

<b>Project Address:</b>	<b>Building Permit:</b>
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This forms part of the Building Permit documents for Class 1 Cooking Operations. All fields are required to be completed. The professional's initials in the right hand column indicate that the project is designed in compliance with this item. Note: refer to NFPA 96 for solid fuel-fired appliances (separate exhaust system). Code references refer to NFPA 96, 2001 unless noted otherwise.

If there are any discrepancies between this document and the drawings, this document will be deemed correct as to what will be constructed.

Mechanical Engineer: \_\_\_\_\_

Scope limits, if applicable: \_\_\_\_\_

Company: \_\_\_\_\_

Mechanical Engineer (for remaining scope): \_\_\_\_\_

Scope limits: \_\_\_\_\_

Company: \_\_\_\_\_

Architect: \_\_\_\_\_

Company: \_\_\_\_\_

Electrical Engineer: \_\_\_\_\_

Company: \_\_\_\_\_

Structural Engineer: \_\_\_\_\_

Company: \_\_\_\_\_

## K2 - Kitchen Ventilation Details Checklist cont'd

No.	Item	Professional's initials signifying project complies (or mark N/A)
1	All cooking equipment producing smoke or grease-laden vapours is under a hood complying with NFPA 96, 2001.	
2	a) Rooftop exhaust is $\geq 10'-0"$ from property lines, including lane or street property lines, discharges $\geq 40"$ above the roof, and the fan housing outlet is $\geq 5'-0"$ horizontally from any combustible structure. [7.8.2]	
	b) Elevations of the building exterior have been provided if there is exterior ductwork.	
	c) The protection around the duct (or clearance) continues up through the roof assembly to 18" above the roof (or reduced height if protection provided in compliance with 4.2.3).	
3	a) Wall exhaust termination is $\geq 10'-0"$ from: <ul style="list-style-type: none"> <li>combustible construction, including exterior wall cladding</li> <li>adjacent grade</li> <li>openings below or to the side</li> <li>adjacent buildings</li> <li>neighbouring private property lines</li> <li>city property lines, if no ecology unit provided</li> </ul> <p>The termination is clear from openings per the formula in NFPA 96, 7.8.3 (i.e., approx. <math>\geq 32'-6"</math> above and <math>\geq 16'-0"</math> to the sides) and will be accessible for maintenance (i.e., approx. <math>\leq 11</math> ft above grade or a platform [See A.7.8.2.2]). [7.8.3]</p>	
	b) Elevations of the building exterior have been provided if there is exterior ductwork or a horizontal termination.	
	c) The protection around the duct (or clearance) continues through the wall.	
	d) Is an <i>ecology unit</i> <sup>1</sup> provided? <span style="float: right;">yes / no</span>	
	e) For a wall termination, the exhaust flow is directed upward or perpendicularly outward from the wall face. [7.8.3.(4)]	
4	The exhaust is $\geq 10'-0"$ from any air intake and, per 7.8.1, ends outside the building. All requirements of NFPA 96, 7.8.2, 7.8.3 and 7.8.4 are satisfied.	
5	Exhaust ducts (including upstream and downstream of an <i>ecology unit</i> ) are steel-welded, liquid-tight and the ducts and their supports are (circle one): [9.3.2] min. 16-gauge carbon steel / min. 18-gauge stainless steel	
6	Exterior portions of ductwork and supports will be (circle one): [7.6.4 and 7.6.5] noncorrosive stainless steel / painted / weather-protection coating, namely: _____	
7	All ducts lead as directly as practical to the exterior of the building and horizontal ducts are substantially pitched back to the hood to drain and collect the grease (min. 2% for horizontal ducts $\leq 75$ ft, and min. 8.3% for horizontal ducts $> 75$ ft). [7.1.2 and 7.8.3.(5); ref. IMC 2003, 506.3.7]	
8	Letter from Strata Council approving of the alterations to the building.	
9	Ducts from different fire compartments are not combined into a single duct or single enclosure. [7.7.5]	
	Hood ducts are not combined with any other building ventilation or exhaust system. [7.1.3]	
	Ducts for a solid fuel appliances' hood are not combined with ducts for gas or other types of fuel.	

<sup>1</sup> Term defined in the 2007 Vancouver Building By-law (VBBL)

## K2 - Kitchen Ventilation Details Checklist cont'd

No.	Item	Professional's initials signifying project complies (or mark N/A)
10	<p>The following terms are defined differently in the VBBL for fire separations than in NFPA 96 for clearances. Using the NFPA 96 definitions [4.2 &amp; Table A.3.3.34], construction is:</p> <p>Exterior wall's cladding (circle one): combustible/limited-combustible/noncombustible            Ceiling assembly (circle one): combustible/limited-combustible/noncombustible            Shaft construction (circle one): combustible/limited-combustible/noncombustible            Top of roof assembly (circle one): combustible/limited-combustible/noncombustible            Behind hood(s) (circle one): combustible/limited-combustible/noncombustible</p>	
11	<p>Min. clearances from the hood(s) (e.g., to ceiling tiles &amp; back wall) are (circle applicable ones):            (if from combustibles:) 18" / 9" w 28-gauge+spacers / 3" w 22-gauge on insul.+spacers            (if from limited comb:) 3" / 0" + noncomb. material            (if from noncomb:) 0"            If another clearance, attach listing. [4.2]</p>	
12	<p>Minimum clearances from ductwork and associated equipment where there is no shaft is (circle applicable ones):            (if from combustibles:) 18" / 9" w 28-gauge+spacers / 3" w 22-gauge on insul.+spacers            (if from limited comb:) 3" / 0" + noncomb. material            (if from noncomb:) 0"            If another clearance, attach listing. [4.2]</p>	
	<p>Protection for the wall from the floor to the hood is provided. [4.2.4.3]</p>	
13	<p>Minimum clearance between the shaft and the duct is (circle one):            Shaft: combustible / limited combust. / noncomb.            Clearance: 18" / 6" / 6"            If another clearance or an alternative to a shaft, attach listing. [7.7.2.2]</p>	
14	<p>Fire-resistance rating for the duct's shaft = _____</p>	
15	<p>When the clearance between the heat source and grease removal device is less than 18", protection such as a steel baffle plate will be provided in conformance with 6.2.2. (e.g., between the appliance's flue outlet and the hood's filter for high-mounted salamanders, woks).</p>	
16	<p>The following minimum is provided between deep fat fryers and the surface flames from adjacent equipment (circle one): [12.1.2.4 and 5]            16" space / 8" high steel</p>	
17	<p>The fire suppression complies with NFPA 96, the manufacturer's specifications, and one of the following: UL300 or ULC/ORD 1254.6 or UL197.</p>	
18	<p>The manual activation of the fire extinguisher is located in the egress path in a familiar location for kitchen staff to use and is <math>\geq 42"</math> &amp; <math>\leq 48"</math> above the floor. [10.5.1 and 11.1.4]</p>	
19	<p>If there is a fire alarm system, the kitchen fire suppression (circle one) [NFPA 96 10.6.2]:            annunciates as a separate zone on the building's fire alarm system and annunciates separately from other kitchen fire suppression system(s) that are on different storey(s).            shares activation with the local fire alarm zone since there are no other available zones in the existing panel.</p>	

## K2 - Kitchen Ventilation Details Checklist cont'd

No.	Item	Professional's initials signifying project complies (or mark N/A)
20	For all the hoods on one ventilation system, all <b>sources of fuel</b> to all appliances will <b>shut off</b> upon fire suppression activation in any one of the hoods, including shut off of gas to all appliances under the hoods and shut off of electric power to electrical outlets under the hoods. [10.4 and 4.1.7]	
21	Under non-fire conditions, the following are <b>interlocked</b> : <ul style="list-style-type: none"> <li>make-up air and exhaust so that they operate together</li> <li>if applicable, direct-fired make-up air heater and exhaust so the heater can only operate if the exhaust is on [VBBL-B<sup>2</sup> 6.2.3.11.(2), ULC-S647-05 6.5, B149.1-05 7.20.3 (b)]</li> </ul> Start-up sequence will be as follows, with shut-down in reverse order: i) make-up air fan, ii) exhaust fan, iii) direct-fired make-up air heater, iv) cooking equipment	
22	(circle one) [4.1.7]: <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">All access panels are accessible from within the cooking operator's suite or via common property.</div> <div style="width: 45%;">All access panels are accessible to the landlord and attached is a letter from the landlord either confirming that the landlord will provide the maintenance or confirming that the landlord gives permission to this tenant to access the panels not in the tenant's area for maintenance.</div> </div>	
23	Min. 3 ft clearance will be provided beside all access panels for an exhaust cleaner to work. [4.1.8]	
24	Safe work areas are provided around fan(s) and beside access panels c/w provisions for fall protection. [A.7.8.2.2, WorkSafeBC, Kitchen Ventilation Guidelines Section VII]	
25	<p>The exhaust and make-up air fans have been chosen so that their noise levels are in compliance with the Vancouver Noise Control By-law No.6555, i.e., at 1.2 m above the ground at the property line in a Quiet Zone, the noise will be not more than 55 dBA<sup>3</sup> between 7 am and 10 pm (10 am - 10 pm Sundays and holidays) and will not be more than 45 dBA between 10 pm and 7 am (10 am - 10 pm Sundays and holidays). (Refer to the Noise Bylaw for the higher permitted maximum noise levels in Intermediate and Activity Zones: <a href="http://vancouver.ca/bylaws/79247.htm">http://vancouver.ca/bylaws/79247.htm</a>)</p> <p>Where there are dwelling units within the building or in an adjacent building (even in Intermediate or Activity Zones), the fan(s) will not create more noise than permitted by the above Quiet Zone criteria when measured from inside those dwelling units. Note: conditions to consider are reflections off the immediate wall(s) or roof that the fan is mounted on ("directivity factor" increases in corners), reflections off neighbouring building surfaces, insulating the ducting for noise reduction, etc.</p> <p>Since traffic noise is typically the assumed noise source that exterior walls have been acoustically designed for to satisfy the max. noise criteria in the Zoning &amp; Development By-law (e.g., max. 35 dBA in Zone C-3A bedrooms), the kitchen ventilation fans have been designed to create no more noise than the estimated outside traffic noise.</p>	

<sup>2</sup> "VBBL" means 2007 Vancouver Building By-law No.9419; "-B" means "Division B" of the By-law.

<sup>3</sup> The following formulas are provided as reference only:

$$L_p = L_w + 10\log_{10}Q - (20\log_{10} d) - 11, \text{ where}$$

$L_p$  is sound pressure level at distance  $d$  from sound source [dB]

$L_w$  is sound power level of sound source [dB]

$Q$  is directivity factor associated with the way sound radiates from sound source [hemisphere = 2]

$d$  is distance from acoustic center of source to distant point [m]

Where the sound is radiating hemispherically, the following are reasonable approximations.

$dBA = 33.2\log_{10}(\text{Sones}) + 28$ , where dBA is the sound pressure level at 1.5 m from the fan (i.e., conversion from Sones to dBA).

$\Delta dBA = -20\log_{10}(1.5/d)$ , where  $d$  is the distance from the fan [m] and  $\Delta dBA$  is the loss in sound pressure level from the fan to the distance  $d$ .

## K2 - Kitchen Ventilation Details Checklist cont'd

No.	Item	Professional's initials signifying project complies (or mark N/A)									
26	<p>Exhaust canopy is (circle one) [8.2.2]:</p> <p style="text-align: center;">ULC listed / not listed</p> <p>If not listed, complete the following:</p> <p>Circle the applicable cfm/sq.ft.*:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>canopy open on ≤ 3 sides</th> <th>canopy open on 4 sides</th> </tr> </thead> <tbody> <tr> <td>≤ Medium-duty* appliances</td> <td>80 cfm/sq.ft</td> <td>125 cfm/sq.ft</td> </tr> <tr> <td>Heavy-duty* appliances</td> <td>100 cfm/sq.ft</td> <td>150 cfm/sq.ft</td> </tr> </tbody> </table> <p>Exhaust fan min. required size is:</p> <p>Hood size = (   ft   in) x (   ft   in) x (   cfm/sq.ft) =   cfm</p> <p>2<sup>nd</sup> hood size = (   ft   in) x (   ft   in) x (   cfm/sq.ft) =   cfm</p> <p style="text-align: right;">Total min. req'd =   cfm</p> <p>Exhaust fan provided =   cfm.</p> <p>* Note: "lineal ft" is not used since the hood size may not be the assumed typical 3'-6" to 3'-10" width.</p> <p><u>Medium-duty</u> cooking appliances include electric discrete element ranges (with or with out oven), electric and gas hot-top ranges, electric and gas griddles, electric and gas double-sided griddles, electric and gas fryers (including open deep fat fryers, donut fryers, kettle fryers, and pressure fryers), electric and gas pasta cookers, electric and gas conveyor pizza ovens, electric and gas tilting skillets (braising pans) and electric and gas rotisseries.</p> <p><u>Heavy-duty</u> cooking appliances include electric under-fired broilers, electric chain (conveyor) broilers, gas under-fired broilers, gas chain (conveyor) broilers, gas open-burner ranges (with or with out oven), electric and gas wok ranges, and electric and gas over-fired (up right) broilers and salamanders. [ref. IMC 2003, Section 202 General Definitions]</p> <p>Note: these requirements are the minimum. The professional engineer is responsible to assure adequate exhaust for capture and containment of the grease-laden vapours, smoke, gas and products of combustion [8.2.2].</p>		canopy open on ≤ 3 sides	canopy open on 4 sides	≤ Medium-duty* appliances	80 cfm/sq.ft	125 cfm/sq.ft	Heavy-duty* appliances	100 cfm/sq.ft	150 cfm/sq.ft	
	canopy open on ≤ 3 sides	canopy open on 4 sides									
≤ Medium-duty* appliances	80 cfm/sq.ft	125 cfm/sq.ft									
Heavy-duty* appliances	100 cfm/sq.ft	150 cfm/sq.ft									
27	<p>For listed and non-listed hoods, min. exhaust fan requirement (vertical area around hood perimeter) [8.2.2.2]:</p> <p style="text-align: right;">(2<sup>nd</sup> hood)</p> <table style="width: 100%;"> <tr> <td style="width: 50%;"> <p>Total of hood's perimeter with open sides (   ft   in)</p> <p>x height between top of appliances and hood (   ft   in)</p> <p style="text-align: right;">x 50 cfm/sq.ft.</p> </td> <td style="width: 50%;"> <p>(   ft   in)</p> <p>(   ft   in)</p> <p style="text-align: right;">x 50 cfm/sq.ft.</p> </td> </tr> <tr> <td colspan="2" style="text-align: right;"> <p>Total min. req'd* =   cfm   cfm</p> </td> </tr> </table> <p>Exhaust fan provided =   cfm.</p> <p>* The required total min. may be reduced where all of the following are provided:</p> <ol style="list-style-type: none"> <li>The proposed value has been tested in conformance with ASTM 1704-05, "Standard Test Method for Capture and Containment Performance of Commercial Kitchen Ventilation Systems" using thermal imaging (such as schlieren or shadowgraph) for capture and containment (C &amp; C) validation. When other methods are used for C &amp; C validation (such as smoke or helium bubbles), a 20% uncertainty factor must be added to the ASTM 1704 threshold of C &amp; C values.</li> <li>Provisions are included to adequately address heat gain to space (ASTM F2474 and the room's heat load).</li> <li>The make-up air is introduced through low velocity devices as defined and diagrammed in ASTM F1704 such as displacement diffusers, a screened wall toward the face of the hood, or perforated diffusers at the ceiling with a max. average face velocity of 75 fpm.</li> </ol>	<p>Total of hood's perimeter with open sides (   ft   in)</p> <p>x height between top of appliances and hood (   ft   in)</p> <p style="text-align: right;">x 50 cfm/sq.ft.</p>	<p>(   ft   in)</p> <p>(   ft   in)</p> <p style="text-align: right;">x 50 cfm/sq.ft.</p>	<p>Total min. req'd* =   cfm   cfm</p>							
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<p>Total min. req'd* =   cfm   cfm</p>											

## K2 - Kitchen Ventilation Details Checklist cont'd

No.	Item	Professional's initials signifying project complies (or mark N/A)
28	<p>Exhaust duct velocity. Required to be <math>\geq 500</math> fpm and <math>\leq 1800^*</math> fpm [8.2.1]</p> <p>Duct 1 = (   " ) x (   " ); Exhaust flow =       cfm; <math>\Rightarrow</math>       fpm †</p> <p>Duct 2 = (   " ) x (   " ); Exhaust flow =       cfm; <math>\Rightarrow</math>       fpm †</p> <p>Duct 3 = (   " ) x (   " ); Exhaust flow =       cfm; <math>\Rightarrow</math>       fpm †</p> <p>† = from Ductulator  * = 1800 fpm may be exceeded in existing ducts where not upgrading is justified by energy utilization life cycle analysis</p>	
29	<p>Make-up air supply fan size:  Is make-up air fan direct-fired? (circle one):                      yes   /   no</p> <p><u>Make-up air supply fan</u>   =       cfm   =       %  Kitchen exhaust fan       cfm</p> <p>Some requirements:  a) If not direct-fired, min. = 80%  b) If direct-fired and openings between kitchen and public area <math>\leq 16</math> ft<sup>2</sup> (can exempt normally closed doors), then <math>\geq 90\%</math> and <math>\leq 110\%</math>.  c) If direct-fired and openings between kitchen and public area <math>&gt; 16</math> ft<sup>2</sup>, then <math>\geq 95.2\%</math> and <math>\leq 100\%</math></p>	
30	<p>Efficiency for air distribution in supply air duct work. Requirement: <math>\leq 0.1</math> "WG loss/100 ft</p> <p>Supply Duct = (   " ) x (   " ); Supply fan =       cfm; <math>\Rightarrow</math>       "WG/100ft †</p> <p>Supply Duct = (   " ) x (   " ); Supply fan =       cfm; <math>\Rightarrow</math>       "WG/100ft †</p> <p>Supply Duct = (   " ) x (   " ); Supply fan =       cfm; <math>\Rightarrow</math>       "WG/100ft †</p> <p>† = from Ductulator</p>	
31	The make-up air will be tempered. [VBBL-B 6.2.3.11.(3)]	
32	<p>For the make-up air duct, insulation is provided around its       interior   /   exterior</p> <p>If it's inside the duct, the duct size versus the net area for air flow has been clarified on the drawings, and the calc's in #30 are based on the net area. [VBBL-B 6.2.3.8.(11) &amp; 9.32.3.9.(4)]</p>	
33	The <b>make-up air discharge</b> has been designed such that the air flow will not interfere with the hood's ability to capture and contain the grease-laden cooking vapours (number of outlet locations and the direction, quantity, and velocity of air flow). [VBBL-B 6.2.3.11.(1), 8.2.2]	
34	The <b>make-up air intake</b> has been located away from existing neighbouring exhausts, etc., such that air entering the building system will not contain more contaminants than the normal exterior air in the building's locality. [VBBL-B 6.2.3.12.(2)]	
35	Structural drawings (or certification of adequacy of structure) have been provided. Issues addressed include penetrations through roof, penetrations through load-bearing walls, support for fan units, support for an ecology unit, etc.	
36	If applicable, "Design Considerations for Development Permit" issues have been included on the drawings (refer to Section V, Kitchen Ventilation Guidelines).	