

# STANDATA bulletin 20-PCB-002/20-GCB-016(REV4)

## Plumbing and Gas

### Requirements for combination heating systems

Date Issued: April 2023

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#### Purpose

This bulletin informs industry of the requirements associated with the sale and installation of dual-purpose water heaters. The CSA Group's gas water heater standards indicate water heaters are certified for use with either potable water only or potable water and space heating (dual-purpose). They must not be used for space heating alone. Therefore, suppliers and installers are reminded that dual-purpose water heaters must be certified and marked "Suitable for Water (Potable) Heating and Space Heating" and can be utilized for either:

- (a) conventional domestic water (potable) heating only; or
- (b) a combination water (potable) heating and space-heating application.

#### Discussion

The certification and installation of these units require:

- (a) all piping, components and heat-transfer devices in contact with the potable water must be intended for use in potable water systems;
- (b) toxic chemicals, such as those used for boiler treatment, must not be introduced into the potable water used for space heating;
- (c) a water heater that will be used to supply potable water must not be connected to any heating system or component(s) previously used with a non-potable water heating appliance; and
- (d) when the system requires water for space heating at temperatures higher than required for other uses, a means such as a mixing valve, listed to CSA B125.3 Plumbing Fittings standard, must be installed to temper the potable water for those uses in order to reduce scald hazard potential.

All combination heating systems must be installed in accordance with the attached guidelines, and no modification should be made to the temperature and pressure relief valve(s), gas controls, or other operating components of a certified dual-purpose water heater.

Issued by the Provincial Plumbing and Gas Administrator

[Original signed]

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The installer is responsible for ensuring the water heater is installed in accordance with the applicable codes and standards to serve both the potable hot water application(s) and space heating application(s) for which it is intended. For further guidance or advice, check with your local authority having jurisdiction for the applicable building code requirements on hydronic heating systems, including radiant floor systems.

## COMBINATION POTABLE WATER / SPACE HEATING GUIDELINES

These systems consist of a certified dual-purpose storage type or a certified instantaneous potable water heater used with a fan coil heating system, baseboard system, and/or a radiant slab heating system; and are intended for space heating applications of no more than 75,000 Btu/h.

### 1 Definition:

**Certified** - (with respect to any appliance, accessory, component, equipment, or manufacturer's installation instructions) investigated and identified by a designated testing organization as conforming to recognized standards, requirements or accepted test reports.

**Combination Heating System** - an integrated installation that supplies hot water to both the potable hot water system and space-heating system of a building. The integrated installation must serve at least one plumbing fixture that will utilize hot water during normal daily usage.

**Potable** - safe for human consumption.

**Water Heater** - a vessel in which water is heated and withdrawn for use external to the vessel, including all controls and devices necessary to prevent water temperature from exceeding 99°C (210°F).

### 2 Compliance:

- 2.1 Personnel performing installation, operation, and maintenance work must be properly trained in a manner acceptable to the Building, Fire, Plumbing, and Gas Administrators, and all work must be done in a skillful, thorough manner.
- 2.2 All solders, brazing materials, fluxes, and any chemicals introduced to a Combination Heating System must be approved for use with potable water.
- 2.3 All components in the Combination Heating System or on the potable water side of a heat exchanger must have a design pressure of no less than 1035 kPa (150 psi) and must be able to withstand a continuous water temperature of 71°C (160°F) and a short-term exposure of 99°C (210°F).
- 2.4 Where the static pressure may exceed 550 kPa (80 psi), a pressure-reducing valve must be installed that conforms to CSA Standard B356 on the water distribution system in accordance with the National Plumbing Code of Canada.
- 2.5 Where a hot water supply is required in a building, the hot water tank must be set to provide an adequate supply of service water with a temperature range from 45°C (113°F) to 60°C (140°F).
- 2.6 The velocity of the water through the Combination Heating System must not exceed 1200 mm (4 feet) per second for temperatures up to 60°C (140°F), 900 mm (3 feet) per second for temperatures exceeding 60°C (140°F).

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- 2.7** An automatic means must be provided to prevent the stagnation of potable water in a hydronic heating system by cycling or flushing the contents not less than once every 24 hours for a minimum duration of 5 minutes.
- 2.8** To reduce the probability of contamination of the potable water system, all piping and components must be thoroughly flushed and cleaned before the Combination Heating System is put into operation.
- 2.9** The installers must instruct the user in the safe and correct operation of all appliances or equipment they install.
- 2.10** The installers must ensure the manufacturer's instructions supplied with the Combination Heating System are left with the user.

### 3 Design & Installation Considerations

The space heating portions of the Combination Heating System must be designed and installed in a manner similar to a conventional hydronic heating system, since the design and installation principles are equivalent.

- 3.1** When a Combination Heating System is installed, the space-heating portion of the system must be sized and installed to comply with the National Building Code – Alberta Edition.
- 3.2** A Combination Heating System must meet the requirements of the CSA B214 Installation Code for Hydronic Heating Systems.
- 3.3** When the total space heating load served by the hydronic heating system does not exceed 21 980 W (75 000 Btu/h), a single storage-type dual-purpose water heater may be used for combined space and domestic water heating purposes.
- 3.4** Multiple storage-type dual-purpose water heaters must not be used to accommodate space-heating loads exceeding the 21 980 W (75 000 Btu/h) limits of the hydronic heating system.
- 3.5** A Combination Heating System with a bottom feed must be installed or equipped with an anti-siphonage device listed to CSA B64. This provides low water protection in the event of a leak in any portion of the circulating system that is located below the heater.

### 4 Selected Reference Publications:

#### NBC-AE

- National Building Code – Alberta Edition
- American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc Handbook of Fundamentals, Residential/Nonresidential Cooling and Heating Load Calculations.
- Handbook of HVAC Applications, Service Water Heating
- Standard 90.1, Energy Standard for Buildings Except Low-rise Residential Buildings
- Standard 90.2, Energy-Efficiency Design of Low-rise Residential Buildings

#### CSA

- B149.1 Natural gas and propane installation code
- B214 Installation code for hydronic heating systems

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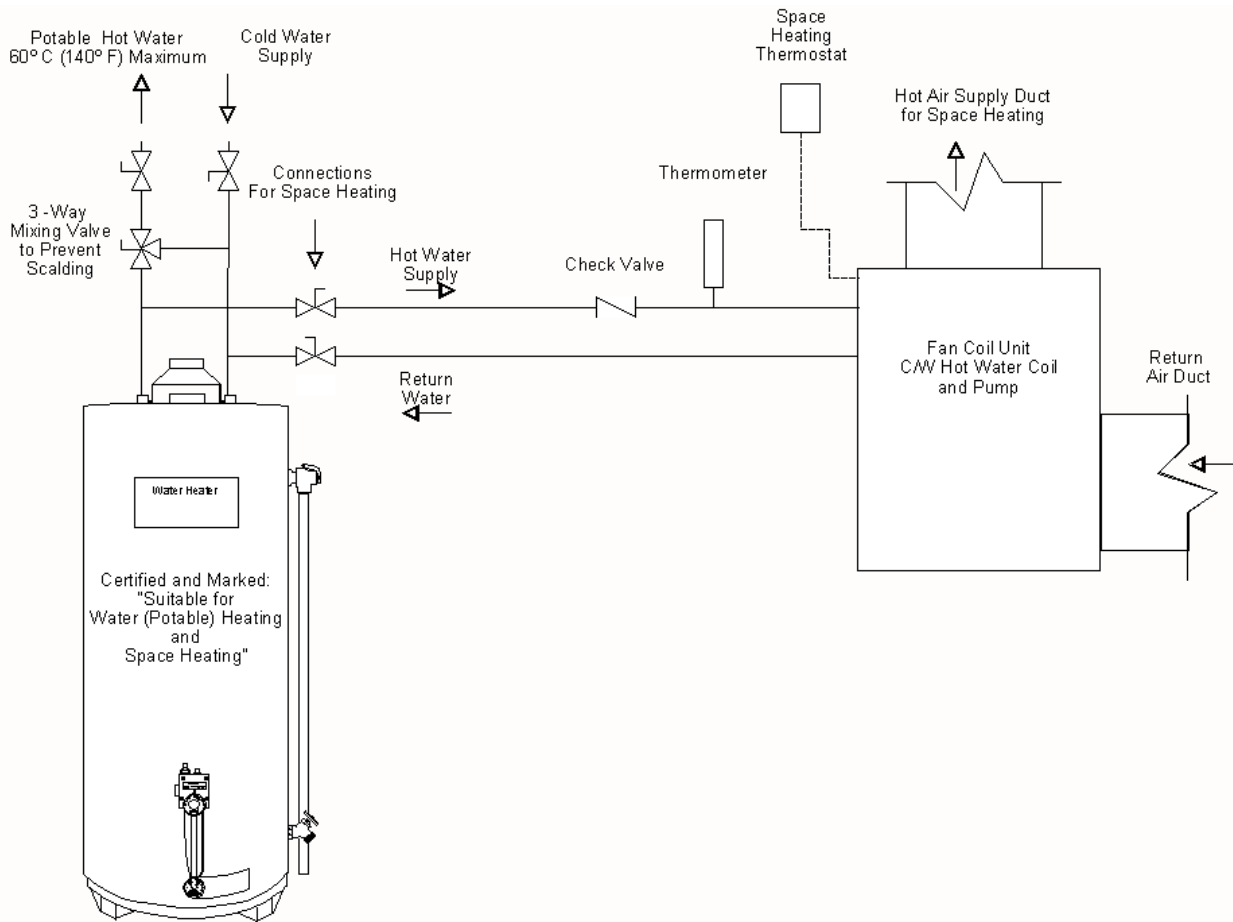
- National Plumbing Code of Canada

**Standata**

- Building code Interpretation/Plumbing safety information bulletin 19-BCI-011/20-PCB-011Hydronic Heating Systems.
- Plumbing Safety Information Bulletin 20-PCB-004 Single Wall Heat Exchangers

**Appendix A Typical Drawings (Not to be used as design drawings)**

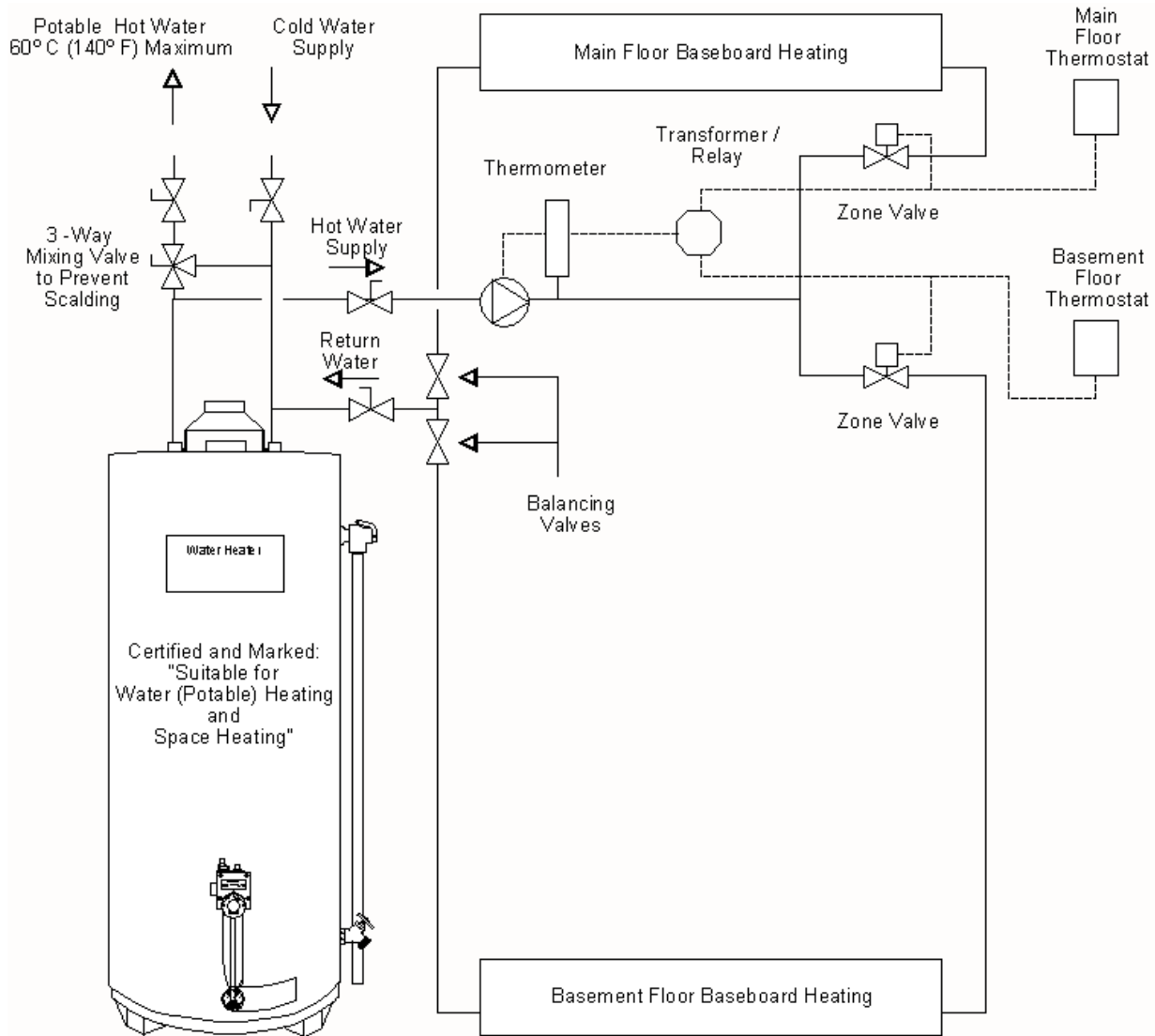
**Figure A.1** Combination (Combo) Fan Coil Heating System with a dual-purpose Water Heater



**Notes:**

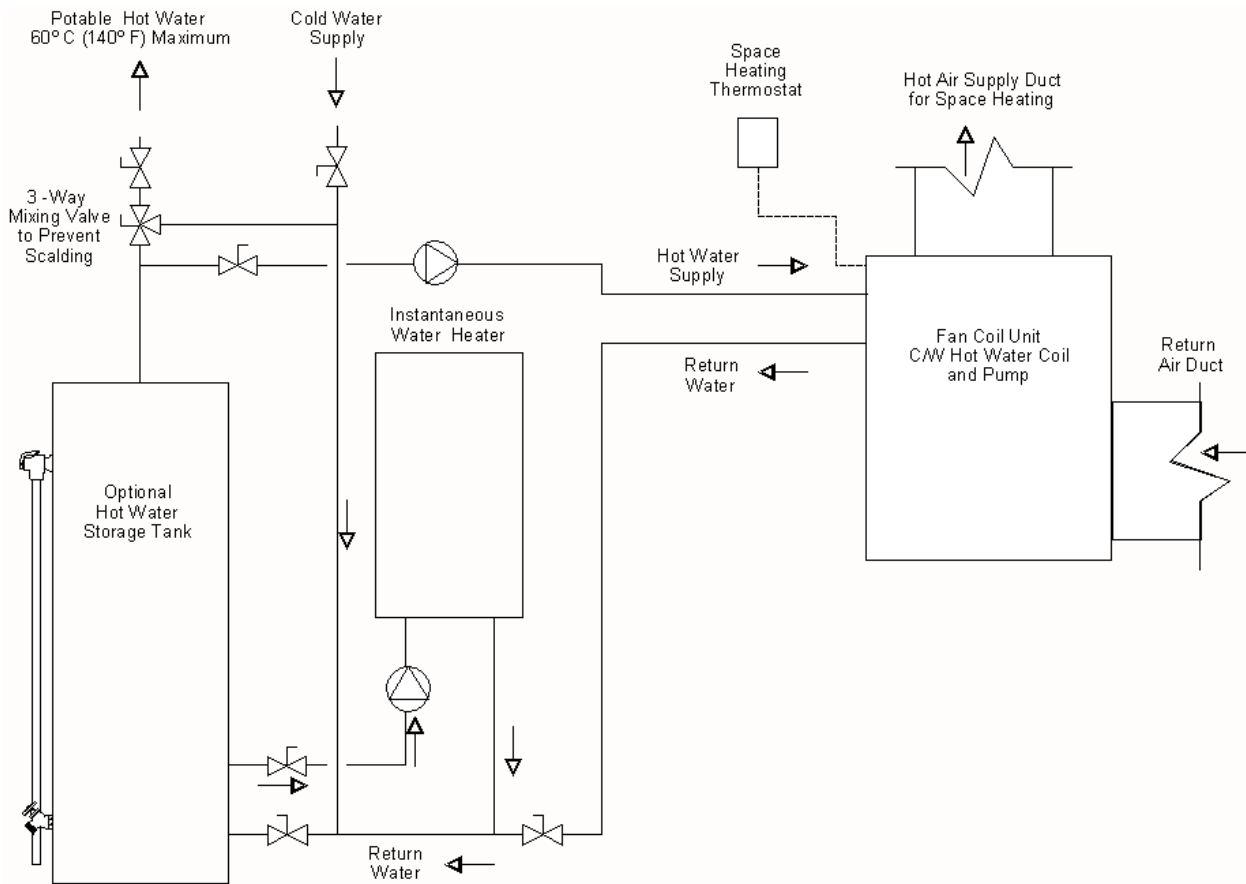
1. All equipment, components, and piping in contact with potable water to be approved for potable water systems.
2. Hydronic space heating systems must have input from a qualified designer (See Building Standata 19-BCI-011)

**Figure A.2** Dual-purpose (Combo) Water Heater with Hydronic Baseboard Single or Multiple Zone System



**Figure A.3** Combination (Combo) Fan Coil Heating System with Instantaneous Type Water Heater

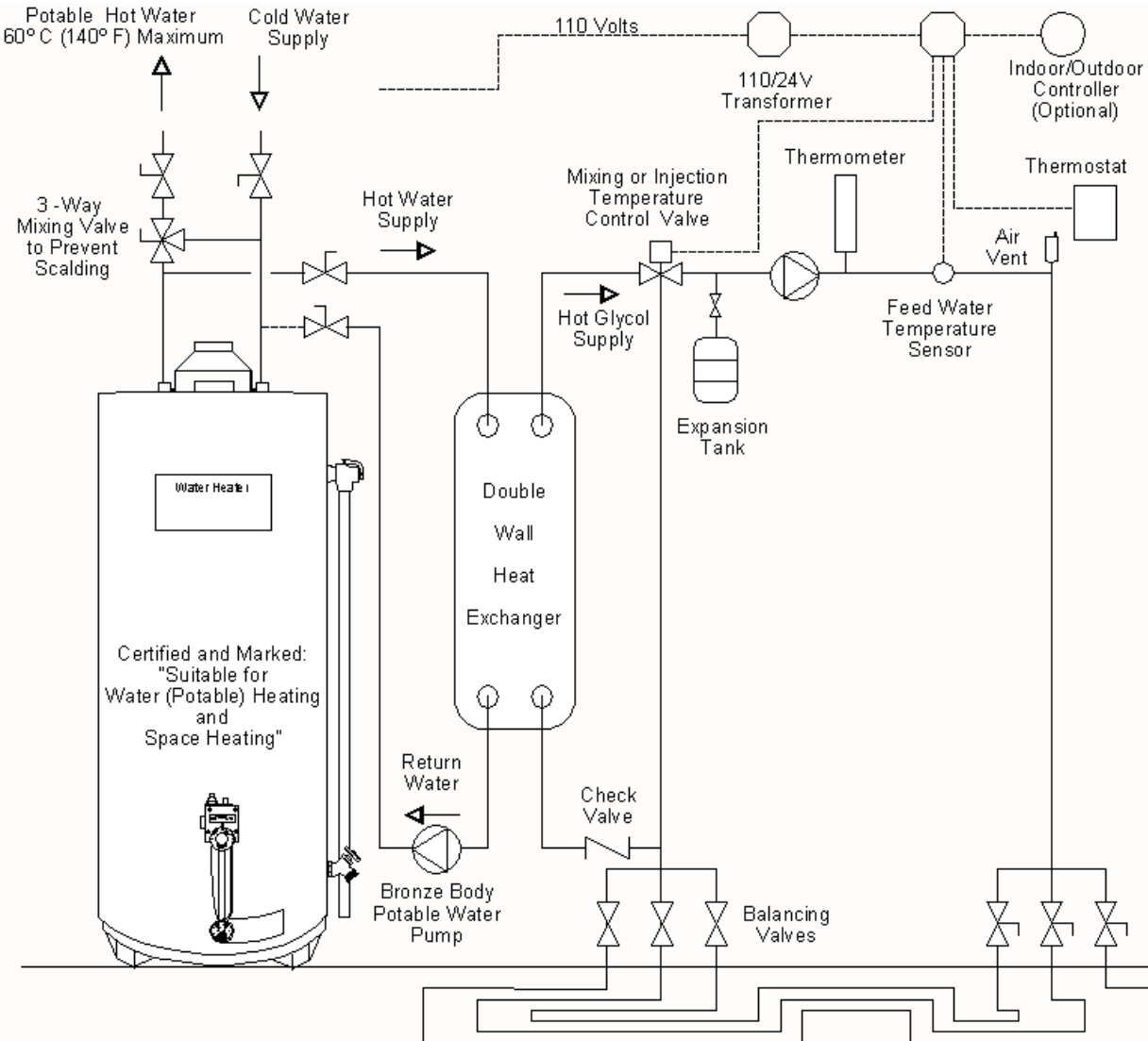
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1. Instantaneous hot water heaters and components must be installed in accordance with the manufacturer's installation instructions.
2. Hydronic space heating systems must have input from a qualified designer.

(See Building Standata 19-BCI-011)

**Figure A.4** Dual-purpose (Combo) Water Heater with an in floor heating system must be equipped with a heat exchanger to separate the potable water from the heat transfer fluid.



1. Toxic Heat transfer fluids must be separated from the potable water using atmospherically vented double wall heat exchangers or equivalent protection.
2. Single wall heat exchangers may be installed when the heat transfer fluid is Non-toxic and the installation must comply with Standata 20-PCB-004.
3. Radiant floor heating systems must have input from a qualified designer.

(See Building Standata 19-BCI-011)



**Appendix B** Background on Combination (combo) Heating Systems:

These systems were introduced in the early 1990s by the heating industry to provide supplementary space heating in areas with poor circulation and for small heating applications as an alternative to a primary heating system.

The trend to build more energy efficient housing in the late 1980s resulted in a significant decrease in the space-heating load. The combination heating systems provided designers with additional flexibility in the design of space heating and water heating in R2000 dwellings. With a single gas-fired appliance being utilized for both space heating and potable hot water, gas installation was simplified.

**Applicable Codes:**

## 1. National Plumbing Code of Canada (NPC)

The NPC covers the materials, piping, allowable pressures, water temperature, and protection from contamination relating to the application of combination heating systems.

- All piping, fittings, heat exchangers, baseboards, and circulating pumps in contact with potable water must be made of approved materials and suitable for use with potable water.
- Operation of a water system at pressures above 550 kPa (80 psi) will accelerate deterioration of the system and could create a health risk due to splashing and potential scalding.
- If the space-heating water system requires water with a temperature in excess of 60°C (140°F), a mixing valve or other means must be installed in the potable hot water supply to temper the water to reduce scald hazard potential.
- Do not introduce toxic chemicals such as those used for boiler treatment. Potable water systems must be protected from all sources of contamination to reduce the probability of creating an unsafe potable water supply.

## 2. National Building Code - Alberta Edition (NBC-AE) -CSA B214 by reference

The NBC-AE will cover the systems designed to provide the primary means of space heating for a structure as part of a combination heating system.

- Calculating the heat loss of the structure.
- Sizing of the air handler/baseboard/radiant slab based on water temperature.
- Sizing of the water heater that will meet the requirements for the space heating application and the domestic hot water system.
- Natural gas and propane installation code CAN/CSA-B149.1.
- The B149.1 covers the gas supply piping or tubing system, installation of the gas-fired water heaters, venting, and combustion air supply.
- The appliance, accessory, component, equipment, or material used in an installation must be of a type and rating approved for the specific purpose for which it is employed.
- The water heaters must be certified and marked "Suitable for Water (Potable) Heating and Space Heating."
- Isolating or rendering inoperative a safety shut-off, safety limit control, or relief valve is prohibited.

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