Canadian code change highlights

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Canadian Code Change Highlights

Designers need to be aware of some important technical changes that apply to the fire protection of buildings in the new editions of the National Fire Code and National Building Code.

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All three of Canada's national construction codes -- the National Fire Code (NFC), the National Building Code (NBC), and the National Plumbing Code (NPC) -- have undergone extensive reviews and changes since their last publication in 1995. Close to 1,300 technical changes have been incorporated into the 2005 editions. This article will review some of those changes affecting the National Fire Code and Part 3 of the National Building Code.

In addition to these technical changes, the 2005 versions of the codes are different in many other respects. A body of new information has been added, making the codes clearer, easier to apply to renovations and more accommodating to technological advances. This new information, namely objectives and functional statements, has been added to help users understand the reason why a particular requirement must be met and to help them evaluate alternative solutions. The new information is especially beneficial in areas where rapid technology advances occur, such as in the storage tank sector.

In order to accommodate the new information, the three 2005 codes have been re-organized into three divisions: A, B and C. Division A comprises the new information: the compliance options, the objectives and the functional statements. Division B contains the acceptable solutions, which are the 1995 code provisions updated to reflect the technical changes that have been made in response to improvements in technology and new health and safety issues. For those wishing to use the code as they always have, Division B is essentially all they need. Division C is composed of administrative provisions.

2005 National Fire Code:
Highlights of Technical Changes

Big Box Mercantile Buildings
New guidance for the development of a fire safety plan for these types of stores has been included in the 2005 NFC. Big box stores are characterized as a mixture of mercantile and warehousing facilities. Typically these buildings display products to a height of approximately 2.5 metres above the floor, and they store products above this display area to a height of up to 9 metres.

These stores carry a variety of merchandise, ranging from normal combustibles to dangerous goods such as oxidizers, compressed gases and flammable liquids. In many cases there are no set procedures addressing the storage configuration of the various products. This poses a great challenge when it comes to the protection of the occupants from a fire.
Documented research has shown that smoke obscuration in these stores can occur 7.5 to 12 minutes after the start of a fire. Prompt response by occupants in a fire emergency is therefore critical. Human behaviour studies have shown, however, that shoppers in a retail environment tend to delay evacuation for various reasons such as unfamiliarity with exits, a lack of visibility of exits, reluctance to leave checkout lines, complacency, and uncertainty about the events unfolding.

In addition to providing guidance in the development of the fire safety plan, the NFC has added storage limitations on the quantity of oxidizers (i.e. pool chemicals) and compressed gases permitted in these stores. As well, new segregation limits between oxidizers and various flammable and combustible liquids and combustible products have been introduced.

**Abandoned Cables in Plenum Spaces**
The large quantity of abandoned cables remaining in plenum spaces was identified as a fire safety hazard that creates an unnecessary threat to life and further contributes to property damage in the event of a fire.

An excessive accumulation of cables with combustible insulation and sheathes in plenums is contrary to the intents of both the NFC and the NBC. It was agreed that the removal of abandoned cables would contribute to controlling the amount of combustible materials in plenums, but there were varying opinions on how this would be achieved.

The new requirements in the NFC require that abandoned optical fibre cables and electrical wire and cables, with combustible insulation, jackets, or sheathes, and nonmetallic raceways be removed unless: “(a) they are permanently enclosed by the structure or finish of the building, (b) they are not capable of being removed without disturbing the building structure or finish, or (c) their removal will risk affecting the performance of cables in use.”

**Fire Safety Devices**
The NFC requires that specific fire safety devices be inspected, tested and maintained for the control of fire hazards. Such devices include smoke alarms, portable extinguishers, etc. In many cases, the testing regime is stipulated by reference to an applicable standard or provision such as Underwriters Laboratories Canada (ULC) or the National Fire Protection Association (NFPA). However, in some situations, the code is silent on the upkeep of the fire safety devices.

The 2005 NFC now includes a provision for situations where specific references to the inspection, testing and maintenance of fire safety devices are not made in the code. Those devices must now be maintained to ensure that they operate according to their initial design requirements. Examples of such fire safety devices include: fire dampers, certain audible alarms in rooms or enclosed spaces, vapour detection systems, bonding and grounding systems, fill pipe backflow prevention, and leak detection devices.

The impact of this change is substantial, as it will now include many devices not currently addressed under the 1995 NFC.

**Leak Detection and Monitoring of Storage Tanks and Piping Systems Containing Flammable and Combustible Liquids**
As a result of comments received by the NRC-IRC Canadian Codes Centre, it had become evident that the 1995 NFC requirements dealing with this topic were not reflecting today’s technology and practices. Some procedures were felt to be outdated, or, in some cases, deemed to be dangerous.
A new Section 4.4. introduces many new requirements for the frequency and methods of leak detection testing and the commissioning and monitoring of storage tanks, piping systems and sumps. Depending on the nature of the storage tank or piping system, options are given for the monitoring and commissioning of tests such as: a combination of inventory reconciliation and/or monitoring wells and precision leak detection; automatic tank gauging; in-tank leak detection; and secondary containment monitoring.

In addition to the above requirements, Section 4.4. has introduced new protocols for the pneumatic and liquid media leak detection testing of storage tanks and piping systems. Leak detection protocols for sumps have also been introduced.

**Part 3 of the 2005 National Building Code: Highlights of Technical Changes**

**Two-Hour Firewall**
The 2005 NBC now permits materials other than masonry or concrete to be used to provide up to a two-hour fire resistance rating for a firewall.

The NBC standing committees’ review of the 1995 code provision indicated that the requirement for masonry or concrete was meant to provide resistance to mechanical and other damage during normal use of the building. This new requirement for 2005 gives a higher level of assurance of resistance to fire damage than a regular fire separation would provide.

A high degree of reliability is needed because when a firewall is used, many credits and significant concessions in construction are allowed.

The 2005 provision allows design alternatives, provided a comprehensive set of performance requirements is met, including damage protection. The damage protection consists of protection from damage under regular use.

An explicit reference to Part 4 of the NBC was added to ensure the structural adequacy of the alternative design. Other firewall requirements remain unchanged.

**Fire Alarm Audible Signal Circuits**
This new provision provides options on the method of connecting audible signal devices to a fire alarm system serving a dwelling unit or a suite of residential occupancy in a building covered under Part 3. The intent is to provide redundancy in the event that the audible device or its wiring in one unit becomes disabled.

The criteria for choosing the first option are that a single open circuit at one device will not impair the operation of the other devices on the same circuit. As a first option, the 2005 NBC now allows either Class A wiring or Class B wiring with signal circuit isolators located outside the suites. This option is for the type of circuitry required for the fire alarm connecting the audible signal devices within a dwelling unit or suite of residential occupancy.

The second option for the connection of the audible signal devices -- within a dwelling unit or a suite of residences -- is a separate signal circuit independent of other devices provided for the audible devices in every unit. Each circuit cannot be connected to other devices in any other dwelling unit, public corridor or suite of residential occupancy.
**Mezzanines**

One of the main changes for open mezzanines not considered, as a storey is that the mezzanine area is required to be calculated as a percentage of the open area of the room it is located in. In the 1995 NBC, this area was to be measured as a percentage of the area of the storey it is located in. The area of the open mezzanine cannot be more than 40% of the open area of the room it is located in.

As in the 1995 NBC, the space above the mezzanine must be open except for library shelving meeting certain conditions, and partitions or walls less than 1,070 mm in height. A new exception is added in the 2005 NBC to permit partial enclosing of open mezzanine: an example would be an operator’s booth on the mezzanines.

Also, for added design flexibility, the restriction on the use of space beneath the mezzanine is removed. Whereas the 1995 NBC required the space beneath the mezzanine to have no visual obstruction, this space may now be enclosed.

Lastly, there is a new Appendix Note in the 2005 NBC that explains the approach for measuring the mezzanine area. The note includes a clarification that if the area below the mezzanine is enclosed, the enclosed area must be deducted from the area of the overall space before applying the percentage allowance.

**Public Corridor Fire Separations**

There is a reduction of the rating between public corridors and the remainder of the storey from 1 hour to 45 minutes. The change is based on the premise that 45 minutes provides sufficient time to evacuate a suite to an exit in unsprinklered buildings. In the 2005 NBC, no fire separation is required in a sprinklered floor area where the travel distance to an exit is not more than 45 metres. In other words, the public corridor does not need to be enclosed at all if those conditions are met. This new provision represents a significant departure from the original concept of enclosed public corridors.

This waiver does not apply to patients’ sleeping rooms, which have to be separated with non-rated fire separations for smoke control, and to suites of residential occupancy. Also, under certain conditions shopping malls are still exempted from the application of the fire separation.

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For further details see [http://www.nationalcodes.ca](http://www.nationalcodes.ca) or for more information on the fire-related technical changes in the 2005 National Construction Codes, e-mail codes@nrc-cnrc.gc.ca.