

TECHNICAL NOTE

Smoke ventilation of the South Block common stair

Options appraisal and justification for a roof-mounted automatic opening vent (AOV)

Project	99 Crane Street, Salisbury — Grade I listed building (refurbishment & change of use)
Subject	Smoke ventilation of the South Block common stair: options appraisal and justification for a roof-mounted automatic opening vent (AOV)
Prepared for	Clydesdale Developments
Prepared by	Mark Wilson, MSAFE FIRE Ltd
Reference	117-TN-01
Revision	1
Date	18 June 2026
Status	For issue

1. Purpose of this note

This note has been prepared by MSAFE FIRE Ltd to explain why an automatic opening vent (AOV) is required to the common stair serving the upper-floor flats in the South Block, to set out the options that have been considered for providing it, and to justify the proposed roof-mounted vent as the minimum intervention necessary.

It addresses the fire-engineering necessity for the vent and the engineering options for providing it. The precise location, form and finish of the vent, and the overall heritage balance, will be developed with the project architect, Radley House Partnership (RHP), and the project's heritage adviser.

2. Background

The development refurbishes and converts the Grade I listed building at 99 Crane Street, Salisbury. The South Block retains existing upper-floor flats (Flats 1a, 1b and 2) served by a single internal common stair, with works taking place at ground-floor level to convert existing offices into a residential flat.

That common stair is the sole protected escape route from the upper-floor flats down to the final exit, and the route by which the Fire & Rescue Service would gain access.

The fire strategy is based on BS 9991:2024 and the functional requirements of the Building Regulations 2010 (Schedule 1, Requirement B1 — means of warning and escape). A sprinkler/water-mist system is due to be installed throughout the flats as a compensatory measure for the extended firefighting hose distance (subject to listed building consent).

3. Why smoke ventilation of the stair is necessary

Where a building is served by a single common stair, that stair has to remain usable for escape — and for firefighting access — throughout a fire in any one flat. Smoke can enter the stair, for example when a flat entrance door is opened by an escaping occupant. If it is not vented, the smoke can accumulate and render the only escape route untenable.

For this reason, BS 9991 and Approved Document B require smoke ventilation of the common stair. Without it, the design would not satisfy Requirement B1. The proposed sprinkler / water-mist system controls the size of a fire but does not, on its own, remove the need to ventilate smoke from the stair; the two measures work together to address different risks.

4. What the vent needs to achieve

Heat and smoke are buoyant and collect at the highest point of the stair, so the most effective position for a vent is at the head (top) of the stair. That position is formed by the roof, which is why the natural location for the vent is at roof level.

Because the building is well below 18 m in height, natural smoke ventilation by an AOV is appropriate. (Above 18 m, natural vents are no longer accepted and mechanical systems would be required — which is not the case here.)

The vent will be a tested unit to BS EN 12101-2, opened automatically by smoke detection within the stair, and sized to the aerodynamic free area required by ADB1 (indicatively in the order of 1 m² for a stair, with the final figure confirmed at detailed design). In accordance with BS 9991:2024 we have further reduced the required free area of the vent to 0.7m² which will further reduce intrusive works and visual impact.

5. Options considered

The following options were considered for providing the required smoke ventilation. They are compared below against compliance and impact on the listed fabric.

Option	What it involves / compliance	Impact on the listed fabric	Assessment
1. Roof-mounted natural AOV at the stair head (proposed)	A vent formed in the roof directly above the head of the stair, opening automatically on smoke detection. Natural ventilation, appropriate for a building below 18 m. Meets Requirement B1 and BS 9991:2024.	Localised — confined to the roof slope over the stair. Can be a low-profile / conservation-style rooflight, kept to the minimum size and installed reversibly.	Preferred: effective and the least intrusive compliant option.
2. High-level vent in an external wall	A vertical AOV or openable vent in an external wall near the top of the stair. The stair head sits at second floor, with no external wall at the level required; a façade vent would also sit below the smoke layer and perform poorly.	Introduces a new, visible opening into a listed elevation — generally more prominent and more harmful than a discreet roof vent, and may not be achievable.	Discounted: not feasible / greater harm.

Option	What it involves / compliance	Impact on the listed fabric	Assessment
3. Mechanical ventilation, smoke shaft or stair pressurisation	Fans, ductwork or a smoke shaft, power supply and a control panel. Technically compliant, but intended for taller or larger buildings and disproportionate for a single low-rise stair.	Substantially more new fabric, penetrations, plant space and permanent services, plus ongoing maintenance — significantly greater impact.	Discounted: disproportionate. May be impossible due to air tightness of building.
4. No smoke control (retain roof as existing)	No vent provided. The single escape stair could become smoke-logged during a fire. Does not meet Requirement B1 or BS 9991:2024.	No impact on the fabric, but the arrangement is unsafe and unlawful — the upper flats could not be occupied in this scenario.	Not an available option: non-compliant.

6. Preferred Option – Automatic Opening Roof Vent

In our opinion, a discreet roof-mounted AOV at the head of the stair — is the best solution to meet Building Regulations requirements / BS9991, is minimally intrusive and therefore sensitive to Listed Building status. The alternatives are either non-compliant (Option 4), technically unworkable in this location (Option 2), or significantly more harmful and disproportionate (Option 3).

The most effective and compliant location for the vent is the top of the stair, and the top of the stair is formed by the roof. A vent through the roof is therefore unavoidable if the conversion is to proceed safely and lawfully; no internal or below-roof alternative achieves the required performance.

We recommend the following measures, to be developed with RHP and the heritage adviser, to keep the impact to a minimum:

- Locate the vent on the least sensitive roof slope consistent with it remaining over the stair (for example a concealed or rear pitch away from principal public views).
- Use a low-profile, conservation-style rooflight or vent that sits close to the roof plane, in materials and finish sympathetic to the existing covering.
- Keep the opening to the minimum size needed to achieve the required free area.
- Install reversibly so far as practicable, retaining and re-using original materials and reinstating disturbed fabric on a like-for-like basis.
- Carry out photographic / measured recording of the affected roof area before works, with the works undertaken by a specialist heritage roofing contractor.

7. Conclusion

Smoke ventilation of the South Block common stair is a statutory life-safety requirement that cannot be avoided if the upper-floor flats are to remain in residential use under the proposed arrangement. Of the options available, a discreet roof-mounted AOV at the head of the stair is considered the most practical, effective and minimally intrusive approach.

Standards and references

The Building Regulations 2010 (as amended), Schedule 1, Requirement B1 — Means of warning and escape.

Approved Document B (Fire safety), Volume 1: Dwellings.

BS 9991:2024 — Fire safety in the design, management and use of residential buildings. Code of practice.

BS EN 12101-2 — Smoke and heat control systems. Specification for natural smoke and heat exhaust ventilators.