



Public Review

Vancouver Building By-law (VBBL)

Proposed change to Improve Air Quality

Topic: Healthy Homes

Code change number: 24-0011

Code reference: New Healthy Home requirements (Parts 3, 6, and 8)

Description of the proposed change

Several best practice construction indoor air quality management practices such as the use of low-emitting materials and testing of air quality prior to occupancy were requirements in the 2017 Green Building Policy for Rezonings. These requirements, along with best practices for construction indoor air quality management are recommended to be added to the VBBL to improve indoor air quality in large new multi-family buildings to support occupant health.

Construction air quality management practices applicable to all Part 3 construction:

- 1) Protection of HVAC systems and ductwork during construction (Part 6 HVAC)
- 2) use MERV 8 filters during construction if using HVAC (Part 6 HVAC)

Construction air quality management practices applicable to all buildings:

- 3) protect absorptive materials from moisture (Part 8 Safety Measures at Construction and Demolition Sites)
- 4) Implement dust mitigation strategies and contain dust-generating activities to designated areas (Part 8 Safety Measures at Construction and Demolition Sites)

Applicable only to Part 3 residential construction:

- 5) VOC emissions limits on Paints and Coatings, and Sealants and Adhesives (Part 6 HVAC)
- 6) IAQ testing for VOCs and formaldehyde prior to occupancy (Part 6 HVAC)

Justification

Several best practice construction indoor air quality management, use of low-emitting materials, and testing of air quality prior to occupancy were requirements in the 2017 Green

Building Policy for Rezoning. These requirements are recommended to be added to the VBBL to apply to more buildings improve construction air quality and in new buildings.

Items 1, 2, 3 and 4 are best practice construction indoor air quality management techniques. Industry feedback indicates that most large construction sites are employing these strategies already, thus these strategies should not add cost to construction, and can make significant improvements to the indoor air quality of the building post-occupancy and during construction. Construction and demolition of buildings can have serious impacts on construction, including an increased risk of Chronic Obstructive Pulmonary Disease. Good construction IAQ practices limit dust from accumulating and mold from developing in the space during construction, prevent these toxins from settling and growing in the occupied space once construction is completed and limiting exposure to construction workers during construction.

Item 5 & 6 (use of low-emitting paints, coatings, sealants, and adhesives) are familiar requirements as most projects under the 2017 Green Buildings Policy for Rezoning (approx 200 projects in Vancouver) were required to meet these as a rezoning condition. Costs for using low VOC content paints, coatings, adhesives and sealants at this time are minimal due to product availability.

Projects under the 2017 Green Buildings Policy for Rezoning were also required to provide low-emitting materials for 2 additional product categories: flooring, and composite wood products. These two additional product categories are not being proposed for 2025 VBBL in order to minimize costs associated with code changes at this time. However, staff recommend these products be evaluated for availability and cost-effectiveness for future VBBL changes as these products contribute to improving indoor air quality.

Volatile organic compounds (VOCs) are gases that are emitted from various products, including solid and liquid products. The use of low VOC products reduces human exposure to VOC levels in conventional products that can cause physiological responses ranging from allergic reactions to system level damage such as kidney, liver, and central nervous system damage. Using low-emitting materials does not only benefit the building occupant; it also benefits construction workers.

Testing for indoor air contaminants (item #6) is a simple and effective way to confirm that low-emitting materials are being installed in the project without the need for extensive documentation, and that construction air quality practices (items 1-4) were followed. For typical projects adhering to items 1-5, meeting the contaminant limits should be straightforward. In past projects in Vancouver, failures for IAQ limits were often attributed to testing too early when contaminant generating work, such as painting, drywall sanding, etc was on-going during testing, or high emitting cleaning products are used prior to testing.

Proposed VBBL content

Legend

Black Text – 2019 Vancouver Building By-law content

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

The following 2 construction air quality management practices applicable to all Part 3 construction:

6.2.1.6. Installation – General

Add;

4) During construction, all heating, ventilation or air-condition systems and ductwork shall be protected from construction dust and debris and ingress of moisture.

(See Note A.6.2.1.6.(4)).

New note A.6.2.1.6.(4) Protection of HVAC system and ductwork.

Strategies to comply with this requirement includes storing uninstalled ductwork and equipment away from dust-producing areas and sealing off HVAC system components to prevent the migration and accumulation of dust and debris in the duct system. For example, if the HVAC system is not used during construction, seal off the supply and return air system openings, seal off diffusers and grilles, wrap terminal units in plastic, provide end caps for duct sections, etc.

6.3.2.14. Cleaning Devices

Add;

2) Any ventilation systems designed to supply ventilation required by Sentence 6.3.1.1.(1) that are operated during the construction stage must be provided with filtration devices with Minimum Efficiency Reporting Value (MERV) of 8, as defined by ANSI/ASHRAE 55.2., and must be replaced with filtration devices meeting Sentence 6.3.2.14 prior to occupancy.

The following 2 construction air quality management practices are applicable to all buildings:

New Section 8.1.5 Construction Air Quality Management

8.1.5.1 Protection of absorptive materials

(1) Absorptive materials stored and installed on-site shall be protected from dust and moisture damage.

(See Note A8.1.5.(1))

8.1.5.2 Mitigating dust

(1) Dust-control measures shall be applied to the site and dust-generating activities shall be contained to designated areas.

(See Note A.8.1.5.2.(1))

New Note A.8.1.5.1.(1) Protection of absorptive materials

Absorptive materials include drywall, carpets, acoustical ceiling panels, fabric wall coverings, insulation, upholstery, furnishings, etc, and if unprotected during construction these materials can become a source for mould or bacterial growth. Strategies to comply with this requirement include developing and implementing a moisture control plan to protect stored on-site and installed absorptive materials from moisture damage, and immediately remove from site and properly dispose of any materials susceptible to microbial growth and replace with new, undamaged materials.

New Note A8.1.5.2.(1) Mitigating dust

Dust is a suspension of fine solid particulate matter and can pose risks to the environment and to human health. Strategies to mitigate dust in construction sites include suppressing dust with wetting agents or sweeping compounds, using an efficient and effective dust collecting method such as a damp cloth, wet mop, or vacuum with particulate filters, immediate clean up upon completion or at the end each day. For high dust-generating activities, use dust guards or collectors to capture generated dust, and isolate dust-generating work using dust barriers or differential pressurization, or scheduling activities that produce dust for unoccupied periods if possible.

Dust-generating activities include cutting, grinding, drywall sanding, masonry work, wood sawing, and some types of insulating.

The following 2 requirements are applicable only to Part 3 residential construction:

6.3.1.6. Indoor Air Contaminants

- (4) For residential occupancies, indoor air contaminant concentration testing shall be completed prior to the issuance of an occupancy permit. Indoor air contaminant concentration levels shall not exceed the limits listed in Table 6.3.1.6.(4) and obtained per the allowable methods, or shall be remedied to the satisfaction of the Chief Building Official.

(See Note A-6.3.1.6.(4))

Table 6.3.1.6.(4) Maximum Concentrations by Contaminant Type

<u>Contaminant</u>	<u>Concentration Limit</u>	<u>Allowed Test Methods</u>
<u>Formaldehyde</u>	<u>20 µg/m³ (16 ppb)</u>	<u>Direct read instruments with third party calibration per manufacturer's instructions</u>
<u>Particulate Matter PM 2.5</u>	<u>12 µg/m³</u>	<u>Particulate monitoring device with accuracy greater of 5 micrograms/m³ or 20% of reading and resolution (5 min average data) +/- 5 µg/m³</u>
<u>Particulate Matter PM 10</u>	<u>50 µg/m³</u>	
<u>Ozone</u>	<u>0.07 ppm</u>	<u>Monitoring device with accuracy greater of 5 ppb or 20% of reading and resolution (5 min average data) +/- 5 ppb ISO</u>

		13964 ASTM D5149 -- 02 EPA designated methods for Ozone
Total volatile organic compounds	500 µg/m ³	Direct read instruments with third party calibration per manufacturer's instructions
Carbon monoxide	9 ppm; no more than 2 ppm above outdoor levels	ISO 4224, EPA Compendium Method IP-3. Direct calibrated electrochemical instrument with accuracy of (+/- 3% of reading and resolution of 0.1 ppm). NDIR CO Sensors with accuracy of 1% of 10 ppm full scale and display resolution of less than 0.1ppm

Edits to Note A-6.3.1.6. Indoor Air Contaminants.

Contaminants of Concern

Indoor air can contain complex mixtures of contaminants of concern such as formaldehyde, legionella, mould, ozone, particulate matter, and emissions from building materials (including volatile organic materials). While some contaminants may be knowingly introduced – as in the case of processing and manufacturing environments – others may be unintentionally released into indoor environments. “Industrial Ventilation: A Manual of Recommended Practice for Design,” published by the ACGIH, ~~and the “Exposure Guidelines for Residential Indoor Air Quality,” published by Health Canada, are~~ is a useful references on the control of contaminants in industrial workplace environments and residential settings, respectively. These and other guidelines and manuals should be interpreted while keeping in mind the settings and purposes for which they were developed compared to those to which they will be applied. Note that such documents do not necessarily consider the interactions between various contaminants.

New Note A-6.3.1.6.(4)

The number of sampling locations to test for contaminants depends on the size of the building – conduct air quality testing on at least 10% of the first 100 residential units, and 5% of all units above 100. Testing should be conducted after all interior finishes are installed, including millwork, doors, paint, carpet and acoustic tiles, etc. Tested spaces should be representative of building’s various finishes and layouts. Select sampling locations for areas with the least ventilation and/or materials with potentially the greatest presumed contaminant source strength. Take samples in the breathing zone, between 0.9 and 1.8m above the floor, during normal occupied ours with the HVAC system operating at normal outdoor flowrates.

For amenity spaces used by residents, conduct one test for each space with unique interior finishes.

Section 3.7 Health Requirements

New 3.7.4 Low-Emitting Products

3.7.4.1 Paints and Coatings

1) For residential occupancies, all paints and coatings applied inside of the weather-proofing systems and applied on-site shall have volatile organic compounds content limits conforming to:

i) California Air Resource Board (CARB) 2007 Suggested Control Measure (SCM) for Architectural Coatings, or

ii) South Coast Air Quality Management District (SCAQMD) Rule 1113 – Architectural Coatings, amended February 5, 2016, effective date 1/1/19.

(See note A.3.7.4.1.(1))

3.7.4.2. Adhesives and Sealants

1) For residential occupancies, all adhesives, sealants and sealant primers applied inside of the weather-proofing system and applied on-site shall meet South Coast Air Quality Management District (SCAQMD) Rule 1168, effective July 1, 2005

(See note A.3.7.4.2.(1))

New Note A.3.7.4.1.(1)

Products in this category includes flat, nonflat, primer, sealer, and undercoater coatings and other architectural coatings.

New Note A.3.7.4.2(1)

Products in this category include carpet, resilient, and wood flooring adhesives; base cove adhesives; ceramic tile adhesives; drywall and panel adhesives; aerosol adhesives; adhesive primers; acoustical sealants; firestop sealants; HVAC air duct sealants; sealant primers; and caulks.

ADDITIONS TO FUNCTIONAL STATEMENTS

Add to Table 3.10.1.1 Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 3

<u>3.7.4.1 Low-Emitting Products</u>	
<u>(1) & (2)</u>	<u>[F40, F50-OH1.1]</u>

Add to Table 6.10.1.1 Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 6

<u>6.2.1.6 Installation General</u>	
<u>(4)</u>	<u>[F40, F41, F50-OH1.1]</u>
<u>6.3.1.6 Indoor Air Contaminants</u>	
<u>(4)</u>	<u>[F40, F41, F50-OH1.1]</u>
<u>6.3.2.14 Cleaning Devices</u>	
<u>(2)</u>	<u>[F40, F41, F50-OH1.1]</u>

Add to Table 8.3.1.1 Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 8

8.1.5.1	<u>Protection of absorptive materials</u>
(1)	[F40, F41, F50-OS-5.6, OH1.1, OH1.3]
8.1.5.2	<u>Mitigating dust</u>
(1)	[F40, F41, F50-OS-5.6, OH1.1]

For reference:

OH1.1 – inadequate indoor air quality

OH1.3 – contact with moisture

OS5.6 – exposure to hazardous substances and activities

F40 To limit the level of contaminants.

F41 To minimize the risk of generation of contaminants.

F50 To provide air suitable for breathing