# Roof Mounted Solar Photovoltaic Systems -Planning and Design

Roof mounted solar photovoltaic (Solar PV) systems are installed on many buildings and now commonly considered when designing and constructing new properties. The equipment presents a number of hazards and exposures requiring careful management to avoid fire and other material damage losses.

This Loss Prevention Standard provides guidance on managing those risks during the planning and design phases.

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## Introduction

Roof mounted solar PV systems convert light energy to create electrical power. The Direct Current (DC) electrical energy generated by the modules is converted to Alternating Current (AC) electricity and typically used by the occupiers of the buildings, sold to distribution network operators, or in some cases, the DC energy can be fed into battery energy storage systems for later use.

When properly designed, installed and managed, the risks of fire and other material damage loss events can be significantly reduced and this document provide risk management guidance to help avoid losses associated with solar PV systems.

**Note:** This Loss Prevention Standard relates to solar PV systems and is focussed on asset loss prevention and related risk management guidance. It is not intended to address liability/general liability exposures. The presumption is that all local regulatory territory requirements, and compliance with national/local building regulations, codes, or standards take precedence and have, or will be, met. In territories where local authorities have jurisdiction, compliance with applicable laws and regulations is assumed as a minimum requirement. The recommendations in this document are intended to supplement, not replace, local requirements.

## Understanding the Risks

The risks commonly associated with roof mounted solar PV systems include, but are not limited to:

- **Fire**. Fires can develop across the whole installation, with common causes including poor installation, module damage or faults including those caused by shading attributed to trees, moss and lichen, overheating inverter and switchgear cabinets, use of incompatible components, and hot works. The potential for fire spread is increased by the presence of combustible materials in proximity to, or within, the roof construction. A lack of appropriate access to roof mounted systems can result in self-inspection, maintenance programmes and developing issues being missed.
- **Wind**. Inappropriately installed arrays (roof-based modules, cables and associated equipment) can be vulnerable to wind damage during poor weather conditions. Even small amounts of movement can place strain on components.
- **Accidental Damage**. Components that work loose can cause damage to other nearby equipment or injure employees and other persons.
- **Business Interruption**. Damaged or impaired systems may suffer significant downtime for repairs and incur income reduction.
- **Performance**. Shading and defective modules can significantly impact system performance and reduce financial earnings.

## Management Systems

### Material Damage Risk Assessment

During the planning and design phases, an assessment of the anticipated/potential financial losses, for both material damage and business interruption exposures, in the event of a significant or catastrophic loss event involving the solar PV installation, should be undertaken. This should address losses relating to the solar PV installation itself, as well as resultant losses to the building and impacts to business operations.

This assessment, which helps ensure risk control measures are sufficient and reflective of the potential property loss estimates, should address:

- The solar PV installation,
- The building and other valuable assets,
- Business interruption, and
- Environmental, social and governance (ESG) exposures.

Refer to the Aviva Loss Prevention Standards **Material Damage Risk Assessment** and **Business Continuity – Step 4: Business Impact Analysis and Risk Assessment** for further guidance.

### Managing Change

The planning and design of solar PV systems should be managed through a formal Management of Change process. This helps ensure all stages of the works including any significant planned changes to buildings and trade operations to accommodate the installation works, are progressed with minimal exposure to the existing arrangements.

Refer to the Aviva Loss Prevention Standards **Managing Change – Property** for further guidance.

### Hot Works

Hot works are tasks or equipment that use or create heat, flame or sparks. Examples include but not limited to welding equipment, blowtorches, grinders, drilling and brazing. Hot works are associated with many fires and must be closely controlled.

- Ensure roof-based hot works are prohibited within the solar PV design tender documents and specify that any necessary hot works are undertaken in a remote and safe location.
- For any work where this is not possible, stipulate that hot works will need to be conducted in strict accordance with the Aviva Loss Prevention standard **Hot Work Operations**.
  - ✓ Fire watches should be undertaken for up to 240 minutes after the hot works and only reduced where supported by a specific risk assessment.
  - ✓ Thermographic cameras should be used throughout the works and during the fire watch periods.

Refer to the Aviva Loss Prevention Standards **Hot Work Operations** and **Managing Contractors – Property** for further guidance.

### Emergency Response

An emergency response plan should be produced within the design specification detailing the key responsibilities and actions that are to be followed in an emergency event during the installation and commissioning works involving the solar PV system. This should be integrated with existing emergency response plans as appropriate.

The emergency response rules should be formally documented, and appropriate training provided to key workers, installers and contractors prior to works commencing.

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

### Business Continuity Plans

Ensure the existing Business Continuity Plans are reviewed to consider exposures created by the solar PV installation. This may include the need to formalise arrangements with specialist solar PV contractors to safely recover the installation post incident and the financial consequences of the system not generating power.

Refer to the Aviva Loss Prevention Standard **Business Continuity - Seven Steps to Continuity** for further guidance.

## Managing the Risks

### Designer and Installer Competence

Ensure competent and experienced solar PV system designers and installers are utilised.

Due diligence should include assessments of the system designers or installers reputations, previous projects and any lessons learned, feedback from other customers including customer service and system performance, and availability to undertake urgent repairs, if ever needed.

The installers should also be required to provide details of the ongoing care and maintenance services that will be provided.

**Important**: The installer **must** offer maintenance services post-installation and the maintenance offering should correlate with the guidance provided in the Aviva Loss Prevention Standard **Roof Mounted Solar Photovoltaic Systems - Ongoing Care**.

Electrical engineers should be qualified to install and maintain electrical systems in compliance with national regulations, standards, or codes. Specific solar PV system training courses are generally available to qualified electrical engineers, and any electrical engineers installing a solar PV system should have undergone such training and be able to provide certification upon request.

### Design Considerations

**Weight Loading**. Solar PV systems can significantly increase the weight loading on a roof, increasing the potential for collapse or damage to the roof in normal or adverse conditions.

Modern roof designs can be lightweight, with little tolerance for additional weight, whilst older roof designs may have deteriorated with age or be in a poorer state of repair.

A roof loading assessment should be completed, in accordance with national or local regulations, standards or codes, to ensure the proposed solar PV system is compatible with the building and roof systems to be used, and appropriate design calculations have been completed.

Weight loading calculations should also consider:

- Construction-phase point loadings, considering temporary concentrations of stored materials and equipment over a reduced surface area.
- The static and point loadings across the range of wind conditions and the potential impact of fatigue.
  - ✓ In some territories, tornadoes, cyclones, hurricanes etc., should all be considered as a source of potential damage to the building and solar PV array.
  - ✓ Wind uplift calculations must be formally completed.
- Snow and ice loading in winter.
- Structural or cosmetic ballast.
- The capacity for water pooling on flat roofs.
- Detritus accumulations capable of blocking roof drainage.
- Maintenance access by contractors.

**Framework and Layout**. The type and fixing of framing and layout of the modules can significantly impact the potential for loss or damage.

- Wherever possible, the mounting structure should be mechanically fastened to the roof structure rather than being ballast mounted.
  - ✓ Ballast can work loose and is not as structurally reliable as mechanical fasteners. It can also damage roofing materials and create additional weight loadings.
  - ✓ Ballast should only be used where mechanically fastened mounting structures are not feasible, either due to the roof construction material or product warranty.
- Consider separating the array into a number of smaller zones. This can provide fire breaks to help prevent or slow the spread of fire, as well as distributing weight more evenly and providing access for servicing and maintenance.
  - ✓ Separation of at least 5 metres is recommended.
- Solar PV arrays should be located at least 2.5 metres from both sides of any fire resisting compartment walls installed within the building.
  - ✓ This distance can be reduced to a minimum of 1.2 metres where supported by a risk assessment confirming roofing materials are non-combustible and the solar PV modules have a low propensity for fire spread.
- Ensure solar PV arrays are installed at least 1.2 metres from combustible rooflights.
  - ✓ This distance can be reduced to a minimum of 0.6 metres where supported by a risk assessment confirming rooflights are non-combustible.
- Inadequate spacing between the PV modules and the roofing can allow waste and detritus, such as leaf matter, to become lodged and can create issues with heat dissipation. Ensure manufacturers guidance is followed for recommended spacing.
  - ✓ Vermin-repellent meshing is encouraged to help prevent waste accumulation and birds from nesting in these areas where considered vulnerable.
- Ensure the module location will not be affected by shading from buildings, trees, etc., in proximity.
  - ✓ Unless fitted with MLPEs, partial shading of an array will affect the string's current, resulting in reduced generation output and the formation of hotspots.
  - ✓ Such partially shaded modules will dissipate power as heat by forming localised hotspots that can damage the module over time and potentially lead to ignition and fire damage.

- Ensure PV modules are adequately separated from any equipment that could impact their safe operation or the safety of the existing assets, e.g., plant rooms, extraction systems, steam or other heat sources, emergency escape routes, etc.

**Modules**. When evaluating the risks presented by the modules, ensure:

- The modules used in the system are selected based on local weather exposures. There are generally two module types on the market, monofacial and bifacial, with different characteristics as shown below:

| Module Type | Monofacial | Bifacial |
|---|---|---|
| **Faciality** | Power is generated exclusively from light incident on the upper surface. | Power is generated mostly from light incident on the upper surface, as well as up to +25% from diffuse and reflected light incident on the lower surface when the module is installed with enough ground clearance. |
| **Structure** | Glass-Polymer.<br>The upper layer composed of protective glass; the lower layer is composed of a polymer backsheet. | Glass-Glass.<br>Both upper and lower protective layers are composed of glass. |
| **Upper Glass Protection** | Mostly 3.2mm tempered glass. Some modules designed for hail resistance go up to 4.0mm. | 1.6-2.0mm heat-strengthened or semi-tempered glass. Glass cannot fully temper below 3.2mm, resulting in reduced impact resistance. |
| **Hail Resistance** | RETC testing published in 2023 and validated by tracker manufacturers has demonstrated that modules with 2.0mm of protective glass have a breakage rate roughly double that of 3.2mm glass for the same effective kinetic energy. | |
| **Combustibility** | More combustible due to the presence of polymers. | Less combustible, but still capable of ignition. |
| **Mass** | Lighter due to the lightweight polymer backsheet. | Heavier due to increased glass quantity. |
| **Structural Resilience** | Higher rigidity.<br>Downwards (snow) load ratings range from 5400-6000Pa.<br>Upwards (wind) load ratings range from 2400-4000Pa. | Lower rigidity, with a greater tendency to be pulled out of their clamps during high wind events.<br>Downwards (snow) load ratings range from 2400-5400Pa.<br>Upwards (wind) load ratings range from 1600-2400Pa. |
| **Heating Effects** | Polymer back sheet promotes heat dissipation, resulting in cooler ambient temperatures. | Operate at a higher temperature due to magnifying and greenhouse effect of glass, impacting efficiency when installed close to the roof surface, and capable of heating detritus underneath. |

- The risks of hail damage should be considered within the material damage risk assessment.
  - ✓ Territories with greater hail exposure should factor hail resilience into component selection.
- Ensure the system design features appropriate lightning protection/earthing systems. The entire PV array should be earthed in accordance with **IEC 62305 Series (Protection Against Lightning)** and **IEC 62548: Photovoltaic (PV) Arrays - Design Requirements**. The array's earthing system should be integrated into the building's lightning protection system to prevent it from accumulating diverging electrical potential.

The following elements should be considered:

- If bifacial modules are installed flush to a roof structure, or elevated but with wind deflectors, there will be no foreseeable increase in generation in comparison with monofacial modules. The enhanced energy yield is generally only attainable with 1 to 2 metres clearance with the ground.
- For hail-exposed regions, baseline pass/fail hail testing according to IEC 61215 does not demonstrate effective hail resilience. This is because testing applies a binary test for 25mm balls of ice at 23m/s whereas most damage occurs at diameters greater than 25mm where the terminal velocity is greater than 23m/s, resulting in much greater impact kinetic energy. Hail Resiliency Curve (HRC) testing or Hail Stress Sequence (HSS) testing, tests modules to failure, providing a much better picture of module hail resiliency for their specific applications.
- Aviva does not consider bifacial modules to be superior to monofacial modules for rooftop systems, and vice-versa. The reduced combustibility of bifacial modules alone does not infer lower inherent risk; they each have strengths and weaknesses which need to be considered during the design phase for each specific system and the roof type on which they are being installed.

**Module-Level Power Electronics (MLPEs)**. MLPEs include two types of devices:

- DC optimisers; and
- Micro-inverters.

Attached to a single or pair of modules, they provide granular monitoring, power and current regulation, and isolation capabilities that would not be possible with string inverters. Unlike traditional string inverter systems where shading or faults on one module reduce the performance of the entire string, MLPEs allow each module to operate independently at its optimum performance level..

Micro-inverters provide the added benefit of module-level DC to AC inversion, often eliminating the need for a string inverter.

During maintenance, a module fault, or an ignition event, MLPEs can instantly reduce the system voltage in affected areas to help reduce the risk of fire and also minimise the risk of injury to maintenance workers and emergency response teams. MLPEs also provide real-time monitoring at individual module level, allowing faults to be identified and the modules isolated before escalating to an emergency event. This also greatly facilitates troubleshooting during maintenance.

**Note**: Aviva recommends the use of MLPEs given the benefits outlined above. All solar PV system proposals should incorporate MLPEs as part of the design.

**Combustible Roofs and Buildings**. Solar PV systems should not be directly installed on combustible roof systems and must be located at least 5 metres from any adjacent combustible roof systems. A fire emanating in the solar PV installation could ignite the combustible elements within such a roof system and potentially spread throughout the building, resulting in large-scale loss or damage.

The combustibility of roofing systems is not always easy to ascertain, with some roofing modules or systems containing concealed insulation, timber and plastic elements, etc., which could support fire development and growth in the event of ignition.

- All materials used in roofing systems should be identified and assessed for their suitability as part of the planning and design phases. Where identified, combustible roof materials should be removed and replaced with non-combustible elements.
- Externally re-cladding existing combustible roof materials can help reduce the potential for ignition, however a focussed standard of inspection and maintenance should be adopted to ensure the cladding integrity does not become compromised via alterations, impact or other damage, fixings that penetrate the materials, etc.

Any decision to install roof mounted solar PV systems on buildings of predominantly combustible materials, such as those of engineered timber, cross laminated timber, glued laminate timber, etc., or which are externally clad and/or insulated with combustible components should be based on a risk assessment which considers the potential for fire damage, business interruption and environmental impacts.

Solar PV modules to be installed on a green or living roof, which is classed as a combustible roof surface, can deteriorate at a faster rate and therefore access infrastructure to facilitate maintenance **must** be included within the design specification.

**Important**: Discuss any plans to install roof mounted solar PV systems on combustible roofing with your property insurer, broker or authority having jurisdiction.

**DC Isolators.** DC isolators are safety devices designed to disconnect the DC side of the system.

- DC isolation switches should be readily accessible to site emergency response teams and the Fire Service, allowing safe and immediate access during an emergency event. Ensure such switches are installed in an accessible ground floor location and not in an area where vehicle or worker movements could result in impact damage.
- Faulty DC isolators can overheat and ignite. Ensure all isolators are installed on non-combustible surfaces to help reduce the potential for fire spread.

**String Inverters**. Inverters convert the DC electricity generated by modules into alternating current (AC) electricity and are present on all solar PV systems other than some systems that utilise microinverters on individual modules. An installation can feature numerous inverters depending on system size and positioning.

- Careful consideration should be given to the location of inverter equipment. Inverters should always be installed in an easily accessible location on a non-combustible surface where they are not exposed to impact or accidental damage by vehicles or workers.

- Externally mounted inverters should be adequately ingress protected (IP) to protect against dust and moisture.
  - ✓ Shading for basic protection from direct sunlight and rain in the form of a non-combustible canopy is recommended, or
- If internally sited, the inverters should be installed within a dedicated fire compartment providing a defined fire resistance (insulation, integrity and load bearing capacity) period.
  - ✓ At least 90 minutes fire resistance is recommended.

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

Additionally:

- Inverters are typically air cooled and require adequate space and air movement for ventilation purposes. Ensure that the minimum air volume specified by the manufacturer for convection cooling is adhered to in the compartment design.
- Access to inverters should be possible without the need for mobile equipment, ladders, or other working at height equipment and personal protective equipment, e.g. safety harnesses, fall arrest systems, etc.
- Where multiple inverters are installed, these should be arranged laterally rather than vertically if spacing allows. Minimum separation distances as specified by the manufacturer must also be respected.
- Automatic fire detection should always be installed in the compartment housing the inverters, with appropriate safety interlocks to the property's automatic fire detection.
- Ensure appropriate ground and wall markings and signage are displayed to help identify the equipment and any required separation distances to prevent any materials being stored in proximity.
- System schematics and shutdown instructions must be clearly displayed.

**Cables**. All cables associated with the solar PV system will need to be protected against ultraviolet (UV) exposure, rain, or water pooling. They should also be protected from wear and tear and impact and be secured to the infrastructure.

- Ensure cables are installed in conduits or cable trays and are suitably secured to the building structure. DC current and electric shock hazard signage should be clearly displayed.
  - ✓ Any power cables passing through into the building should enter through a non-combustible sleeve fitted to the full thickness of the wall/roof and adequately fire stopped with a material having a fire resistance rating (insulation and integrity) consistent with the existing wall.

  **Note:** Aviva does not consider the use of expandable, aerosol 'pink foam' type materials as an acceptable fire stopping material. Refer to the Aviva Loss Prevention Standard **Fire Compartmentation** for further guidance.
- Avoid running or routing cables over any sharp edges or around sharp angles. Cables should be installed as per the manufacturer's guidance regarding minimum bend radii.
- All cables should be clearly labelled to identify which array/strings they are connected to, either at the inverter end or module end in accordance with relevant national wiring regulations.
- Arc boxes installed around DC connectors are a positive risk feature and should be considered, in particular where there are concerns with roof combustibility.

**Component Standards.** Moisture and water ingress can cause electrical faults which can damage components and/or lead to fires.

- All modules and diode junction boxes should ideally be Ingress Protection (IP) 68 rated.
- PV module quality and reliability can vary depending on the manufacturer and design standard the modules conform to. It is important to ensure the manufactured modules and installation are certificated to a recognised standard, such as a minimum of IEC 61215 and IEC 61730.
  - ✓ Ideally with a minimum rating of Protection Class II, Fire Rating C (with A being the highest).

Relevant International Electrotechnical Commission standards include:

- **IEC 61215-1-1: Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules**
- **IEC 61730-1: Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction**
- **IEC 61730-2: Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing**

**System Monitoring**. The solar PV system's ongoing performance, including any fault conditions, will be continuously tracked using the inverters, or where fitted, the Module Level Power Electronics (MLPE).

The data generated by the PV system's Supervisory Control and Data Acquisition (SCADA) system should be designed to integrate with any existing building management systems (BMS), to streamline monitoring and response capabilities.

Monitoring should be designed and configured to safely shut down or isolate the array or sections of the array, in the event of any identified faults.

**Array Fire Detection**. Detection equipment can be provided to detect fires involving the array, typically where the system does not benefit from MLPEs. Examples include but are not limited to:

- Addressable linear heat detection for the modules.
- Integrated Infra-Red (IR) and/or Video Surveillance Systems (VSS). Some video content analysis (VCA)-equipped cameras have specific filters to identify and flag points of ignition and smoke.

**Note**: The installation of roof-based detection equipment should be considered via risk assessment and following guidance from the designer and/or installer. Any plans to install fire detection systems should be discussed with your insurer, broker and any authority having jurisdiction.

**Battery Energy Storage Systems (BESS).** BESS are often installed as part of the solar PV system to capture and store produced or surplus energy.

Whilst proprietary BESS, installed and maintained in accordance with manufacturers' guidelines and national or local regulations, standards or codes are generally safe and reliable to use, the risks, which include fire and explosion, need to be carefully considered and managed.

- Ensure BESS enclosures are located a minimum of 10 metres from buildings and other valuable assets.
  - ✓ Battery fires can produce volatile and prolonged flaming and cannot be suppressed using traditional means. Adequate fire separation can help prevent the spread of fire and smoke to other structures or assets.
- Heat, smoke and gas detection should be interlocked with the fire alarm system in order to provide prompt warning of fire.

**Note**: Lithium-ion BESS using chemistries such as Lithium Nickel Manganese Cobalt Oxide (Li-NMC), Lithium Nickel Cobalt Aluminium Oxide (Li-NCA), or Lithium Ion Phosphate (LFP) are not recommended for installation within buildings. For BESS using different chemistries to those listed previously, please consult with your insurer, broker or authority having jurisdiction.

Refer Aviva Loss Prevention Standards **Small Scale Battery Energy Storage Systems** and **Planning a Battery Energy Storage System – 12 Top Tips** for further guidance

**Fire Service.** Fire Services are often amenable to inspecting premises to evaluate fire risk exposures, firefighting response and offer guidance. Accordingly, you should invite the local Fire Service to inspect the site and plans to evaluate fire risk exposures, determine water supplies, access and egress routes, etc.

If installing a firefighting isolation switch, consult with the local fire service for their preference of location and location signage recommendations.

It is also good risk management practice to know what water supplies are available for the Fire and Rescue Service to use. Therefore, site management should always establish:

- What firefighting water supply is available.
- The static pressure flows and residual pressure test results.
- Whether additional resources, such as a private hydrant system or water storage tanks are necessary.

Please refer to the Aviva Loss Prevention Standards **Emergency Response Planning with Fire and Rescue Services** and **Manual Fire Fighting Water Supplies** for further guidance.

**Self-Inspection and Maintenance**. Solar PV systems require ongoing inspection and maintenance to ensure they continue to operate safely and efficiently. All components of the system should therefore remain fully accessible throughout their service life.

Access requirements should be considered during the design phase, with permanent safe access provided to all roof-mounted equipment and associated infrastructure. This will help avoid the need for costly, disruptive, and often inconvenient temporary access arrangements in the future.

Refer to the Aviva Loss Prevention Standard **Roof Mounted Solar Photovoltaic Systems – Ongoing Care** for detailed guidance on self-inspection and maintenance of solar PV systems. A self-inspection checklist template is provided in the Aviva Loss Prevention Standard **Roof Mounted Solar Photovoltaic Systems – Self-Inspection Checklist**.

**Important**: For new installations, the installers **must** provide details of the ongoing care and maintenance services that will be provided, which should correlate with the guidance provided in the Aviva Loss Prevention Standard **Roof Mounted Solar Photovoltaic Systems – Ongoing Care**.

## Contact Information

### United Kingdom

Please visit Aviva Risk Management Solutions or email us at riskadvice@aviva.com. To speak to one of our advisors, call 0345 366 6666.*

*The cost of calls to 03 prefixed numbers are charged at national call rates (charges may vary dependent on your network provider) and are usually included in inclusive minute plans from landlines and mobiles. For our joint protection telephone calls may be recorded and/or monitored.

### Canada

Please visit Aviva Risk Management Solutions | Aviva Canada or email us at arms.canada@aviva.com

### Ireland

Please visit Insurance Risk Management | Business Risk Management Insurance - Aviva Ireland or Email us at armsireland@aviva.com

# Specialist Partner Services

Aviva have created a network of Specialist Partners to complement our in-house capabilities and to enable our policyholders to benefit from a wide range of risk management solutions at preferential rates and terms. Together, we provide solutions to help with the significant challenges of modern-day risk management.

**Note:** These partner relationships are wholly for the benefit of our policyholders with no income to Aviva.

The following Specialist Partners provide products or services in relation to risk guidance provided, discussed or referenced in this Loss Prevention Standard.

### United Kingdom

- Solar PV servicing and maintenance - **Solarsense**
- Direct low pressure suppression systems – **Secom**
- Solar PV cleaning - **Rentokil**

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

### Ireland

For more information please visit: Insurance Risk Management | Business Risk Management Insurance - Aviva Ireland

### Canada

For more information please visit: Our Specialist Partner Network | Aviva Canada

# Standards, Sources and Useful Links

### Canada

- CSA standards for photovoltaic systems and electrical installations. CSA Catalogue - Standards and Learning Store - CSA Group
- Canadian Electrical Code (CEC), Part I.
- PV maintenance guidance from CanREA (Canadian Renewable Energy Association) and provincial utilities Canadian Renewable Energy Association

### Ireland

- Safe Electric National Rules for Electrical Installations (I.S. 10101).
- ESB Networks and EirGrid connection requirements.
- SEAI-Solar Photovoltaic (PV) Manual of Consenting Procedures

### United Kingdom

- Industry best practice manual : Guidelines for the operation and maintenance of rooftop solar photovoltaic systems
- RC62 - Recommendations for Fire Safety with PV Panel Installations
- In the United Kingdom electrical requirements are addressed in **BS 7671: 2018 Requirements for Electrical Installations IET Wiring Regulations (18th Edition)**
- **Approved Document A** of the Building Regulations, **BS EN 1991-1-1 (Eurocode 1. Actions on structures - General actions - Densities, Self-weight, Imposed Loads for Buildings)** provides guidance on weight loadings.
- Grid connectivity is addressed in **ENA Engineering Recommendation G98 or G99,** which should be completed in conjunction with the relevant Distribution Network Operator (DNO) to ensure the system connects safely to the national grid, and should any output curtailment be required.

### Other

- RETC Module Reports
- IEC 61215-1-1: Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules
- IEC 61730-1: Photovoltaic (PV) module safety qualification – Part 1: Requirements for construction
- IEC 61730-2: Photovoltaic (PV) module safety qualification – Part 2: Requirements for testing

# Additional Information

## Loss Prevention Standards

These documents set out best practice recommendations to help reduce the likelihood and impact of losses.

Relevant Aviva Loss Prevention Standards include:

- **Roof Mounted Solar Photovoltaic Systems - Installation**
- **Roof Mounted Solar Photovoltaic Systems - Ongoing Care**
- **Roof Mounted Solar Photovoltaic Systems - Decommissioning**
- **12 Top Tips for Roof Mounted Solar Photovoltaic Systems**
- **Roof Mounted Solar Photovoltaic Systems - Self-Inspection Checklist**
- **Material Damage Risk Assessment**
- **Business Continuity - Step 4: Business Impact Analysis and Risk Assessment**
- **Hot Work Operations**
- **Emergency Response Teams**
- **Fire Compartmentation**
- **Business Continuity - Seven Steps to Continuity**
- **Small Scale Battery Energy Storage Systems**
- **Planning a Battery Energy Storage System - 12 Top Tips**
- **Emergency Response Planning with Fire and Rescue Services**
- **Manual Fire Fighting Water Supplies Managing Change - Property**
- **Managing Contractors**

Please visit Loss Prevention Standards to view the full library.

## Aviva Risks Training Solutions (United Kingdom Only)

Aviva Risk Training Solutions, delivered through our Specialist Partner, SafetyCulture, provide free, bite-sized learning modules exclusively for Aviva policyholders.

Please visit Aviva Risk Training Solutions for further guidance.

**Please Note**

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