



Public Review

Vancouver Building By-law (VBBL)

Proposed change to Sprinkler Design

Topic: Simplification and Harmonization of the Application of Sprinkler Design Standards

Code change number: 24-0001

Code reference: Book I, Division B, 3.2.5.12.

Description of the proposed change

Simplification and Harmonization of the Application of Sprinkler Design Standards

Justification

This proposal addresses one of the more significant challenges with current VBBL regulations with respect to sprinkler regulations, which is that the current regulations do not adequately consider the impacts of ancillary residential units such as secondary suites and lock-off suite which are increasingly prevalent in Vancouver low density housing forms due to the high cost and limited availability of land.

In addition, with recent revision to single family zoned land into multiple family zoned land permitting up to 8 residential suites to facilitate housing, there is a need to further simplify the design of sprinklers.

Further to this, the fire sprinkler industry has expressed significant amounts of frustration with permit applications based on the general application of NFPA 13 and its derivative standards, particularly when this is not consistent with the typical grouping established by those standards.

The intent of this proposed changes is to better correlate the referenced sprinkler design standard with the building typology, with less reliance on the form of ownership. This approach more closely aligns with the application statement of the applicable sprinkler standard, and therefore also better aligns with the industry expectations for the use of these standards. This is expected to result in fewer major concerns in application, since the fundamental design approach is more likely to coincide with the Building By-law requirements and is therefore more likely to be suitable for adjustment without extensive redesign.

In addition, the language in Article 3.2.5.12. has been updated to include the use of the term “principal dwelling unit” to clarify that ancillary residential units need not be included for the purpose of the determining the applicable sprinkler standard. This aligns with the City’s current and historical policy of considering the principal dwelling unit and all its subordinate units as a single entity for the purposes of mechanical and electrical system design. This is potentially a more cost-effective arrangement, though it leaves the responsibility for maintaining the operation of the sprinkler system serving subsidiary dwelling units with the owner/resident of the principal dwelling unit. This is not deemed to be a concern since

ancillary residential units may not be separately owned, so the responsibility for maintenance in an operational state clearly remains the owner responsibility, unless otherwise contractually established.

This approach is also expected to largely resolve the issues associated with requiring fire department connections for construction that are essentially detached houses, or duplexes, where the fire department is unlikely to use such systems. NFPA 13D does not require fire department connections, and this would now be more regularly applicable to houses and duplexes.

Language improvements have also been included that removed the reference to testing, this being already identified at length in NFPA 13 and other associated standards, and language improvements related to flow through system arrangement with respect to water closets has been removed, in favour of consistent language with the definition and explanation within the NFPA 13D standard for a passive purge system.

Sentence (13) has been expanded to include carports, which were not previously captured but have a similar function to garages.

Lastly two new sentences have been added to address practical installation concerns.

a) Sentence (14) expands the use of Polyethylene pipe to include designs required to be NFPA 13R, but of a size or scope more consistent with NFPA 13D.

b) Sentence (15) addresses a known problem with steeply pitched roofs, and codifies current policy thus promoting a consistent approach and making this accessible to all designers.

Additional clarifying notes have been added as background material related to the proposed new Sentence (15).

Proposed VBBL content

Legend

Black Text – 2019 Vancouver Building By-law content

Underlined Black Text – Proposed modification to Vancouver Building By-law content

3.2.5.12. Automatic Sprinkler Systems

[...]

3) Instead of the requirements of Sentence (1), NFPA 13D, “Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes,” is permitted to be used for the design, construction and installation and testing of an automatic sprinkler system installed

a) *in a building of residential occupancy throughout that contains not more than two principal dwelling units, where*

i) each principal dwelling unit has its own sprinkler water supply, and

~~ii) a one tank type water closet is supplied with water from the sprinkler head which is located farthest from the main water supply, a passive purge sprinkler system design is used as described in NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes." (see Note 3.2.5.12.(3)(a)(ii))~~

b) in a *building of care occupancy*, provided

i) it contains not more than two *suites of care occupancy*,

ii) it has not more than five residents throughout, and

iii) a 30-minute water supply demand can be met, and

c) in a *building of residential occupancy* throughout that contains more than two principal dwelling units, provided

i) ~~except for a secondary suite~~, no principal dwelling unit or its ancillary residential unit is located above another principal dwelling unit or its ancillary residential unit,

ii) all ~~suites~~ principal dwelling units are separated by a vertical *fire separation* having a *fire-resistance rating* of not less than 1 h that provides continuous protection from the top of the footing to the underside of the roof deck, with any space between the top of the wall and the roof deck tightly filled with mineral wool or *noncombustible* material,

iii) each principal dwelling unit has its own sprinkler water supply provided in accordance with NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes,"

iv) a passive purge sprinkler system design is used as described in NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," and

v) where the sprinkler system is taken into consideration for the reduction of *limiting distance*, all rooms, including closets, bathrooms and attached garages, that adjoin an *exposing building face* are sprinklered, notwithstanding any exemption stated in NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes.", and

d) a detached ancillary building subordinate to a principal detached house or duplex on the same parcel of land, where the associated building is also sprinklered to NFPA 13D in accordance with this Sentence, where

i) each bathroom, clothes closet, linen closet, and pantry must have sprinkler coverage, notwithstanding the exemptions set out in NFPA 13D, and

ii) sprinklers are provided in each attached garage or carport, notwithstanding the exemptions set out in NFPA 13D,

~~iii) a one tank type water closet is supplied with water from the sprinkler head which is located farthest from the main water supply. a passive purge sprinkler system design is used as described in NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes." (see Note 3.2.5.12.(3)(a)(ii))~~

~~iv) the path of travel for firefighters complies with Clause 3.2.5.5.(3)(a),~~

v) each dwelling unit has direct access to an exterior exit facility complying with Sentence 3.3.4.4.(3);

(See Note A-3.2.5.12.(2); also see 3.2.5.5. and 9.10.20.4.)

[...]

11) Except as permitted by Sentence (12), Notwithstanding the requirements of Sentences (1) and (2) and except as permitted by Sentence (12), automatic sprinkler protection shall be provided for all unenclosed balconies, exterior decks, porches and patios of buildings sprinklered to NFPA 13R or NFPA 13, shall be provided with sprinklers if

a) the framing or cladding is of combustible construction,

b) the depth of balcony, deck, porch, or patio is more than 1200 mm, and

c) the balcony, roof overhang or structure above is more than 300 mm overlapping the balcony, deck or patio below and is located less than 3 m above the finished floor of the balcony, deck or patio below.

12) Automatic sprinkler protection for an unenclosed exterior balcony of a residential building may be omitted if

a) the building is of noncombustible construction, and

b) the exterior wall assembly adjoining the balcony and the exterior ceiling assembly covering the balcony are constructed with noncombustible materials.

13) Notwithstanding the requirements of the standards referenced by Sentence (3) regarding the installation of automatic sprinkler systems, sprinklers shall be provided in any storage garage or carport attached to a building of residential occupancy where a fire separation is not provided between the storage garage or carport and adjacent floor areas.

14) Where NFPA 13R, "Installation of Sprinkler Systems in Low-Rise Residential Occupancies," is used for the design, construction and installation of an automatic sprinkler system installed in a residential building containing not more than two principal dwelling units and accessory uses, water service pipe, as defined in the Building By-law Book II (Plumbing Systems) is permitted to be designed and constructed per requirements in NFPA 13D.

15) In a residential building designed to NFPA 13D or 13R, residential sprinklers may be installed under steeply sloped roofs with a pitch that exceeds 8 in 12, provided that the hydraulic design area is increased by 30% or as otherwise acceptable to the Chief Building Official. (see Note A-3.2.5.12.(15))

A-3.2.5.12.(3) Superimposed Residential Suites. Sentence 3.2.5.12.(3) provides for the application of NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," where a residential building contains not more than two principal dwelling units or row housing. However, designers should recognize that the provisions of NFPA 13D are based in fire testing of conventional single dwelling arrangements of the 1970's and U.S. NFIRS statistical data through to 2009 for conventional single dwellings, duplex, and mobile home arrangements as evidenced in the Annex notes to NPFA 13D. They are therefore intended only to allow for arrangements where dwelling units are located in a side-by-side (horizontally connected) configuration. Multi-family residential arrangements (i.e. larger than duplexes) wherein which principal dwelling units are superimposed above another principal

dwelling unit (residential or commercial) are to be designed to NFPA 13 or 13R as permitted by Article 3.2.5.12. ~~Ancillary Residential Units are the notable exception to these requirements and are addressed separately in Section 9.37.~~

A-3.2.5.12.(15) Steeply pitched roofs. Steeply pitched roofs are addressed in NFPA 13, 13R and 13D, and require the use of listed sprinklers, for which there are no readily available sprinklers with a Canadian certification. The provisions of Sentence 3.2.5.12.(15) are intended to provide an interim solution until such sprinkler are widely available. The permission presented in Sentence (15) is reflective of recommended design practice by sprinkler manufacturers, to use an increased design area to accommodate the possibility that this arrangement could lead to additional sprinkler operating. Users addressing steeply pitched roofs should consult with the Chief Building Official to ensure that the needs of the specific application have been adequately addressed.