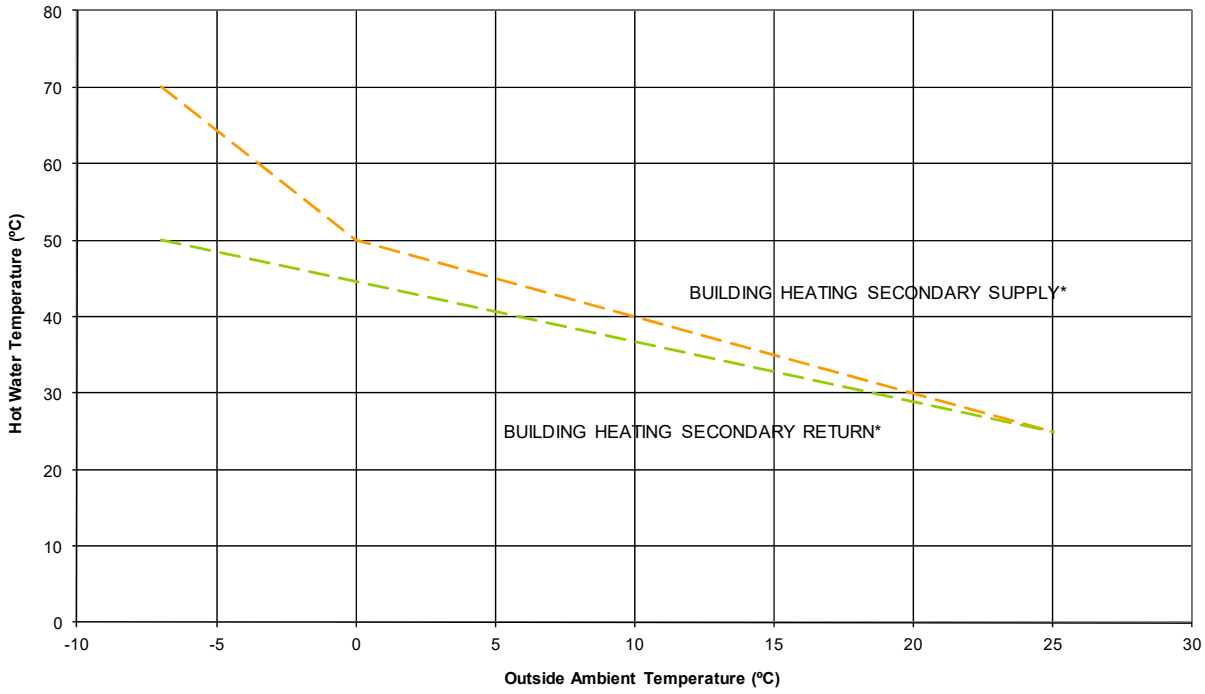
The building hydronic heating system shall be designed to maximize ΔT and minimize hot water return temperatures over all load conditions.

The building heating system shall be designed for variable hydronic flow, using 2-way control valves at all terminal units. When necessary 3-way mixing valves at terminal units may be used strategically. Bypass valves (e.g. 3-way diverting valves) are not permitted.

1.2.2 Hydronic Heating & DHW Systems (Minimum) Requirements

The ETS controls the supply water temperature to the building heating circuit based on an outside air temperature reset schedule. This is the maximum temperature available to the building. A sample hydronic heating circuit supply and return temperature reset curve is shown in Figure 2.

Figure 2: Typical Building Space Heating Temperature Reset Curve for Vancouver



* - Space heating only, direct primary DHW heating with Max. 60ºC DHWS.

Hydronic Space Heating

The hydronic heating system will be designed to provide **all** space heating and ventilation air heating requirements (as applicable) for the whole building; supplied from a central ETS. Gas-fired or electric resistance heating or ventilation equipment (roof top units, air handling units, electric coils, electric baseboards etc.) are not permitted. The use of vapour compressors (or conventional heat pumps) or VRFs to provide heating are not acceptable. Alternatives such as hybrid heat pumps, four-pipe radiators, four-pipe fan-coils, or VAV are preferred.

Hot water generated by the ETS shall be distributed, via a 2-pipe system, to the various heating elements (terminal units) throughout the building. The building heating system **must** be designed as specified below.

Table 1 - Hydronic Space Heating System (Building Side) Design Criteria

Description	Peak Winter	Summer
Supply Temperature, **Max.**	70°C (158°F)	45°C (113°F)
Return Temperature, **Max.**	50°C (122°F)	40°C (104°F)
Min. Difference (Δ T)	20°C (36°F)	5°C (9°F)
Design Pressure (Max)	1,600 kPag (232 psig)	

The specified differential temperature (ΔT) shall be regarded as a minimum requirement, and larger ΔT or lower return temperatures are desirable. The building return temperatures shall be as low as possible to allow the DEU to take advantage of alternate technologies.

Specific types of heating systems (i.e. terminal units) can operate at lower temperatures. The terminal units shall be selected based on temperatures as low as can be reasonably expected for commercially available products.

The table below outlines the **maximum** hot water supply (HWS) & hot water return (HWR) temperatures, for which terminal units shall be designed and selected.

Table 2 – Terminal Unit Design Criteria

Type of Terminal Unit	Maximum HWS	Maximum HWR
Radiant in-floor heating	49°C (120°F)	38°C (100°F)
Perimeter radiation system	70°C (158°F)	50°C (122°F)
Fan coil units & reheat coils[2]	70°C (158°F)	50°C (122°F)
Air handling pre-heat coils[3]	65°C (149°F)	45°C (113°F)

Domestic Hot Water

The Domestic Hot Water (DHW) system shall be designed to provide all DHW requirements for the building, supplied from a dedicated DHW heat exchanger from the ETS in the building. It is understood that DHW systems configured with storage must operate at 60°C (140°F) to minimize potential bacteria growth, and the utility is able to supply this temperature to all buildings at all times.

The building domestic hot water heating system **must** be designed as specified below.

Table 3 – Domestic Hot Water Heating System (Building Side) Design Temperatures

Description	Winter	Summer
Supply Temperature (with storage), **Max**.	60°C (140°F)	60°C (140°F)
Supply Temperature (no storage), **Max**.	55°C (131°F)	55°C (131°F)

DHW systems shall be designed in a fully instantaneous, or if required, semi-instantaneous configuration. **All** domestic cold water (DCW) for the DHW system should enter immediately before the DEU heat exchanger.

In a semi-instantaneous system, the storage capacity is small. In such a system, storage tanks act as "buffer tanks" only; and there is no recirculation from DHW storage tanks directly back to the heat exchanger. This configuration requires 60°C (140°F) supply temperature.

1.2.3 Cooling in Customer Buildings

The DEU will provide heating only (i.e. district heating); customers are responsible for any cooling systems they choose to employ.

1.2.4 Supplemental Heat Sources

Some customers may prefer to supplement the DEU with alternative energy sources. These will be reviewed on a case by case basis. Generally, solar heating systems are acceptable, as is heat recovery from cooling or other waste heat sources in the building.

2. Working Drawings / BP Phase

Following guidelines above, submit Attachment A alongside 50% architectural and mechanical drawings (Submission timing: as soon as 50% drawings are available).

3. Construction Phase

3.1 Hydronic Heating Water Quality & Expansion

Building owners are responsible for filling and managing their own building hot water heating system. The DEU requires that the water treatment for the building system meet the minimum criteria set forth below:

- Chloride: < 30 ppm
- Nitrate: < 5%
- Hardness: < 2 ppm
- pH Level: 9.5 – 10
- Iron < 1 ppm

The customer will employ the services of a water treatment sub-contractor to provide the necessary chemicals, materials and supervision for a complete cleaning and flushing of all piping to the ETS demarcation point.

Upon request by the customer, and with suitable compensation, the ongoing water quality may be maintained by the DEU.

Building owners will manage the expansion of the water in their own hot water system.

3.2 Commissioning

RDE will require one (9) months' notice, before system start-up and heating is required by the customer building to complete the DE commissioning process.

System start-up and commissioning will only occur after acceptable water quality analysis results have been obtained. **Certification from the water treatment contractor verifying that the water quality is adequate is required before the customer can flow water through the ETS.**

The DEU personnel, together with the building operator, will start and commission the ETS. Commissioning includes verifying measurement points and testing the controls under various operating modes. During commissioning, the building operator is responsible for the building's internal hot water system.

3.3 Changes to the Building System

The Customer shall not materially change the design or substitute any pertinent equipment during the installation without approval from the DEU. Use Attachment B to request approval for changes affecting the district energy system. (Submission timing: as soon as a deviation from the technical review approval is contemplated)

The ETS is owned and maintained by the DEU. Under no circumstances can the customer, or any of its contractors, adjust, modify or otherwise tamper with any ETS equipment. This includes adjusting or changing the position of any valves, gauges or instruments and altering the controls and control panel.

When the project site is ready for ETS installation, submit Attachment C to request an energization date. In order to avoid installation delays, ensure all items in the checklist are complete. Allow 2 weeks to process request and confirm energization date.

4. (Leading up to) Occupancy Phase

As a condition to release occupancy holds, RDE requires building designers to Sign off the attached Professional Assurance Letter (Attachment D).

ATTACHMENTS

Attachment A

Building Side System Design Summary: Submit this form as soon as 50% Arch, Mech and Elec drawings are available.

Basic Building Information		
Customer Building Name: Address:		
Heated Building Area [in sq. metres]:	Residential: Commercial: Amenities: Parkade:	
Number of suites	Residential: Commercial:	
Building Side Mechanical Statistics	**Space Heating**	**Domestic Hot Water**
Design Supply Temperature (°C)		
Design Return Temperature (°C)		
Design Pressure		
Peak Thermal Demand (kW)	Residential:	Residential:
	Commercial:	Commercial:
	Other:	Other:

Thermal Energy Expected (kWh/m^2)	Residential:	Residential:
	Commercial:	Commercial:
	Other:	Other:

Attachment B

Equipment Change Review: Submit this form if relevant equipment approved in the Peer Review process is changing. RDE reserves its right to reject changes that might materially affect the district energy system's performance.

This form should be submitted for proposed changes to **any** of the following. Check the relevant items to be considered for changes:

- ❑ Overall System Configuration (Mechanical Schematic) including changes in control strategy, pumping, and piping.
- ❑ Building domestic hot water or space heating Pumps
- ❑ Terminal Units (Fan-coils, heat pumps, AHUs, etc. identify changes in unit type, or design temperatures or pressures)
- ❑ DHW Storage Tanks (addition or deletion, modification of connections, change in size)
- ❑ Other: _____ - This includes any other changes from the information reviewed and accepted in the peer review.

Description of change:

Attach to this form the following:

1. Revised system schematics
2. Equipment specification/selection

Attachment C

Energization Request: Submit this Checklist to request energization.

Energization Checklist	PM Initial	Comments
Supply of one dedicated 15 amp 120V, 60 Hz, single-phase electrical service from local panel (c/w lockable breaker switch) inside the ETS room has been provided.		
All building side pipework, valves, strainers, hangers, supports and pumps are correctly installed and complete.		
Pressure tests have been carried out and results recorded.		
Cleaning and flushing completed and letters of completion shared with RDE. (Attach to energization request)		
Space heating and domestic hot water systems are signed off for start-up by Engineer. (Attach sign off to energization request)		
Space heating and domestic hot water systems are full of water and ready for start-up.		
Pumps are ready for operation.		
Terminal heating units are ready to accept heat.		

Request to Energize **the week of*** _____ (dd-mm-yyyy).

Per Project Manager or Authorized signatory:

_____ (Signature)

_____ (Name, Title)

_____ (Date)

***Note:** Submit this form at least 3 weeks prior to desired energization date.

Attachment D

Professional Assurance Letter: Submit this document prior to Occupancy Letter Request

Compatibility Checklist	Eng. Initial	Comments
Heating system is fully hydronic.		
Heating loads are 100% served by hydronic system.		
Is there any gas-fired or electric heat generation equipment installed within building.		
Does the thermal energy provided by this equipment represent less than 1% of the building total thermal energy.		
Types of heating terminal units align with those reviewed in the peer review or have been submitted and approved via an equipment change review.		Describe types of terminal units:
Space provided for Energy Transfer Station is as per the peer review.		Outline location and sq. meters:
Heating system is compatible with district energy supply/return temperatures (Max 70°C supply and max 50°C return).		
Heating system is designed to minimize return temperatures.		
DHW configuration aligns with the peer review or an approved equipment change request.		DHW configured as: _____ Choose from instantaneous, semi-instantaneous, or charging.
Heating system is designed for fully variable flow with 2-way control.		
Heating system is designed with outdoor air temperature reset strategy that is approved by RDE. Describe reset curve temperatures under comments.		

Certification:

I certify that I am a registered professional as defined in the BC Building Code.

Registered Professional of Record's Name (Print)

Address

Phone No.

Date

Professional's Seal, Signature & Date

DE Utility review by: _____

Date: _____