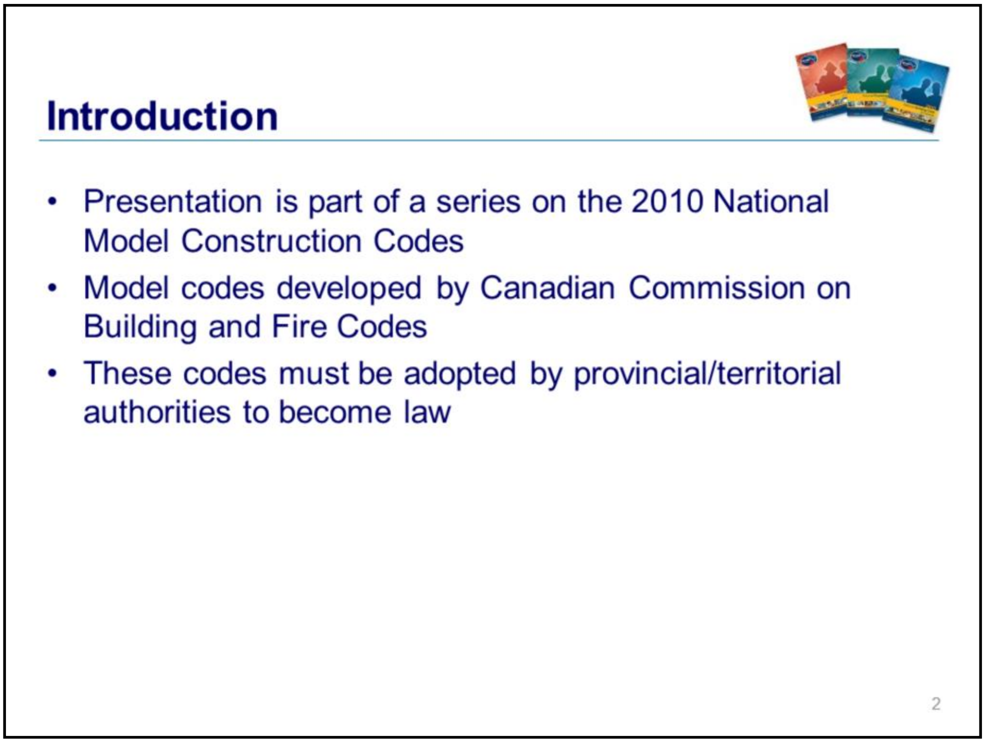

Welcome

My name is ###########

The major topics of this presentation are the changes to the heating, ventilating and air-conditioning provisions in Part 6 of the National Building Code of Canada and the plumbing provisions in the National Plumbing Code of Canada.




This Presentation is part of a series of 13
on the 2010 National Model Construction Codes.

It is important to note that the model codes, which are developed
by the Canadian Commission on Building and Fire Codes
must be adopted by provincial/territorial authorities to become law.

This may mean that code requirements enacted by legislation within your province or territory might differ from what is presented here.

Please check with your local authority.

## HVAC Overview – NBC Part 6

- Two substantive changes
  - Acceptable air for ventilation
  - Venting of laundry drying appliances

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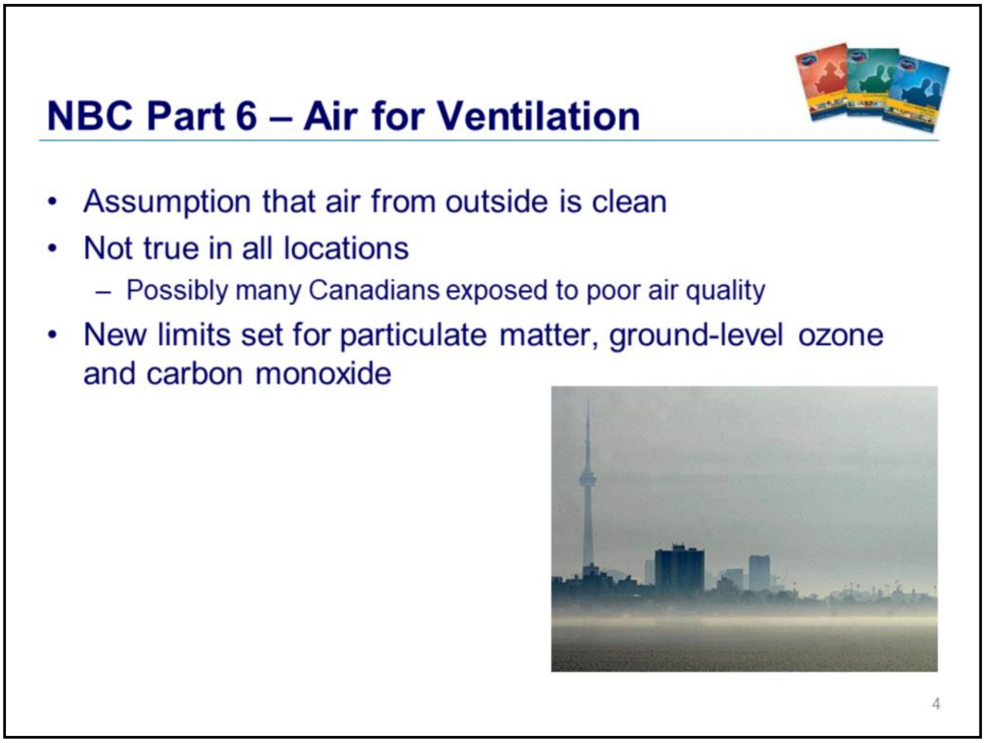
There are two substantive changes to Part 6 of the NBC. The first introduces new requirements for acceptable air for building ventilation purposes. The second modifies existing requirements that address venting of laundry drying appliances, including collective venting of multiple installations.




There were no requirements in the 2005 NBC regarding what constitutes acceptable air for building ventilation purposes with respect to the concentration of particles and gases. The past practice of ventilating buildings assumed that the air being introduced to the indoor building environment was acceptable. It has become evident that, in some areas in Canada, the quality of the air being introduced may not be acceptable to ventilate buildings unless particles and gasses are first removed or reduced.

It has recently been estimated that many Canadians are exposed to poor air quality via the building ventilation system. Since using contaminated air to ventilate a building can create adverse health effects on the occupants, Part 6 of the 2010 NBC has set maximum levels of particulate matter, ground-level ozone and carbon monoxide in air for building ventilation purposes.

## NBC Part 6 – Air for Ventilation

**6.2.1.7. Outdoor Design Conditions**

**…**

**2) Except as provided in Sentence 6.2.2.4.(1), the outdoor air quality conditions of the geographic area of the building site to be used in designing ventilation systems shall conform to appropriate provincial or territorial requirements or, in the absence of such requirements, shall be equal to or less than the maximum acceptable levels stated in the National Ambient Air Quality Objectives of the Canadian Environmental Protection Act as follows:**

**…**

- Form part of the National Ambient Air Quality Objectives (NAAQOs), published under Section 8, Part 1, of the Canadian Environmental Protection Act (CEPA)

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These limits are based on the NAAQOs benchmark levels. The goal is to reduce the probability that, as a result of the design of the ventilation system, a person in the building will be exposed to an unacceptable risk of illness due to inadequate indoor air quality.

The National Ambient Air Quality Objectives (NAAQOs) identify benchmark levels of acceptable outdoor air quality for the protection of public health. These documents are published under Section 8, Part 1, of the Canadian Environmental Protection Act (CEPA). In order to manage the air quality of a building's indoor environment, and thus reduce the occurrence of the occupants' adverse health effects, the outdoor air for building ventilation purposes necessarily needs to be addressed.

The NAAQOs provide a legitimate source of information from cognizant authorities in determining the maximum acceptable levels of particles and gases that a building ventilation system should introduce directly to the interior environment. The air contaminants that have been identified, and objectives developed, are particulate matter, ground-level ozone and carbon monoxide.

## NBC Part 6 – Air for Ventilation

- When outside air is not "clean" enough as per 6.2.1.7.(2) with regard to particulate matter, ground-level ozone and carbon monoxide

**6.2.2.4. Cleaning Devices**

**1) Where outdoor air quality conditions do not meet the requirements of Sentence 6.2.1.7.(2), ventilation required by Sentence 6.2.2.1.(1) shall be provided by a ventilation system designed to include devices that reduce particles and gases to the maximum acceptable levels described in Sentence 6.2.1.7.(2) prior to the introduction of outdoor air to indoor occupied spaces.**

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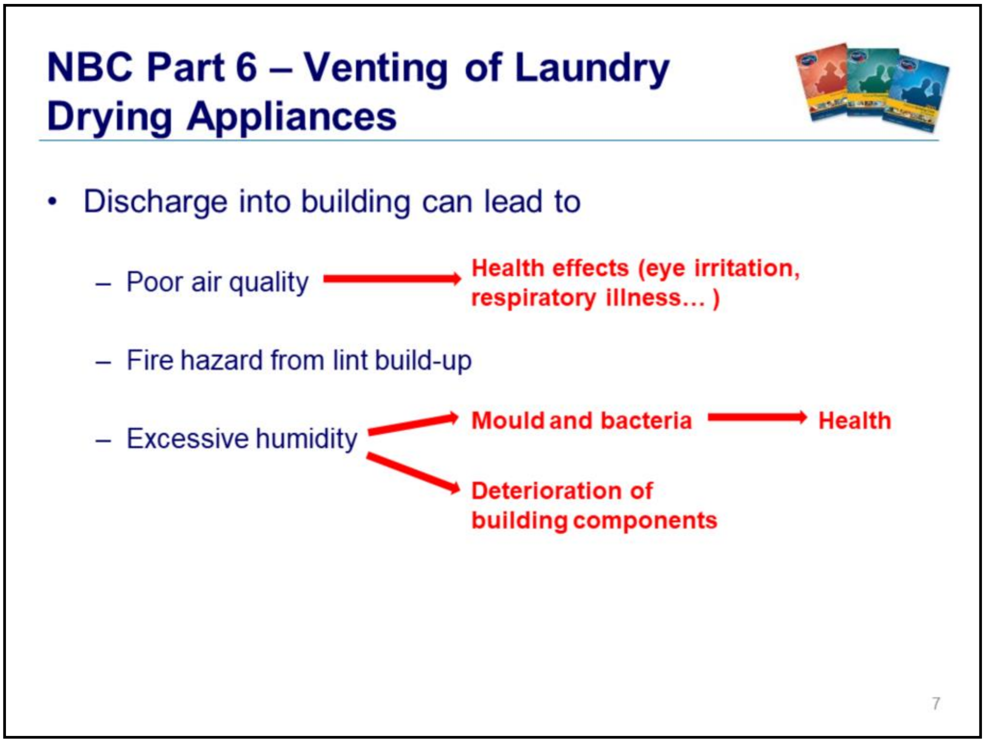
A new requirement has also been added to address air for building ventilation purposes that is not within the limits set for particulate matter, ground-level ozone and carbon monoxide. The provision will make it a requirement to provide a means by which particles and gases are reduced to at least the set maximum levels prior to the introduction of outdoor air to the indoor occupied spaces.

This would reduce the potential that failure to remove these particles and gases at their point of origin would lead to an accumulation in excessive concentrations. The inclusion of this requirement would ensure that the indoor air quality is at an acceptable level, which in turn would reduce the occurrence of adverse health effects on the occupants.




The discharge of contaminated and moisture-laden air into a building environment can create poor indoor air quality, a fire hazard and excessive humidity. This could cause adverse health effects on the occupants due to the particulates and other contaminants, and due to possible mould growth as a result.

For example, exposure to particulates at certain levels can cause various health effects such as eye irritation and respiratory illnesses as well as trigger asthma and allergy related symptoms. Also, excessive humidity, combined with the heat generated by the drying appliance, can accelerate a chemical reaction that triggers an increase in the off-gassing from materials and fabrics. Excessive humidity can encourage the growth of viable organisms such as mould and bacteria, cause a deterioration of the building assembly and cause the build-up of particulates such as lint which can be a fire hazard.

## NBC Part 6 – Venting of Laundry Drying Appliances

**6.2.3.8. Exhaust Ducts and Outlets**

…

**9) Exhaust ducts or vents connected to laundry-drying equipment shall discharge directly to the outdoors.**

- Controls contaminants and excessive humidity
- Beneficial for health and reduces deterioration of components

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To address these concerns, new requirements are added to Article 6.2.3.8. Exhaust Ducts and Outlets.

The new Sentence 9 provision controls the source of the contaminants by requiring that the venting of laundry drying appliances discharge directly to the outdoors. This would reduce the amount of particulates and the level of humidity in the indoor building environment, therefore increasing the indoor air quality of the building. Control of the source of the contaminants would also reduce the occurrence of fire and the deterioration of the building assembly.

## NBC Part 6 – Venting of Laundry Drying Appliances

**6.2.3.8. Exhaust Ducts and Outlets**

…

8) Where collective venting of multiple installations of laundry-drying equipment is used, the ventilation system shall

a) be connected to a common exhaust duct that is vented by one central exhaust fan and incorporates one central lint trap,

b) include an interlock to activate the central exhaust fan when laundry-drying equipment is in use, and

c) be provided with make-up air.

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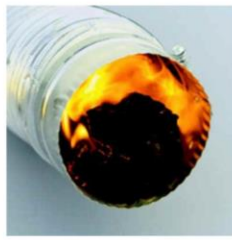
Sentence 8 addresses the collective venting of multiple installations of laundry drying appliances, which can cause a build-up of lint in the exhaust ducts when one or more laundry drying appliances are not in use. Collective venting may also cause short-circuiting of the air to non-operating drying appliances. These situations may cause a fire hazard.

## NBC Part 6 – Venting of Laundry Drying Appliances

- Collective venting → lint build-up and/or short circuiting of air → fire hazard
- Provision requires
  - Common exhaust duct and fan to prevent short circuiting of air
  - Central lint trap for easy access and cleaning



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This new provision will require a common exhaust duct with a central exhaust fan and a central lint trap in order to create a continuous negative pressure in the plenum, which prevents back drafting or short-circuiting of the air to non-operating drying appliances.  This would reduce the risk of fire associated with the build-up of lint.

Although requirements for access to appliances are already generally specified in Part 6, explanatory information is included to remind the users of the code that the venting of clothes dryers forms part of the ventilation systems and therefore access to central lint traps should also be readily accessible for servicing.

## NPC – Plumbing Overview

- Water pipe sizing
- Non-potable water system design
- Composite polyethylene/aluminum/polyethylene piping use for hot water
- Miscellaneous
  - Traps for floor-mounted sinks
  - Suds pressure zones
  - Standpipe and trap dimensions
  - Drainage of roofs

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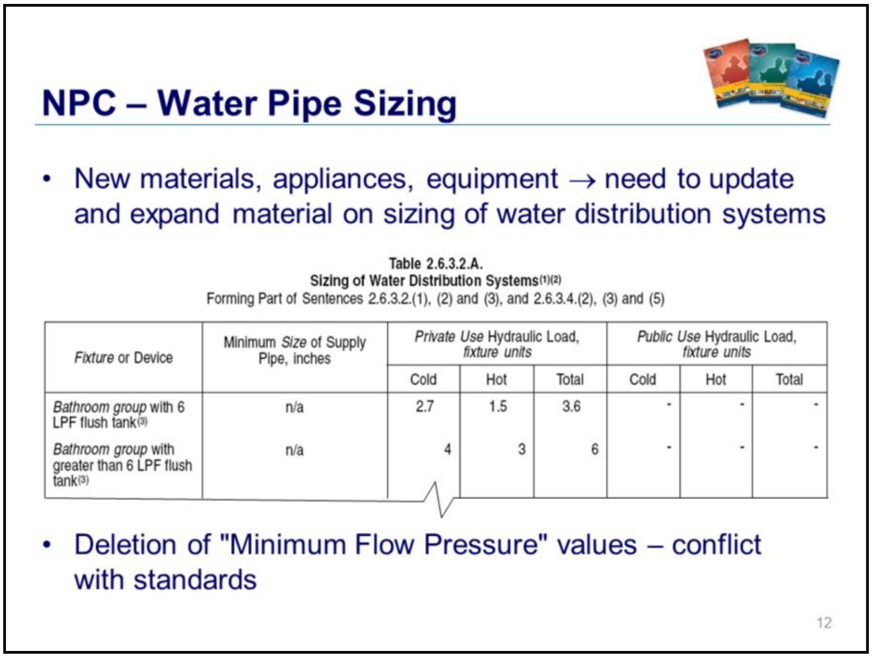
Next, the changes to the National Plumbing Code of Canada will be reviewed, and include water pipe sizing, non-potable water system design, composite piping, and other miscellaneous items.



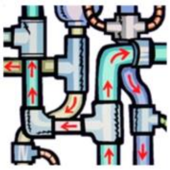

Work was undertaken to review new materials and technologies to determine if changes were needed to the pipe sizing information in the NPC. It was concluded that the information needed to be updated since the use of water-conserving appliances and fixtures in buildings and facilities is becoming standard practice. This results in a lower water usage, which has an impact on the water pipes delivering water to the building or facility.

Material was developed resulting in a number of changes to Section 2.6, which in turn created some discrepancies in the NPC. Therefore, a multitude of minor changes were made to address these discrepancies as well as for clarification and updating purposes. For examples, outdated values have been revised and, new materials and fixtures introduced, in order to reflect modern plumbing systems.

In Table 2.6.3.2.A., because of a conflict with referenced standards, the minimum flow pressure values given in the 2005 table were deleted.

# NPC – Water Pipe Sizing

- Update to Article 2.6.3.4. Sentences and Table 2.6.3.4.A.



**2.6.3.4. Size**

**1)** Every *water service pipe* shall be sized according to the peak demand flow but shall not be less than ¾ inch *size*.

**2)** Except as provided in Sentence (3), the *size* of a supply pipe that serves a *fixture* shall conform to Table 2.6.3.2.A.

**3)** For *fixtures* listed in Table 2.6.3.2.A. that have a permitted supply pipe *size* of ⅜ inch, a connector not more than 750 mm long and not less than 6.3 mm inside diameter may be used to supply water to the *fixture*.

**4)** No *water system* between the point of connection with the *water service pipe* or the water meter and the first *branch* that supplies a water heater that serves more than one *fixture* shall be sized less than ¾ inch.

**5)** Where both hot and cold water is supplied to *fixtures* in residential *buildings* containing one or two *dwelling units* or row houses with separate *water service pipes*, the *water system* may be sized in accordance with Table 2.6.3.4., where
- a) the hydraulic loads for maximum separate demands on *water distribution system* piping are not less than 100% of the total hydraulic load of the *fixture units* given in Tables 2.6.3.2.A., 2.6.3.2.B., 2.6.3.2.C. or 2.6.3.2.D. for *private use*,
- b) the minimum water pressure at the entry to the *building* is 200 kPa, and
- c) the total maximum length of *water system* is 90 m.

(See Appendix A.)

**Table 2.6.3.4.**
**Water Pipe Sizing for Buildings Containing One or Two Dwelling Units or Row Houses with Separate Water Service Pipes**
Forming Part of Sentence 2.6.3.4.(5)

| *Size of Water Pipe, inches* | Water Velocity, m/s[1] | | |
|---|---|---|---|
| | 3.0 | 2.4 | 1.5 |
| | Hydraulic Load, *fixture units* | | |
| ½ | 8 | 7 | 4 |
| ¾ | 21 | 16 | 9 |



Additional information has been added to clarify the method of designing hot and cold water systems for residential buildings by providing a generic method of design for water velocity.

## NPC – Water Pipe Sizing

- Explicit appendix information on hydraulic load
- Additional information and examples of design calculations for small commercial buildings by:
  - Empirical method
  - Pressure loss method

**Average Pressure Loss Method**

Information required if using this method:
(a) The developed length:
(i) from the property line or private water system when located outside the building to the water service entry point to the building, and
(ii) from the building entry of the water service to the most remote water outlet.
(b) Minimum static pressure:
(i) the minimum static pressure available at the property line or other water source (private water supply system), or
(ii) where there is a wide fluctuation of pressure in the main throughout the day, the minimum static pressure available.

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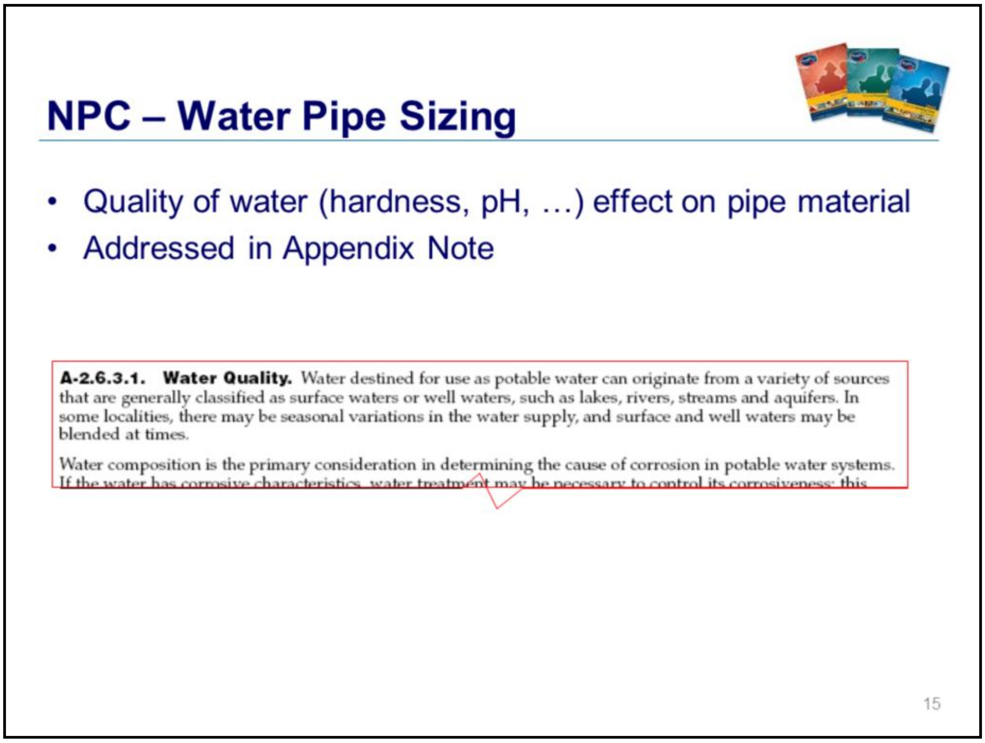
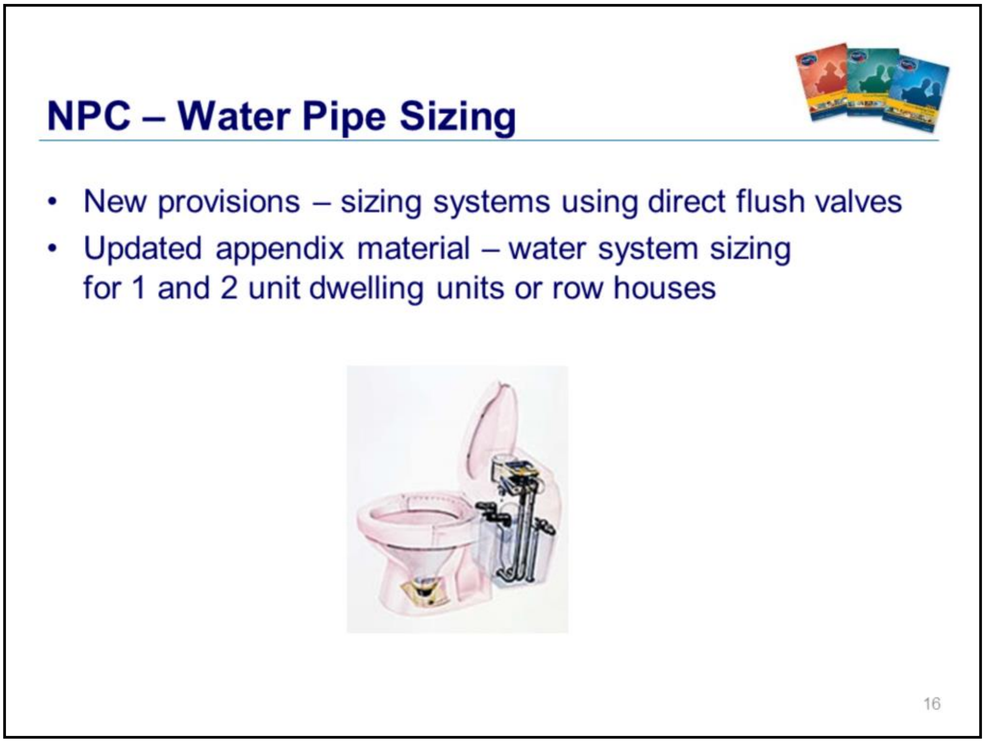
Appendix information regarding hydraulic load was updated and expanded upon to provide additional explanation as well as offer examples of water piping system design calculations for small commercial buildings using an empirical method. It also describes an average pressure loss method.

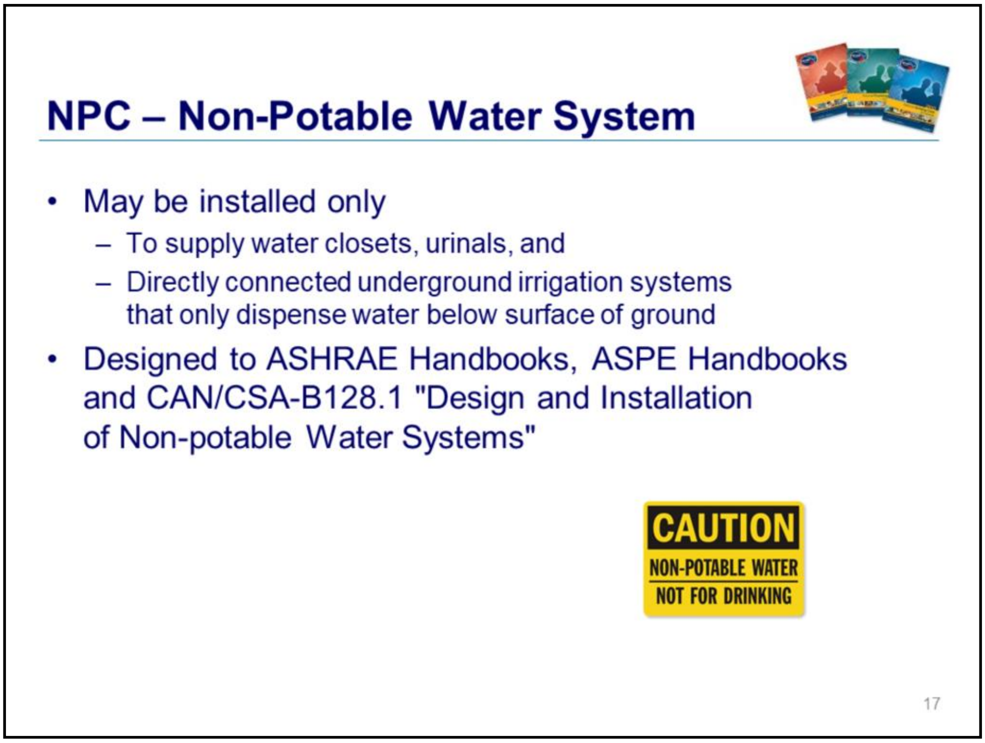



Other appendix material was developed to provide guidance to the designer of water distribution systems as to what should be considered to ensure acceptable water quality destined for use as potable water.



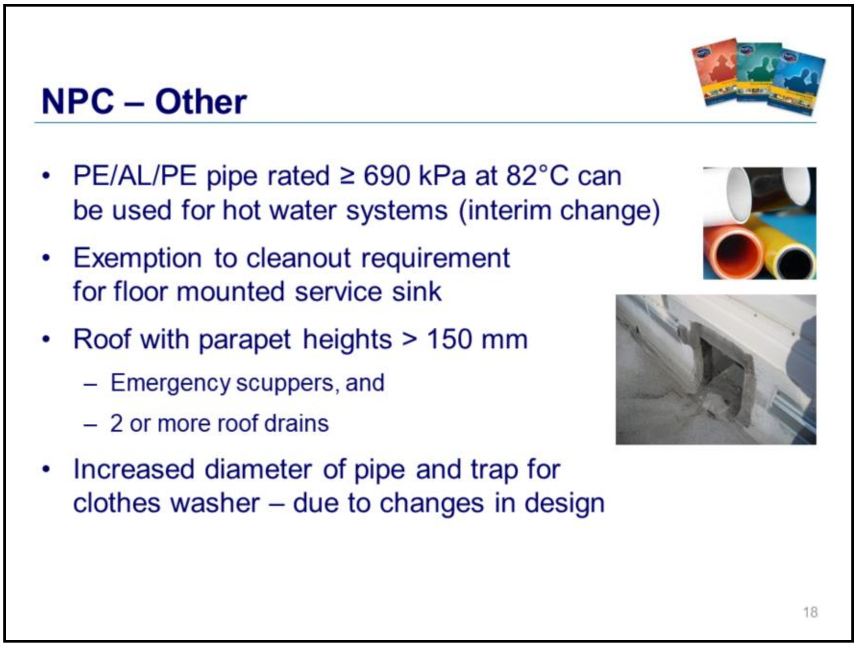

Requirements are provided for sizing systems that use direct flush valves such as urinals and water closets.

Appendix material was updated to provide a simplified method of water system sizing that is permitted in buildings containing one or two dwelling units or row houses with separate water services.




A new provision was developed to address non-potable water system design in recognition that these types of systems are presently being installed. It addresses non-potable water used to supply water closets, urinals, and directly connected underground irrigation systems that only dispense water below the surface of the ground. The design, fabrication and installation of a non-potable water system must be in accordance with good engineering practice.

The referenced documents only apply to the extent that they relate to the objectives of the NPC. In this case, the objective is health. Therefore the NPC doesn’t explicitly mandate the installation of non-potable water systems; it just says that if you install such a system, that you would need to “design, fabricate and install” it in such a way that it limits the probability that it could lead to harms to persons.




An interim change was sought and secured to ensure that an improved composite piping product made of polyethylene/aluminum/polyethylene, which is suitable for hot water applications, was recognized by the NPC. It was demonstrated that the application of Sentence 2.2.5.13.(2) that prohibited this product was no longer justifiable.

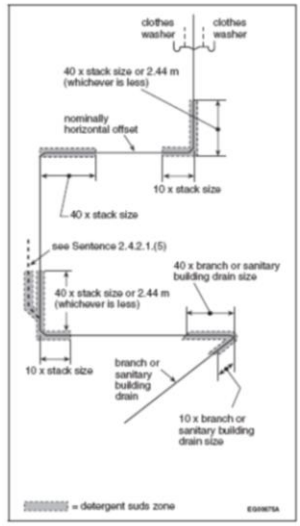
Since mop or service sinks are typically floor mounted and are not usually provided with an accessible trap, the relevant provision was modified to provide an exception for these types of sinks.

The capacity and spacing of scuppers is clarified to prevent the pooling of water on the roof which could result in structural damage to the building envelope. On roofs with a single roof drain, and where the parapet height exceeds 150 mm or the adjacent wall flashing height, rainwater could enter the building and cause damage should the roof drain become plugged or overwhelmed by a rainfall exceeding the 15-minute rainfall. A new provision has been added to provide a safeguard to this by requiring emergency roof overflows or scuppers and a minimum of 2 roof drains.

Due to changes in clothes washer designs, and the prevalence of front-loading machines with faster pump capacities, standpipe and trap dimensions have been changed to prevent overflowing.

## NPC – Other

- High sudsing detergents → disrupt venting systems

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High-sudsing detergents used in clothes washers produce suds that tend to disrupt the venting action of venting systems. This can result in spreading of the suds through the lower portions of multi-storey drainage systems and backup of the suds into fixtures. Revisions were made to the NPC to provide guidance on how to avoid the creation of suds pressure zones.

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**Questions?**

**Send them to us at** codes@nrc-cnrc.gc.ca

*Thank you!*

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Thank you, if you have any questions, please e-mail them to …