Technical Note

Project	Greville Street				
Reference	Planning Condition 14				
Scope	Separation of ventilation intake and exhaust grilles				
Date	26.01.2021	**Job number**	J3304	**Author**	Andrew Lerpiniere

Planning Condition 14 – Separation of ventilation intake and exhaust grilles

Building Regulations part F, notes in table D1, 'Guidance on ventilation intake placement for minimising ingress of pollutants', in relation to 'local static sources' of pollution, which in this context could be taken to including general building exhausts, that 'some guidance is given in CIBSE TM21'.

CIBSE TM21 *Minimising pollution at air intakes* notes 'Ventilation exhausts and other HVAC equipment' as a 'source of pollution' and that there are particular;

issues with exhausts from fume cupboard systems, special extract systems (e.g. from print rooms or kitchen areas). However, even extract systems from 'normal' occupied areas will contain the pollutants generated by internal sources (see 2.5.2). These may result in an odour nuisance rather than a health hazard, but such potential problems should be identified and designed out wherever practicable.

Section 3.5 in this document discusses the location of 'Ventilation exhausts' and provides 'simple guidelines' from ASHRAE and more detailed calculation methods for assessing the impact of recirculation on roof inlets and outlets. There is no clear guidance on separation required or advised between wall-mounted air intake and exhaust vents.

Recommendation on minimum distance between air intake and exhaust openings is provided in prEN 13779:

Ventilation for non-residential buildings — Performance requirements for ventilation and room-conditioning systems

This document includes a clear set of diagrams and calculation methodology:

prEN 13779:2006 (E)

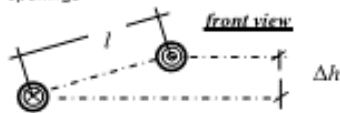### Table A.2 Minimum distance between air intake end exhaust openings

TABLE. Minimum distance between ventilation intake and exhausts

Legend:

α, β = angles of pitched roof or slant façade (angle between straight and dotted line)

Δh = vertical height
l = length of line connecting the centers of the two openings

front view

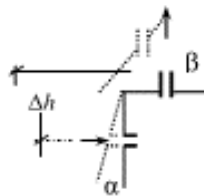q_v = required capacity of ventilation exhaust in l/s
B = capacity of combustion device in kW

A   situation with ventilation exhaust
B   with flue gas exhaust (gasfired boiler)
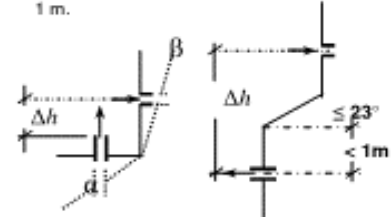C   with flue gas exhaust (other fuels combustion)

1.
Intake in façade below or equal to exhaust in adjacent (pitched) Rooftop. Intake in pitched roof (≥ 23°) below an exhaust in an adjacent roof with angle ≤ 23°

$0° \leq \alpha < 15°$ AND $0° \leq \beta < 75°$ OR
$15° < \alpha \leq 67°$ AND $0° \leq \beta < 23°$

A. $l + 2\ \Delta h > 0,308 * \sqrt{q_v}$
B. $l + 2\ \Delta h > 0,613 * \sqrt{B}$
C. $l + 3,38\ \Delta h > 2,051 * \sqrt{B}$

2.
Intake in façade above exhaust in adjacent (pitched) rooftop. Intake in façade above exhaust in lower part of the façade whereby the façade is divided by a roof-plane. The distance from exhaust to the roof-edge of the protruding lower façade should be less than 1 m.

$\leq 23°$
$< 1m$

$0° \leq \alpha < 15°$ AND $0° \leq \beta < 15°$

A. $l + \Delta h > 0,308 * \sqrt{q_v}$
B. $l + \Delta h > 0,613 * \sqrt{B}$
C. $l + \Delta h > 3,030 * \sqrt{B}$

3.
Intake in a façade below or equal to exhaust in the façade.

$0° \leq \alpha < 15°$ AND $0° \leq \beta < 15°$

A. $2l + \Delta h > 0,308 * \sqrt{q_v}$
B. $l > 0,2 * \sqrt{B}$
C. not applicable

4.
Intake in a façade above exhaust in the façade.

$0° \leq \alpha < 15°$ AND $0° \leq \beta < 15°$

A. $3,071 - \Delta h > 0,613 * \sqrt{q_v}$
B. $1,541 - \Delta h > 0,308 * \sqrt{B}$
C. not applicable

5.
Intake in a flat or slightly slant roof-plane below or equal to an exhaust in the same or an adjacent part of the roof, also flat or slightly slant (maximum pitch < 23°).

$0° \leq \alpha < 23°$ AND $0° \leq \beta < 23°$

A. $l + \Delta h > 0,613 * \sqrt{q_v}$
B. $l + \Delta h > 1,250 * \sqrt{B}$
C. $l + 2,954\ \Delta h > 3,030 * \sqrt{B}$

The situation at Greville Street is described by case 3, situation A; ventilation intake and exhaust installed in the façade at equal levels:

$2l + delta h = 0.308.SQR(q)$

Where:

l = minimum recommended centreline distance between intake and exhaust

h = height between intake and exhaust, in our case h = 0

q = air flow rate in l/s, in our case q = 427 l/s

calculating for q = 427 l/s, gives l = 3.2m

The centreline distance as shown in the drawings previously issued against this planning condition (planning condition 14) between intake and exhaust of was 3.115m i.e. a little below requirements.

The design solution is to reduce the grille sizes to 900mm wide (from the current 1000mm wide) to increase the centreline separation to 3.215m to satisfy the requirements as set-out in prEN 13779.

Other points to note:
- The occupants can open windows to increase fresh-air intake.
- The separation distance has been set to meet the criteria at maximum air flow rate. The air flow rate will vary in response to measured CO_2 levels in the office and will generally run at less than 427l/s. The design conforms to separation guidelines under all air-flow conditions.