NRC Canadian Codes Centre

2011 National Energy Code for Buildings (NECB) — Service Water Heating

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Canada

Introduction

- Presentation is part of a series of seven
- Model code developed by Canadian Commission on Building and Fire Codes
- Must be adopted by provincial/territorial authorities to become law

Outline

- Scope and compliance
- Prescriptive requirement
  - Equipment
  - Piping and storage tank insulation
  - Controls
- Trade-off path
- Performance path

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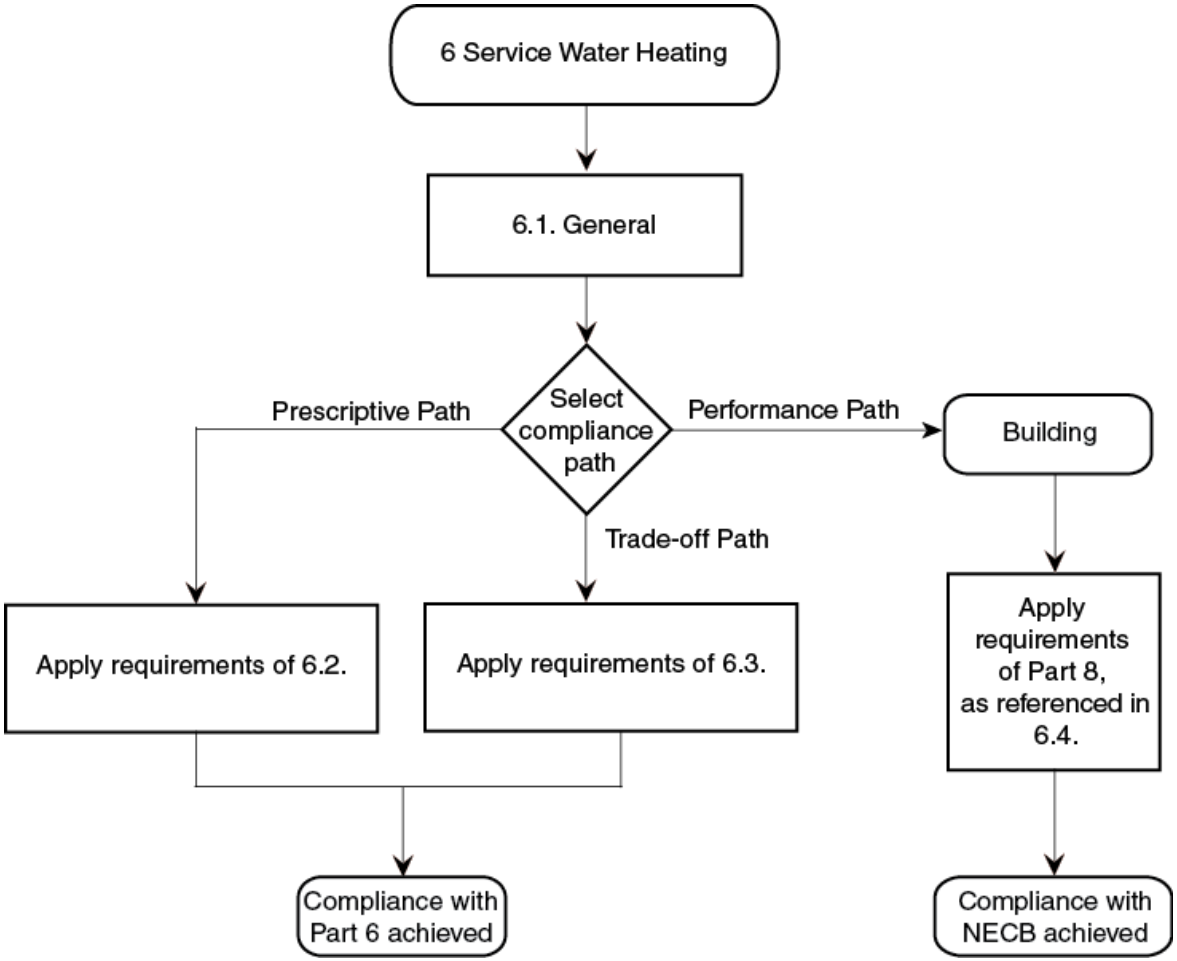
Scope

- Addresses service water heating (SWH)
  - Heating equipment
  - Piping insulation
  - Controls
  - Hot water discharge flow

"*Service water means water for plumbing services, excluding systems exclusively for space heating or cooling or for processes*"

Compliance path

- Prescriptive
- Trade-off path
- Performance path



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Equipment minimum performance efficiency

- Requirement set to current practice at median of sales
- Trade-off path introduced

Other equipment requirements

- Combination space and SWH
  - Load < 22 kW or input < 2x design service water load
  - Greater of the space and SWH requirements efficiency
- Space heating equipment used for indirect SWH
  - Greater of the space and SWH requirements efficiency
- Equipment installed outdoors
  - Designated for such installation

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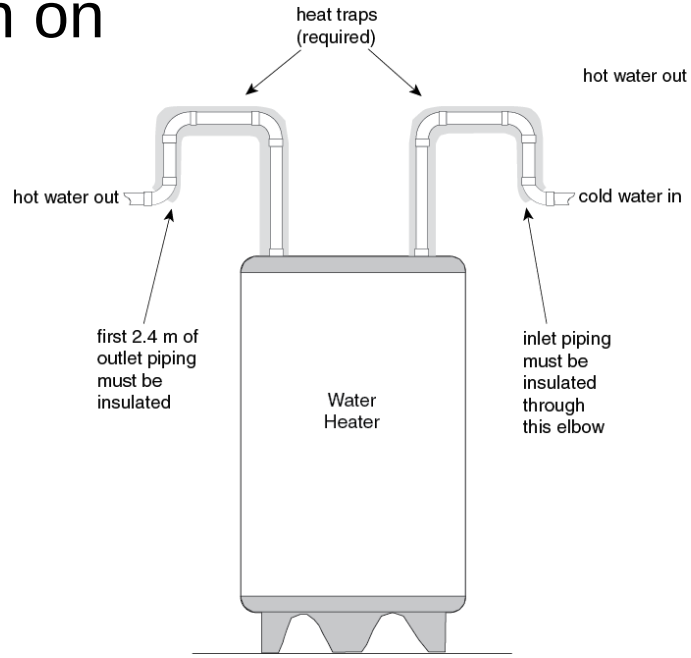
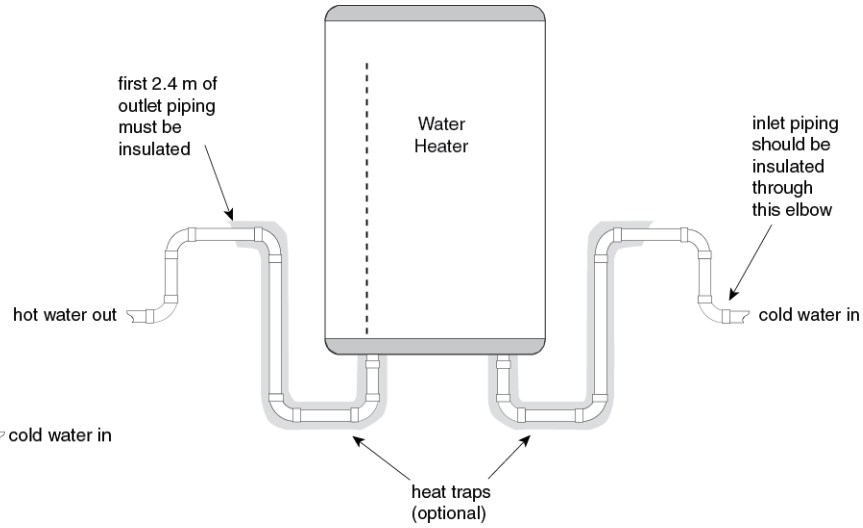
Piping insulation

- Insulation requirement based on fluid temperature
  - For non-circulating system with heat traps
    - Only piping between storage vessel tank and heat trap
    - Only first 2.4 m of outlet downstream of heat trap

Placement

- Clarification on heat traps requirements and location of insulation on runouts





Storage tank insulation

- Protection from mechanical damage required
- Unless covered by equipment efficiency standard, 0.45 W/(m^2•K) required

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Controls

- Systems with storage tanks
  - Automatic temperature control
- Controls for heat maintaining system required
  - Expanded to all energy sources
- Seasonal shutdown controls required
  - Expanded to all energy sources

More than one end-use temperature

- Booster heater
  - For system with 50% total design flow below 60˚C

Showers and lavatories

- Limit flow:
  - 9.5 L/min for showers
  - 8.3 L/min for lavatories
- Automatic shut-off valves in assembly occupancy spaces (stadiums, theatres, etc.)

Pools

- If heated, covers required
  - Must cover 90% of surface area
  - Not greater than 0.48 W/(m^2•°C) if temperature greater than 32°C
  - Requirement removed for indoor pools
- Shut-off controls on pool pumps and heaters

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Trade-off concept

Trade-off concept

- System efficiency approach considers SWH system as a whole
- Allows improvement in other system parts to compensate for one component not meeting a prescriptive requirement

Total **proposed** system efficiency $\geq$ Total **reference** system efficiency

Components considered

- Factors considered
  - Heat generator equipment efficiency
  - Tank insulation value
  - Piping insulation value
  - Pump motor efficiency
  - Pump efficiency
  - Heat recovery
  - Average flow of faucets and showers
  - Ratio of showers to faucets

Systems considered

- Comparison: system to same system
- Three system types:
  - Tank
  - Instantaneous
  - Originating from space heating boiler

Method

- Parameters entered into equation for system
  - Example: tank system

$$SHW - TOI = 2.813 \bullet \left\{ \begin{array}{l} \dfrac{2.813 \bullet PDR}{\mathrm{ToV}_1} \bullet \left\{ 1 - 0.6514 \bullet \mathrm{ToV}_6 \bullet e^{-0.312 \bullet \mathrm{ToV}_6} \right\} \\ \qquad + 0.06153 \bullet \left(\dfrac{A_{norm}}{\mathrm{ToV}_2} + \dfrac{26.180}{\mathrm{ToV}_3} \right) + \dfrac{0.00677}{\mathrm{ToV}_4 \bullet \mathrm{ToV}_5} \end{array} \right\}^{-1}$$

$$- 2.813 \bullet \left\{ \frac{2.813}{\eta_{ref}} + 0.06153 \bullet \left(\frac{A_{norm}}{12.4} + 6.807 \right) + 0.0141 \right\}^{-1}$$

- System complies if SWH-TOI > 0

Trade-off limitations

- Energy sources used must be natural gas, propane, oil or electricity
- Back-up equipment must meet prescriptive requirements
- One of the 3 “traditional” systems

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Performance limitation

- Equipment performance efficiency cannot be reduced below those of EEA regulations
- Back-up equipment must comply with prescriptive path

Questions?

www.nationalcodes.nrc.gc.ca

Thank you