Blue Roofs – 10 Top Tips

Blue roofs provide a number of environmental benefits, however, they also introduce risks that require careful management.

This Loss Prevention Standard outlines the main risk concerns and provides 10 Top Tips to help reduce the risks of loss or damage associated with blue roofs.

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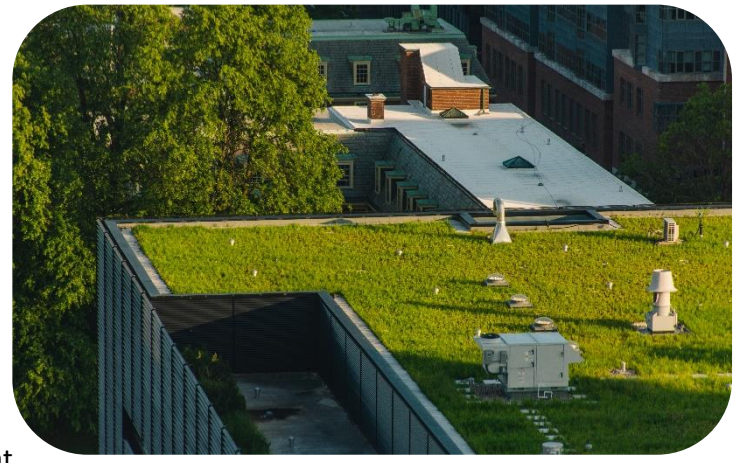
Blue Roofs – 10 Top Tips

Introduction



Aviva Loss Preventions Standards **Blue Roofs – Design and Installation** and **Blue Roofs – Ongoing Care** provide a detailed overview of the main risks associated with blue roof systems.

This Loss Prevention Standard summarises these risks and provides 10 Top Tips to help design, install and maintain blue roofs.

Note: This document relates to blue roofs and is focussed on property loss prevention and related risk management guidance. It is not intended to address 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

- **Leaks**. Leaks from the blue roof system can cause structural damage, particularly where timber construction materials are present.
- **Fire**. Dry/partially dry plastic components in the blue roof system are vulnerable to fire in the presence of ignition sources. Water leaking onto electrical equipment could cause electrical fires.
- **Structural Damage**. Equipment that exceeds the load bearing capacity of the building can cause structural damage.
- **Drainage**. Drainage systems can become blocked, or systems underspecified, which can lead to backing up and water ingress into the building.
- **Insulation**. Exposure to moisture can degrade insulation systems which can lead to increased energy costs and condensation issues.
- **Condensation**. Condensation can affect air handling systems, promote mould growth, cause damp and other damage.
- **Mould and damp**. Mould and damp can affect structural integrity and building finishes, and also lead to earlier deterioration of system components.
- **Freezing**. Frozen standing water can damage the system and block drains and outlets. Freezing water expands, potentially causing structural damage and escape of water-related damage upon thawing. The weight of ice combined with any associated snow can also lead to structural faults.

Managing the Risks

1. Designer and Installer Competence

Ensure competent and experienced blue 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 blue roof system.
- Use systems and components that are reputable and suited for the type and size of the installation.

2. Integrity

Ensuring the blue roof system is compatible with the building and the construction materials is critical, especially in the event of leaks, overflows, etc. The structural engineer should confirm, as a minimum:

- The weight of the blue roof will not lead to structural or other associated damage to the property, including during cold weather periods where snow and ice may accumulate.

  Refer to the Aviva Loss Prevention Standard **Weight of Snow** for further guidance.

- Fire resisting and non-combustible materials have been used wherever possible. Polymer components should be fire retardant where achievable.

  Note: Concrete should be used as the substrate supporting the roof, preferably with a fire resistance rating (insulation and integrity) of at least 90 minutes.

- Where inverted roofs are to be installed, ensure the ballast is sufficient to avoid flotation of plastic components but that it cannot block or damage inlets and drainage.
- The system is designed to accommodate projected rainfall over the specified system lifespan, or is adaptable if added capacity is needed in the future.
- A post-installation waterproofing certificate will be issued, should any installation faults lead to subsequent damage to the building.

3. Drainage Systems

Reduce the potential for water related damage by ensuring:

- Penetrations through the waterproofing layers are minimised.
- The blue roof system is capable of being manually bypassed, with rainwater diverted to normal rainwater drainage.
- Multiple drainage routes, inlets, debris traps and inspection chambers have been incorporated. This relieves pressure and avoids wear.
- At least one emergency overflow is installed per drainage zone in addition to normal drainage outlets.
  - ✓ Emergency overflows should discharge to drains, etc., that are able to safely accommodate the expected volume of water.
- Automatic leak detection devices are installed to drainage systems and other vulnerable areas, incorporating automated valving and piping systems that stop or redirect water flows to ‘lower exposure’ areas.

4. Electrical Equipment

Electrical installations and lightning protection services installed in proximity to the blue roof should be suitably rated for use in or near such systems, and installed in accordance with local regulations, standards or codes.

- Advice should be sought from qualified and accredited contractors/companies.
- All parts should be similarly rated for use in potentially wet environments.
- Lightning risk assessments should be reviewed or completed by a competent person or company.
- Ensure lightning protection systems are adequately separated from the blue roof.
- Terminals, conductor cables and associated fixings should be mounted to non-combustible building elements only and not placed or mounted within or beneath the blue roof system.

Refer Aviva Loss Prevention Standard **Lightning Protection** for further guidance.

5. Condensation

Condensation can lead to mould and other structural issues. Ensure:

- Continuous vapour layers are installed on the warm side of the insulation.
- Thermal breaks (materials with low-conductivity) are installed.
- Insulation is installed above the waterproofing layer where possible.
- Joints and gaps are minimised.
- Integrated moisture detection is installed where humidity and moisture levels in the location could be detrimental to the blue roof system.

6. Cold Weather Conditions

Drainage components should be freeze-resistant to help ensure normal operation during cold weather events.

- The use of trace heating to drainage systems should be considered in cold weather locations.

7. Housekeeping

- Ensure the roof area is well-maintained and clear of waste receptacles and waste, including contractors waste.
- Smoking and the installation of smoking shelters should not be permitted on or within 10 metres proximity of the blue roof system.
- Catering equipment should not be installed or permitted on roofs with blue roof systems, particularly types that use solid fuels e.g. charcoal, wood pellets or chips, etc. Other catering equipment types should only be used on non-combustible surfaces and sited at least 5 metres from blue roof systems. Ensure fuel cylinders are stored safely.
- Ensure system chemical cleaning agents used in the blue roof system are compatible with the components and stored in chemical cabinets.

Refer to the Aviva Loss Prevention Standard **Housekeeping** for further guidance.

8. Solar Photovoltaic Systems

Solar PV systems installed on buildings featuring blue roof systems should be closely managed.

- Ensure Microgeneration Certification Scheme (MCS) accredited designers/installers, with experience in installing and maintaining solar PV systems on blue roofs are utilised.
- Only install solar PV panels in a manner that avoids penetrating waterproof membranes
- Solar PV installations should be fitted with voltage optimisers which incorporate a number of safety features and reduce the potential for fire events.
- Ensure solar installations do not obstruct drainage paths or maintenance access to the blue roof system.
- Small gravel and pebble ballast should be avoided on any roof system with solar PV systems. Such material can become wind-blown and damage panels. Birds also have been known to drop stones and gravel on to panels, and they can block blue roof inlets and drainage systems.

Refer Aviva Loss Prevention Standard **Blue Roofs – Design and Installation** for more guidance. The following Aviva Loss Prevention Standards also provide specific guidance on 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**

9. Self-Inspection

Ensure a formal self-inspection programme is implemented, including but not limited to:

- Checking and removal of any waste, leaf litter, etc.
- Checks to ensure tree branches do not overhang any system inlets.
- Inspections of:
  - ✓ Outlets and restrictors.
  - ✓ Inspection chambers and filters.
  - ✓ Drainage and overflows, including seals.
  - ✓ Waterproofing membranes.
  - ✓ Leak detection, monitoring systems, water diversion systems, isolation valves, etc.

  Note: Optical fibre cameras can aid inspections of drains, voids, etc.

- Thermographic camera checks for temperature variations that may indicate leaks or insulation issues.
  - ✓ Roof mounted Solar PV system checks for damage, shading, nesting birds or detritus accumulation beneath the panels.

Important: Ensure the self-inspection regime is always undertaken following any significant storm event or remedial works.

Refer to Aviva Loss Prevention Standard **Self-Inspections** and **Use of Thermographic Cameras – General Considerations** for further guidance.

10. Maintenance

Blue roof systems and associated equipment 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 system, and any associated systems, e.g. leak detection, monitoring, lightning protection, etc.

  Refer to Aviva Loss Prevention Standard **Managing Contractors** for further guidance.

- Produce a formal recorded maintenance plan in line with original equipment manufacturer (OEM) or installer's recommendations and routinely audit to ensure procedures are being followed.

  Refer to the Aviva Loss Prevention Standard – **Maintenance Regimes** for further guidance.

- Ensure sufficient and compatible spares are retained to support servicing and prompt repairs.
- The Aviva Loss Prevention Standard **Hot Work Operations** should be followed where hot works are unavoidable.
  - ✓ Thermographic cameras should be used throughout the process and during fire watches.
  - ✓ Fire watches should be undertaken for up to 240 minutes after the hot works, and only reduced where supported by a specific risk assessment. A minimum fire watch period of 120 minutes should be enforced.
- Ensure repairs or alterations to the blue roof system are managed under a formal Management of Change programme.
- Review emergency response plans, key roles and responsibilities, and training provision at least annually. Ensure an emergency call-out arrangement is in place for drainage issues and leaks etc., ensuring prompt attendance.

  Refer to the Aviva Loss Prevention Standard **Emergency Response Teams** for further guidance.

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For more information please visit: Aviva Risk Management Solutions – Specialist Partners

Sources and Useful Links

- BS EN 12056-3: Gravity drainage systems inside buildings - Roof drainage, layout and calculation
- BS EN 1991-1-1 Eurocode 1. Actions on structures - General actions - Densities, self-weight, imposed loads for buildings
- BS EN 1991-1-3: Eurocode 1. Actions on structures - General actions. Snow loads
- BS EN 1991-1-4: Eurocode 1. Actions on structures - General actions - Wind actions
- BS EN 13501-1: Fire classification of construction products and building elements - Classification using data from reaction to fire tests
- 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 6229: Flat roofs with continuously supported flexible waterproof coverings
- Structure: Approved Document A of the Building Regulations
- EN 13956 – Flexible sheets for waterproofing – Plastic and rubber sheets for roof waterproofing – Definitions and characteristics.
- EN 13707 – Reinforced Bitumen sheets for roof waterproofing – Definitions and characteristics
- BS EN 1928 – Waterproofing – Determination of watertightness

Note: Whilst UK standards and legislation are referenced in this document, other international standards and legislation should be referenced where applicable.

Additional Information

Relevant Aviva Loss Prevention Standards include:

- **Blue Roofs – Ongoing Care**
- **Living Roofs - Design and Installation**
- **Living Roofs – Ongoing Care**
- **Living Walls and Roofs – 12 Top tips**
- **Self-Inspections**
- **Maintenance Regimes**
- **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**
- **Hot Work operations**
- **Lightning Protections**
- **Managing Change – Property**
- **Emergency Response Teams**
- **Business Continuity**
- **Weight of Snow**
- **Use of Thermographic Cameras – General Considerations**
- **Use of Thermographic Cameras – Checklist**

To find out more, please visit Aviva Risk Management Solutions **or speak to one of our advisors.**

Email us at riskadvice@aviva.com or call 0345 366 6666.*

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