

# Living Walls and Roofs – 12 Top Tips

Version: 1.0

Date: 7<sup>th</sup> February 2025

**Living walls and roofs provide a number of environmental benefits, however, also introduce risks that require careful management.**

**This Loss Prevention Standard outlines the main risk concerns and provides 12 Top Tips to help reduce the risks of loss or damage associated with living roofs and walls.**



# Living Walls and Roofs – 12 Top Tips



## Introduction

Aviva Loss Preventions Standards **Living Walls – Design and Installation; Living Walls – Ongoing Care; Living Roofs – Design and Installation** and **Living Roofs – Ongoing Care** provide a detailed overview of the main risks associated with living architecture. This Loss Prevention Standard summarises these risks and provides 12 Top Tips to help design, install and maintain living walls and roofs.

**Note:** This document relates to living wall and roofs and is focussed on Property loss prevention and related risk management guidance. It is not intended to address living roofs used for agricultural purposes or Liability exposures. The presumption is that all regulatory requirements, such as Fire Risk Assessments and compliance with local building regulations, codes, or standards, have or will be met.



## Understanding the Risks

**Combustibility.** Living architecture should be considered as combustible construction. The foliage can be combustible during prolonged periods of dry/hot weather and some of the components, e.g., some membrane and moisture layers etc., may also be combustible.

**Irrigation Systems.** Living wall and some living roof systems require irrigation, which can be damaged, under designed or poorly performing, potentially allowing planting to dry out and becoming susceptible to ignition and aiding fire spread. Even systems relying on manual watering can be overlooked in the event of role or job changes, property occupancy and changes in ownership etc.

**Fire Breaks.** Fire breaks built into the design to prevent or slow fire spread may be corroded over time, removed, or damaged etc.

Common ignition hazards include, but are not limited to:

**Electrical.** Damaged, faulty, incompatible, incorrectly installed or maintained electrical equipment e.g. lighting etc., can lead to ignition of foliage, particularly during dry spells.

**Hot works.** Poorly managed hot works such as brazing, welding, grinding etc., undertaken on or in proximity to living walls and roofs, can ignite combustible roofing materials and dried foliage.

**Arson.** Deliberate ignition of combustible elements including or dry foliage.

**Heating.** Incompatible fixed or temporary heating systems can overheat and ignite or suffer electrical fault.

**Smoking.** Discarded smoking waste can ignite vegetation, especially in warm/dry periods.

**Catering.** Inappropriate portable cooking appliances, such as solid fuel barbecues, can be used in proximity to living walls and roofs.

**Fireworks.** Accidental or malicious targeting of living architecture can ignite combustible foliage.

In addition, the presence of living walls and roofs increases the potential for water related damage to buildings as a result of leaks, drainage faults etc., as well as wind related conditions; possible root damage to membranes and components; and business interruption losses should buildings need to be fully, or part closed following related loss or damage events.

## Managing the Risks

### 1. Designer and Installer Competence

Ensure competent and experienced living wall and/or roof designers and installers are utilised. A collaborative approach between designers, architects, installers, fire engineers and the Property Insurer and Broker can help ensure the project is designed to be resilient, as well as compliant with regulatory building requirements, standards, or codes.

- Ensure the structural integrity of the building is compatible with the weight loading imposed by the living architecture.
- Use systems and components that are reputable and suited for the type and size of the installation.

### 2. Ignition Management

Fire presents a significant risk to living architecture and ignition hazards need to be carefully managed.

- Hot work should be the last resort for repairs etc., within 10m of the living wall and/or roof. The Aviva Loss Prevention Standard **Hot Work Operations** should be followed where hot works are unavoidable.
- Ensure electrical installations, including any outlets and electrically powered monitoring equipment used within or in proximity to the living wall and/or roof, and any replacement components, are suitably rated for use in such systems.
- Lighting should be mounted to non-combustible structural materials; be low heat emitting and be suitably rated for external use where applicable.
  - ✓ This also applies to temporary lighting installed for display or seasonal purposes.
- Smoking should not be permitted on, or within 10 metres proximity of any living wall and/or roof systems.
- Prohibit the use of catering equipment on or in proximity to living walls and/or roofs where possible.
  - ✓ Where this is not possible, avoid the use of solid fuels and ensure only electric or gas fired equipment are used, and only whilst mounted on non-combustible surfaces sited at least 5 metres from living walls and/or roofs.
  - ✓ Any fuel cylinders should be safely secured in a non-combustible store when not in use.
- Heating systems should be suitable for use near potentially combustible living wall and/or roof systems, and be permanently secured and mounted on non-combustible structural materials.
  - ✓ Utilise fire breaks between the heating appliances and living roofs of at least 1 metre.
  - ✓ Fire-pits, chimineas and other open type heating appliances are not suitable for use on or near buildings featuring living architecture, nor are heaters that use liquid fuels such as kerosene or ethylene.
- Ensure lightning protections extend from the property to the structure and any living wall and/or roof components and tall planting as necessary.

### 3. Fire Growth/Spread

Consider how the risks of fire growth/spread can be minimised, managed and/or mitigated. These actions include, but are not limited to:

- Ensuring living walls and/or roofs are adequately watered. The risk of fire significantly increases as living architecture dries.
- Installing living walls and/or roofs on non-combustible and fire resisting construction elements.
  - ✓ Ensure any penetrations are fire stopped to the same fire resistance rating (insulation and integrity) as the supporting wall and/or roof.
  - ✓ Further guidance is provided in Aviva Loss Prevention Standards **Living Walls – Design and Installation** and **Living Roofs – Design and Installation**.

- Siting bins, bin stores or other combustible storage at least 10 metres from living walls and fully prohibiting on living roof systems.
- Only utilising non-combustible permanent fixtures such as planters, seating, furniture or finishings in proximity.
  - ✓ Timber decking areas are not recommended on or near living architecture.
  - ✓ Any combustible furnishings provided should be secured away from the roof when not in use.
- Installing regular fire breaks within the living wall and/or roof; around openings and vertical construction elements can help prevent or slow fire spread. Refer to Aviva Loss Prevention Standards **Living Walls – Design and Installation** and **Living Roofs – Design and Installation** for detailed guidance on fire breaks.
- Where possible, membranes, linings etc., within the living wall and/or roof systems should be non-combustible.

#### 4. Irrigation Systems

Irrigation systems should be engineered to deliver adequate volumes of water to ensure the living wall and/or roof can maintain sufficient moisture. Periods of time in direct sunlight and the built environment will impact this.

- Separating irrigation systems into a number of zones, capable of separate isolation, can help prevent drying during protracted maintenance and repairs.
- Ensure the irrigation systems are adequately monitored and alerts are provided to trained persons.
- Ensure appropriate water treatments are utilised to prevent the build-up of mineral deposits.
- Install and monitor water level meters to help ensure water levels remain within required thresholds.
- Ensure any sprinkler heads are adequately fixed to avoid equipment being re-sited or wind-blown.
- Where water tanks are installed on roofs, ensure the surface can accommodate the additional weight loading.

#### 5. Planting

Selective planting can help in maintaining healthy living walls and roofs, reducing the risks of loss or damage.

- Hardier plants and sedums should also be considered for roofs with limited or access, where regular watering would be challenging.
- Some plants have a high oil content which increases combustibility and the risks of fire development. These plants may not be ideally suited for warm weather locations.
- Some plants will not prosper in shaded areas, including beneath tall planting and solar photovoltaic (PV) systems and this should be factored into the design.
- A number of plant species are more vulnerable to pests and disease, these plants are likely to require increased levels of maintenance.

#### 6. Solar Photovoltaic Systems

Solar PV systems can be installed on buildings featuring living wall and/or roof systems, however, will need to be closely managed.

- Ensure Microgeneration Certification Scheme (MSC) accredited designers/installers, with experience in installing solar PV systems on living roofs are utilised.
- Utilise a framework that is affixed to the building structure rather than ballasted. This is likely to be more structurally reliable.
- Only install solar PV panels on flush mounted framework and ensure full clearance is maintained between the growing surface and the panels, connectors, junction boxes and cabling.
- Solar PV installations should be fitted with voltage optimisers which increase energy yield and automatically reduce the voltage within faulty panels to safe levels, reducing the potential for fire events.
- Ensure at least 1 metre separation between separate arrays. This acts as a fire break.

- Install skirting around the underside of the solar PV panels to help prevent combustible waste accumulating and deter nesting birds.
- Do not use gravel and pebbles for fire breaks and paths. Birds can drop such material on to solar PV panels causing damage/fire.
- Regularly inspect panels for lichen. This can cause shading of the panels and lead to internal damage, shorting and possible ignition.
- Ensure components such as switchgear, inverters, isolators etc., are installed on non-combustible structural elements away from the living wall and/or roof.

Refer Aviva Loss Prevention Standard **Living Roofs** for more guidance. The following Aviva Loss Prevention Standards also provide useful guidance in managing Solar PV systems:

- ✓ **Roof Mounted Photovoltaic Solar Panel Systems – General Considerations**
- ✓ **Roof Mounted Photovoltaic Solar Panel Systems – Planning for Installation**
- ✓ **Roof Mounted Photovoltaic Solar Panel Systems – Installation and Construction**
- ✓ **Roof Mounted Photovoltaic Solar Panel Systems – Installed and Ongoing Care**
- ✓ **15 Top Tips for Roof Mounted Photovoltaic Solar Panel Systems**

## 7. Wind Exposures

Ensure the wind related risks are fully assessed in the design stage by a competent company ensuring adequate wind deflection and mitigation is incorporated.

- Where self-weighted living roofs are installed, concrete paving/stone edging should be used in preference to ballast, particularly on taller buildings.
- Continuous parapet walls should also be installed on any structures featuring living roofs. This helps deflect wind from the more vulnerable areas of the system.
- Erosion control measures such as netting should be considered, particularly whilst a new living roof establishes itself.
- Avoid the use of moveable pots, planters etc., which can become wind-blown in high winds and damage assets.

## 8. Shearing

Living roofs can be installed on some pitched roofing types, however, will be subject to shear forces that can lead to detachment and collapse.

- The need for anti-shear protections should be assessed in the design, by a competent company/engineer, and considered for roof pitches in excess of 10 degrees.
- The weight of any anti-shear protections should also be factored into the loadbearing calculations.

## 9. Self-Inspection

A programme of regular self-inspections can help ensure issues and developing faults are identified and remedied promptly, potentially avoiding associated loss and damage.

- Introduce formal annual, six monthly and monthly self-inspection programmes for the living architecture and all associated systems. The checklists provided in Aviva Loss Prevention Standards **Living Walls – Ongoing Care and Living Roofs – Ongoing care** provide guidance on the areas to be including within the self-inspection regimes.

## 10. Maintenance

Healthy living wall and/or roof systems require regular maintenance to ensure the risks of loss or damage are managed and minimised.

- Ensure competent and where appropriate accredited companies are used for inspection, servicing, and maintenance of the living architecture and all associated systems including, but not limited to lighting; heating; electrical equipment; lightning protection; irrigation; solar PV equipment; monitoring equipment etc.
- Produce a formal recorded maintenance plan.
  - ✓ Refer to the Aviva Loss Prevention Standard – **Maintenance Regimes** for further guidance.
  - ✓ Routinely audit the maintenance plan to ensure maintenance works are being completed satisfactorily and corrective actions are being addressed.
- Ensure an emergency call out arrangement is in place for irrigation systems, ensuring prompt attendance.
  - ✓ This can significantly reduce the potential for the living wall and/or roof drying and the associated increased combustibility concerns.
- Ensure sufficient spares are retained to support servicing and prompt repairs.
- Ensure like for like replacement parts are utilised wherever possible.

## 11. Fire and Rescue Service

The presence of a living wall and/or roof may create challenging firefighting conditions in the event of ignition, which can be impacted by wind direction and speed.

- Invite local Fire and Rescue Service personnel to inspect the premises to evaluate fire risk exposures, firefighting response and offer guidance.
- Site management should also establish what fire water is available including the static pressure, flows and residual pressure test results, and whether any additional resources, such as a private hydrant system or water storage tanks are necessary.
- Refer to Aviva Loss Prevention Standard **Manual Fire Fighting Water Supplies** for further guidance.

## 12. Emergency Response

An emergency response plan should be produced specifically developed to outline key responsibilities and actions in an emergency event including failure of the primary irrigation system.

- The emergency response plan should include responses to all likely events as described in this Loss Prevention Standard. It should also include the actions key individuals should take during emergency events.
- The emergency response rules should be formally documented, and appropriate training provided.
- Refer to Aviva Loss Prevention Standard **Emergency Response Teams** for further guidance.

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## Sources and Useful Links

- Risc Authority guidance document [Green and Living Walls as External Cladding - A Joint Guide to Managing Risk](#)
- Industry best practice guide [External Cladding: Living Walls and Fire Safety](#).
- [The Green Roof Organisation \(GRO\) Green Roof Code](#)
- [BS EN 1991-1-1 Eurocode 1. Actions on structures - General actions - Densities, self-weight, imposed loads for buildings](#)
- [BS EN 1991-1-3:2003+A1:2015 Eurocode 1. Actions on structures - General actions. Snow loads](#)
- [BS EN 1991-1-4:2005+A1:2010 Eurocode 1. Actions on structures - General actions - Wind actions](#)
- [BS EN 13501-2 - Fire classification of construction products and building elements - Classification using data from fire resistance and/or smoke control tests, excluding ventilation services](#)
- [BS EN 62305 pts 1 to 4 – Protection Against Lightning](#)
- [BS EN 12056-3: Gravity drainage systems inside buildings](#)
- [BS 6229:2018, Flat roofs with continuously supported flexible waterproof coverings](#)
- [BS 8616:2019 Specification for Performance Parameters and Test Methods for Green Roof Substrates](#)

## Additional Information

Relevant Loss Prevention Standards include:

- **Living Walls – Design and Maintenance**
- **Living Walls – Ongoing Care**
- **Living Roofs – Design and Maintenance**
- **Living Roofs – Ongoing Care**
- **Roof Mounted Photovoltaic Solar Panel Systems – General Considerations**
- **Roof Mounted Photovoltaic Solar Panel Systems – Planning for Installation**
- **Roof Mounted Photovoltaic Solar Panel Systems – Installation and Construction**
- **Roof Mounted Photovoltaic Solar Panel Systems – Installed and Ongoing Care**
- **15 Top Tips for Roof Mounted Photovoltaic Solar Panel Systems**
- **Fire Safety Inspections**
- **Fire Compartmentation**
- **Escape of Water and Fluid Leakage**
- **Fire Safety Legislation**
- **Electrical Installations - Inspection and Testing**
- **Emergency Response Teams**
- **Housekeeping - Fire Prevention**
- **Maintenance Regimes**
- **Heat and Smoke Venting Systems**
- **Hot Work Operations**
- **Thermographic Surveys**
- **What is Environmental, Social and Governance**

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7<sup>th</sup> February 2025

Version 1.0

ARMSGI2312025

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