

## LABSS INFORMATION PAPER INFOP41

### Mandatory Standard 2.9/2.14 Ventilation of Escape Routes – Automatic opening external wall ventilators

#### Information for verifiers

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#### Document Version Control.

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## Purpose

The purpose of this information paper is to provide clarity on the method of measurement in respect of automatic opening ventilators (AOV).

## Background Information

An enquiry was made to the Scottish Building Standards Hub (SBSH) seeking clarity on the appropriate method of measurement to be used in determining the size of an AOV. Clarification was sought if this was a *geometric area*, geometric free area, or *aerodynamic area*.

This enquiry was sent to the consortium lead technical representatives to gain feedback on such considerations.

### Conclusion

The method of measurement for an AOV would be the *geometric area*. The handbooks only reference the *geometric area* requirement, and in most situations, such as when a design follows the guidance in the Technical Handbooks, this may be the only necessary consideration.

Depending on the nature of the AOV and overall design principles for the project, further reference may be required to BS EN 12101-2:2017, in terms of consideration of *aerodynamic free area*.

The Building Standards Division (BSD) concur with the conclusion noted above which can be considered as applicable to the following guidance clauses.

Domestic Technical Handbook (DTH)		
2.9.10	Table 2.6	Escape routes from flats and maisonettes
2.14.2	Table 2.8	Fire and rescue service facilities
2.14.6	Stairs	1.0m <sup>2</sup> at top of stair, <b>or</b> 0.5m <sup>2</sup> on each storey.
2.9.15/2.14.6	Lobbies	1.5m <sup>2</sup> on external wall, or 1.5m <sup>2</sup> shaft area, and 1.0m <sup>2</sup> inlet lobby vent to shaft and 1.0m <sup>2</sup> at head of stair
Non Domestic Technical Handbook (NDTH)		
2.14.2	Table 2.16	Fire and Rescue Service facilities
2.14.6	Stairs	1.0m <sup>2</sup> at top of stair, <b>or</b> 0.5m <sup>2</sup> on each storey.
2.14.6	Firefighting Lobbies	1.0m <sup>2</sup> on external wall.

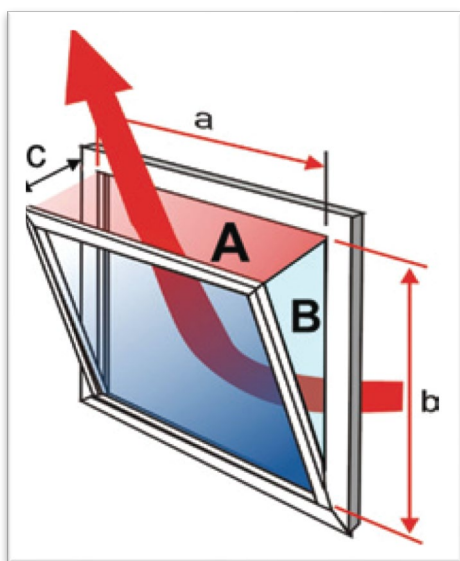
## Definitions from BS EN 12101-2:2017

*Geometric area* - means area of the opening through a natural smoke and heat exhaust vent (NSHEV), measured in the plane defined by the surface of the construction works, where it contacts the structure of the NSHEV. (No reduction is made for controls, louvres, or other obstructions). It is calculated by multiplying the width and the length of the opening.

*Aerodynamic free area* - means the geometric area multiplied by the coefficient of discharge. This is calculated using BS EN12101. The flow coefficient can range between 0.3 to 0.96 dependent on angle and position of opening window, which is represented by  $C_v$ .

The geometric free area, which is sometimes referenced, is not defined within BS EN 12101-2:2017 and is commonly considered to be the actual area of the vent that allows the smoke to pass through. It may be the size of the rectangle area if the window opens 90 degrees.

**Figure 1**



**Please note** Figure 1 has been provided for illustrative purposes only. EN 12101-2:2017 notes a 'small opening angle' as being 60 degrees or less. Where a lesser opening angle is proposed, further reference should be made to EN 12101-2:2017 and supporting calculations may be required. For roof vents anything less than an angle of 120 degrees may lead to negative discharge, in which case further reference should be made to EN 12101-2:2017.

*Geometric Area* =  $a \times b$

*Geometric Free Area* =  $A + B$

*Aerodynamic free area Area* =  $a \times b \times C_v$

## Further consideration for domestic buildings - Operation of Automatic Opening Ventilators (AOV)

Only the automatic smoke ventilators on the fire floor should open, and the remaining smoke ventilators should remain closed.

With the escape strategy being a "defend and stay in place" for the remaining occupied flats on the upper levels, any smoke passing from the fire floor may pass into the upper-level lobbies through any open ventilators. With smoke entering these non-fire floor lobbies, this

could cause confusion to the occupiers, as to the fire location, which would then affect firefighting operations and the possible further evacuation these flats by the Scottish Fire and Rescue Service.

This is clarified within guidance clause 2.9.15 of the DTH which states:

Automatic opening external wall ventilators - every protected lobby should be provided with natural smoke vents on an external wall which have an area of at least 1.5 m<sup>2</sup> that discharges smoke direct to the external air. The ventilators should be actuated automatically by means of smoke detectors in the common space.

In reference to a natural smoke shaft, guidance clause 2.9.15 also states:

On detection of smoke in the protected lobby, the ventilator on the fire floor, the ventilator at the top of the smoke shaft and the 1m<sup>2</sup> ventilator at the head of the stairway should all open simultaneously. The ventilators from the protected lobbies on all other storeys should remain closed.

Further considerations and information on the provision of heat and smoke control are contained within DTH guidance clause 2.9.15 and NDTH guidance clause 2.14.6.

End.