Flat roofs

The functional fifth façade

ROCKWOOL®

Contents

Using this whitepaper

This paper traces the expanding role of the roof in modern construction and occupancy, building on a breakdown of the legislative landscape to explore each topic in turn.

You can follow this throughout the paper, or jump to the sections that best suit your role and interests.

1. Introduction – the Fifth Façade

The role of the roof in modern building design has expanded significantly in recent years. Flat roofs now commonly house not just plant and HVAC equipment but renewable energy infrastructure, social spaces, and much more.

This trend is occurring against a backdrop of consistent roof fire rates[1] and additionally, we have seen wider recognition following the Grenfell Tower fire of the risks that combustible building materials can pose in certain circumstances. While the Grenfell Tower fire prompted a change to legislation, and the use of combustible materials is predominantly banned in the external walls of relevant buildings of 18m and over[2], this ban only partially extends beyond walls and certain attachments – leaving roofs outside the fire protection afforded by the ban to the remainder of the building envelope.

In a whitepaper entitled, 'Flat roofs: Managing fire risk in the fifth façade', ROCKWOOL addressed industry misconceptions surrounding testing protocols and evidence of fire safety credentials for construction materials. Specifically, the paper recommended utilising the A1 to F Euroclass reaction to fire classification system as the clearest way to identify non-combustible materials, compared to the $B_{ROOF}(t4)$ roof classification, which neither tests the performance of a roof system when exposed to a fire from inside the building, nor the combustibility of its component parts. Furthermore, ROCKWOOL recommended that one of the most straightforward ways to approach compliance with fire safety requirements is to use non-combustible insulation materials in all flat roof constructions.

'Flat roofs – Managing fire risk in the fifth façade' provided context amid a changing legislative landscape, and real-world examples of the impact of roof fires. It is available for download at **www.rockwool.com/uk/fifthfacade**.

As flat roofs become more multifunctional than ever, these themes become increasingly relevant. Leveraging the roof space brings benefits to developers, owners and occupiers, but fire risk must remain a key consideration for all stakeholders – specifiers, contractors, and insurers included.

This paper, building on the themes explored in 'Flat roofs: Managing fire risk in the fifth façade', will explore the fire safety implications of modern multifunctional roofs, and discuss best practices for identifying and mitigating the risks.

[1] UK Government: Fire Data Statistics Tables report over 960 roof fires annually from 2016/17 to 2021/22.

[2] In England, Approved Document B provides new guidance on residential buildings equal to or over 11m. Separate rules apply for buildings equal to or over 11m in Scotland.

2. Building regulations and guidance: understanding legislation

It is the responsibility of those designing and carrying out building works to meet the statutory requirements of the Building Regulations.

This is often confused with meeting the guidance of approved documents, for example Approved Document B (ADB) in relation to fire safety in England (other documents apply for other regions of the UK, and in the Republic of Ireland). This is especially common in complex applications where different building types and heights are subject to different guidance – such as compartmentation and a material's reaction to fire requirements for façades and roofs.

ADB itself states:

> "It is the responsibility of those carrying out building works to meet the requirements of the Buildings Regulations 2010. Although it is ultimately for the courts to determine whether those requirements have been met, the approved documents provide practical guidance on potential ways to achieve compliance with the requirements of the regulations in England.
>
> Although approved documents cover common building situations, compliance with the guidance set out in the approved documents does not provide a guarantee of compliance with the requirements of the regulations because the approved documents cannot cater for all circumstances, variations and innovations. Those with responsibility for meeting the requirements of the regulations will need to consider for themselves whether following the guidance in the approved documents is likely to meet those requirements in the particular circumstances of their case."

Regulations for flat roofs

For flat roofs, the requirements under the building regulations regarding the potential for fire spread are set out in Requirement B4: External Fire Spread, which states:

These sections deal with the following requirement from Part B of Schedule 1 to the Building Regulations 2010. Section 10 also refers to regulation 7(2) of the Building Regulations 2010. Guidance on regulation 7(1) can be found in Approved Document 7.

External fire spread

	Requirement	Limits on application
B4.	1. The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building.	-
	2. The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building.	

However, and especially where the roof is required to perform the function of a floor (as discussed in section 3 of this paper, 'Multifunctional roofs for socialising'), designers should also remain aware of Requirement B3 which covers internal fire spread:

These sections deal with the following requirement from Part B of Schedule 1 to the Building Regulations 2010.

Internal fire spread (structure)

	Requirement	Limits on application
B3.	1. The building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period.	
	2. A wall common to two or more buildings shall be designed and constructed so that it adequately resists the spread of fire between those buildings. For the purposes of this sub-paragraph a house in a terrace and a semi-detached house are each to be treated as a separate building.	
	3. Where reasonably necessary to inhibit the spread of fire within the building, measures shall be taken, to an extent appropriate to the size and intended use of the building, comprising either or both of the following— a. sub-division of the building with fire-resisting construction; b. installation of suitable automatic fire suppression systems.	Requirement B3(3) does not apply to material alterations to any prison provided under section 33 of the Prison Act 1952.
	4. The building shall be designed and constructed so that the unseen spread of fire and smoke within concealed spaces in its structure and fabric is inhibited.	

In practice, for a designer, this means finding a solution that has been subject to a suitable fire resistance test and can prove its fire resistance (REI) rating and ensure that the correct compartmentation is maintained. Furthermore, that appropriate fire stopping measures have been incorporated to prevent the spread of fire and its by-products, including smoke.

For example, if a roof serves the purpose of a floor and requires a specified level of fire resistance, ROCKWOOL can offer a tested solution incorporating HardRock Multi-Fix (DD) installed to a profiled steel sheet and BeamClad applied to the beams and the exposed underside. Classified in accordance with BS EN 13501-2, this solution has proven to achieve REI 120 when exposed to fire from below, and supports a simulated load of 1.5kN/m².

As another example, where compartmentation must be maintained at the junction between a compartment wall and roof, ROCKWOOL recommends a solution combining HardRock Multi-Fix (DD) with ROCKWOOL Trapezoidal Firestops (2A and 2B) above and below the roof deck – subject to the application.

These practical examples demonstrate that, where a specified REI is required, designers can work with a trusted manufacturer and select a tested solution to achieve the required performance.

Compliance and liability

Guidance documents, such as ADB in this instance, support by providing practical ways to achieve compliance with the statutory requirements in common constructions.

However, and especially in light of the Building Safety Act 2022, it may not be sufficient to simply follow the guidance. The Building Safety Act 2022 reinforced liabilities for all stakeholders, directing that compensation can be claimed from anyone responsible for any defective work, such as builders and other contractors, architects or designers, and that it is not a valid defence for the defendant to claim to have followed established practice at the time[1].

The Building Safety Act also extended the limitation periods for claims under the Defective Premises Act (DPA); from six to 30 years for work completed by 28 June 2022, and 15 years for works completed after this date - giving all prospective claimants greater protection, and placing a greater weight of accountability on all involved in the design and build.

Responsible parties must consider carefully whether their specific project adheres to the statutory requirements, rather than to the guidance alone. In relation to roofs and façades, designers should be vigilant in regard to all potential fire risks. Threat of fire from above the roof is considered in classifications such as B_{ROOF}(t4) (BS EN 13501-5), but exposure to fire from below the roof may not always be adequately addressed. The absence of fire stopping seals to building services and penetrations that pass through the roof may create paths for fire to spread to the roof, from below.

Approved Document B states that "complying with the guidance in the approved documents does not guarantee that building work complies with the requirements of the regulations" and that "the approved documents cannot cover all circumstances. When considering modern methods of construction and the rapid changes to construction technologies, looking beyond regulatory guidance may be best practice."

[1] UK Government: Building Safety Act 2022

[2] Zurich Insurance UK (December 2019): The Human Impact of Fire

3. Multifunctional roofs for socialising

Flat roofs are not a new phenomenon.

There are examples of flat roof construction throughout history, especially in warmer climates where they have been seen to improve indoor comfort.

In modern buildings, flat roofs are an increasingly popular design choice and not just for their performance properties. Flat roofs are increasingly identified as spaces that can be used for social or practical purposes, especially in busy urban areas[1] where every expanse of a building must be utilised.

Social spaces

Social uses for flat roofs are becoming more ambitious and varied. A paradigm shift during the pandemic, in which many urban dwellers experienced lockdowns in accommodation with little or no access to outdoor space, has only strengthened this trend. Utilising flat roofs, balconies and terraces (which are covered by their own guidance document in BS 8579:2020), developers are finding creative ways to introduce social spaces that make the outside more accessible.

As a significant available space, flat roofs are seeing a great deal of activity. Modern uses for the roof include:

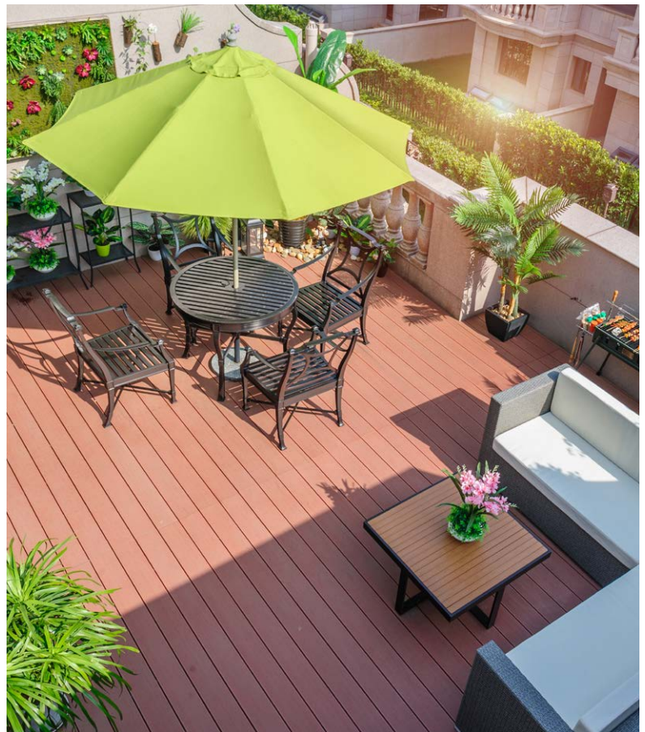
- Restaurants
- Gyms and pools
- Terraces
- Bars
- Gardens
- Farming
- Cafes

These uses can present challenges, especially in terms of fire safety – in an industry underpinned by complex legislative frameworks.

For example, where social spaces are placed on high-elevation flat roofs, they create greater escape distances. Furthermore, within a block or even within a single building there may be roof expanses at different heights for different uses (social or otherwise) which require individual consideration by the specifier.

Especially in busy inner cities where space is at a premium and buildings are often close together, consideration should be given to the risk of fire from above or below the roof itself – but also to the possibility of a fire passing from a taller, neighbouring building.

ROCKWOOL believes it is best practice, and a straightforward way of approaching compliance with fire requirements in a changing regulatory environment, to specify non-combustible materials (those materials classified A1 or A2-s1, d0 in accordance with the Euroclass system) in not just the façade, but also the roof elements of the building envelope – with due consideration given to the penetrations and through-roof services required.



Footfall on the roof

Social uses of roofs mean greater footfall compared to that required for maintenance or plant installations alone. Where individuals or small teams would be the only ones to access a traditional roof, restaurants and bars could see larger groups spending longer periods on the roof while socialising.

While there is no statutory requirement for non-combustible materials to be used on roofs irrespective of footfall (except within protected zones over compartment lines), there are circumstances in which the roof must provide a period of fire resistance.

Where a roof will also perform the function of a floor, such as where it provides a means of escape, ADB provides guidance through minimum periods of fire resistance in Tables B3 and B4 for structural building elements including floors. Fire resistance is measured in REI, a designation that identifies the performance of a building element in terms of its load bearing Structure (R), Integrity (E) and Insulation (I). This is significant for designers working around social spaces where escape routes must be considered.

In instances referenced by ADB, including those given in the table below, the period of performance required depends on the purpose group of the building, and its height. Selected examples from ADB Table B4 'Minimum periods of fire resistance' include:

Table B4 Minimum periods of fire resistance (minutes) in a:							
	Basement storey inc. floor over		Ground or upper storey				
	Depth (m) of the lowest basement		Height (m) of top floor above ground, in a building or separated part of a building				
Purpose group of building	>10	≤10	≤5	≤11	≤18	≤30	>30
1. Residential: a: Block of flats							
- without sprinkler system	90 min	60 min	30 min	60 min	Not permitted	Not permitted	Not permitted
- with sprinkler system	90 min	60 min	30 min	60 min	60 min	90 min	120 min
3. Office:							
- without sprinkler system	90 min	60 min	30 min	60 min	60 min	90 min	Not permitted
- with sprinkler system	60 min	60 min	30 min	30 min	30 min	60 min	120 min

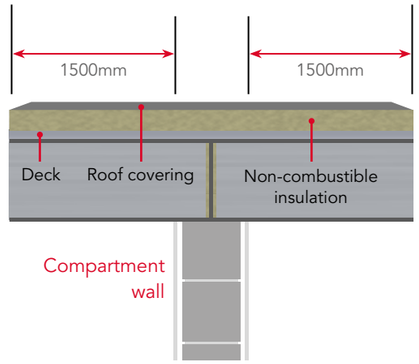
Note: Excerpts from ADB Table B4 are given for example purposes only. For full details, guidance and contextual notes, please refer to Approved Document B.

Protected zones

ROCKWOOL recommends that specifiers go beyond the zoning requirements at junctions with compartment walls as provided in ADB: Volume 2 (see table below), and select non-combustible insulation across the whole roof area - especially within systems subject to frequent footfall or pedestrian access.

Approved Document B Volume 2: Requirement B3 *Junction of a compartment wall with roof*	
Section	**Comment**
8.25	A compartment wall should achieve both of the following. a. Meet the underside of the roof covering or deck, with fire-stopping to maintain the continuity of fire resistance. b. Be continued across any eaves.
8.26	To reduce the risk of fire spreading over the roof from one compartment to another, a 1500mm wide zone of the roof, either side of the wall, should have a covering classified as B_{ROOF}(t4), on a substrate or deck of a material rated class A2-s3, d2 or better, as set out in Diagram 8.2a.

Roof detail recommended by ROCKWOOL:



[1] *Aaron O'Neill (November 2022): Urbanization in the United Kingdom 2021*

4. Practical purposes for the roof

Utilising roof space for practical purposes is a well-established concept.

Doing so helps to save interior space by moving plant room infrastructure from the main floor plan onto the roof, and can simplify maintenance depending on building operation and layout.

- Plant room and plant equipment
- Evacuation and fire exits
- Roof lights
- Solar and photovoltaic panels
- Sun tunnels
- Rooftop parking

Approved Document B provides guidance on specific applications that designers may need to consider when selecting products and materials for use within a flat roof system. These include:

- **Plant rooms**
- **Rooflights**
- **Junctions with compartment walls**

Rooftop plant and plant rooms have the potential to provide a source of ignition and therefore designers may need to consider how roofing materials react to fire; in addition to whether there are any specific requirements for levels of fire resistance, particularly if they are in close proximity to escape routes.

Rooflights may provide a passage for fire to spread to the roof area from below, and the use of combustible materials within close proximity to roof lights may allow fire to spread across the roof. If fire is able to spread across junctions with compartment walls, there is also the potential for fire to break back into other areas of the building below the roof.

ROCKWOOL believes that the use of non-combustible materials within the roof system can support in reducing the spread of fire that may occur from areas of the roof which carry a higher risk.

One significant aspect of building construction that has warranted further, detailed guidance is the design of balconies and terraces, which is covered in BS 8579:2020 'Guide to the design of balconies and terraces'.

Legislation cannot always move as quickly as innovation, which can result in breakthrough technologies being used without specific guidance in ADB to support their use.

Solar PV is one such technology which can provide a source of fire ignition – a concept that is covered more fully in section 5 of this paper, 'Flat roofs and solar solutions'. It is worth considering at this point, however, that while solar panels can change the fire dynamics on roofs where they are installed, they are not addressed by classification standard BS EN 13501-5 and its associated test standard ENV 1187:2002, which underpin the reaction to fire classification $B_{ROOF}(t4)$ referred to in ADB.

In addition to the lack of fire test methods specific to the use of solar PV, the test standard ENV 1187:2002 and associated classification standard BS EN 13501-5 do not consider penetrations through the roof.

These penetrations could come from cabling for PV, or cable transit systems for other purposes which are designed to pass through the roof. The conversation surrounding such services is largely concerned with maintaining waterproofing, with little or no consideration towards fire penetration.

Penetrations through the roof system can provide a passage for fire to spread to the roof from below, and combustible roofing materials that surround service penetrations may provide a further medium for fire to spread across the roof system.

For the designer, from a performance liability perspective, serious thought should be given to the wider impacts of installations on flat roofs – even in the absence of official guidance.

5. Flat roofs and solar solutions

It is clear in the UK as with the rest of Europe that the market for solar energy is growing rapidly.

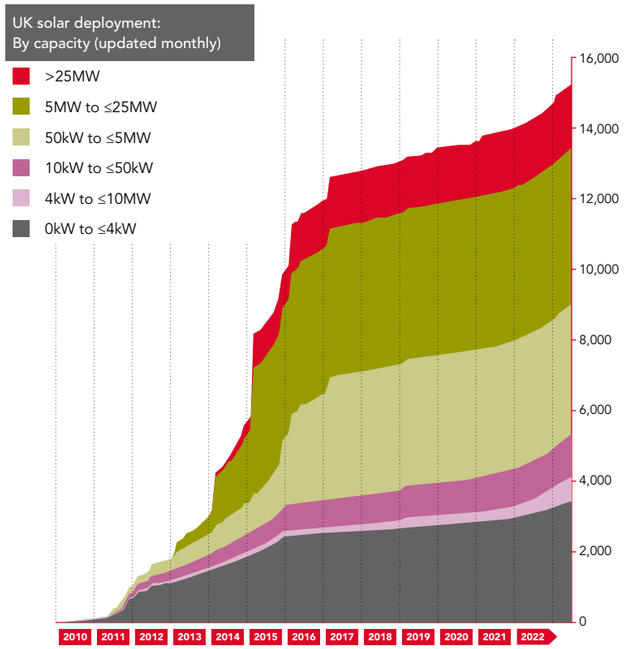
The European Commission reports that the cost of solar power has decreased by 82% over the last decade, making it the most competitive source of electricity in many parts of the EU[1].

In the UK market[2]:

- Provisionally, as of the end of June 2023 there is a total of 15.2 GW solar capacity in the UK across 1,353,261 installations
- This is an increase of 6.7% (952 MW) since June 2022
- Solar Energy UK forecasts that the UK can achieve 40GW of solar capacity by 2030 (capacity is reported at 14.6GW in early 2023)

"Solar is the source of energy that is growing at the highest pace in the EU."

European Commission[3]



On top of an ongoing trend towards solar energy, external factors such as the energy crisis and subsequent move towards energy self-sufficiency have accelerated solar adoption. Net zero programmes are also driving legislation which supports – or even enforces – solar installations.

To create uniform guidance around solar developments, the European Commission has launched 'REPowerEU', an initiative covering a variety of sustainable energy mechanisms including solar; and the 'EU Solar Energy Strategy' to address solar specifically.

The resulting EU proposal includes having solar panels, also known as photovoltaic panels or PV panels, installed on the roofs of the following buildings:

- All new public and commercial buildings with a roof size of more than 250m² from 2027
- All existing public and commercial buildings with a roof size of more than 250m² from 2028
- All new residential buildings from 2029

The obligation to install solar panels is only one part of the whole strategy, which also includes such measures as decarbonising industry, diversifying and changing the gas supply, and considering hydrogen power. It is nonetheless predicted to increase installed capacity across the EU to 600GW by 2030.

Solar solutions and fire risk

With the use of roof-top solar panels becoming commonplace, it is essential that all building stakeholders (per the BSA: Architects, Designers, Developers and Contractors) are aware of any associated potential fire risks, and engaged in mitigating them. Designers, specifiers, owners, contractors and insurers all have a role to play.

It is important to ensure that the installation of roof-top equipment, such as solar PV panels, is done in a way that does not introduce an additional fire risk to a building or its occupants.

A fault tree analysis by the University of Edinburgh[4] concluded that, "Rooftop PV systems are promising electrical power sources and a potential fire risk at the same time. In the qualitative fault tree analysis, seven major events were defined as the potential ignition sources leading to the major event, a PV-related fire. Herein, it was found that arcing is the major contributor of fire events, which arise from poor-quality products, planning and installation errors, component damages during transportation, operation errors, lack of regular inspection and maintenance, as well as weathering effects."

There are known incidents of solar panel 'arcing' in which electrical energy passes through air gaps and can cause ignition of nearby materials, or the solar panel itself, due to the high temperatures involved (described as "easily hot enough to melt glass, copper and aluminium, and to initiate the combustion of surrounding materials"[5]).

A recent roof fire featuring solar panels at We The Curious, a science museum in Bristol, is widely reported to have been caused by birds having damaged the solar panels leading to electrical faults[6]. This event also highlights the wider impact of fire – although the fire service was able to arrive and manage the fire quickly, the amount of water needed to extinguish the fire from the roof inevitably led to seepage and water damage through the building where the fire itself did not reach.

Similarly, it is critical that solar installations do not provide a route for a fire to bypass zones of compartmentation, or otherwise support or accelerate fire spread. A potential source of fire risk not always considered by designers and installers are the cables and penetrations associated with PV. Solar panels might not be the cause of a fire, but would they accelerate the spread if subjected to fire attack from below?

Specification and installation guidance, such as that covering waterproofing membrane warranties[7], discusses the waterproofing of penetrations without always also giving due consideration to the fire performance of the complete roof system. Many PV systems rely on cables that route through the roof system, and it is important that such cables and other penetrations in the roof are appropriately fire-resistant. A developed fire below the roof could spread to the roof, through unprotected PV cable penetrations, which has the potential to create a more severe fire and wider reaching damage to the property.

This is not to suggest that solar installations are inherently unsafe, however, we believe that stakeholders should consider whether it is prudent to go above and beyond legislative requirements and specify non-combustible building materials.

1. *European Commission (May 2022): Communication on EU solar energy strategy*
2. *UK Government (August 2023): Solar Photovoltaics deployment in the UK – July 2023*
3. *European Commission: https://energy.ec.europa.eu/topics/renewable-energy/solar-energy_en*
4. *Nur Aliah Fatin Mohd Nizam Ong, et al (April 2022): Fault tree analysis of fires on rooftops with photovoltaic systems*
5. *BRE (May 2018): Fire and Solar PV Systems – Investigations and Evidence*
6. *ITV News West Country (May 2022): Fire at Bristol museum We The Curious caused by birds damaging solar panels on roof*
7. *Building Centre (March 2018): Putting a cable through a school flat roof – how not to invalidate your warranty*

6. Green energy self-sufficiency, fire risk, and a fabric-first approach

The greatest risk in any fire is the risk to life itself. As such, the building regulations designate minimum requirements around ensuring safety for building occupants.

Building regulations do not however consider the level of fire protection needed to prevent damage to, or loss of, a building, which is also a serious consideration for owners and insurers – and can have long-lasting socio-economic effects to surrounding communities.

Consequences can include rehousing, loss of equipment, and compensation for business shutdowns. Solar PV itself, whether a cause of fire or simply an affected asset, can represent a major financial loss. Further ramifications, such as where public services are affected, could impact upon patient care in healthcare settings or education where schools and colleges are concerned.

As this paper has established, stakeholders must be cognisant of fire risks both above and below the roof. Direct and indirect financial liabilities following the loss of a building to fire can be significant.

The Building Safety Act 2022 is the foundation of a new building safety regime for the construction sector. It introduces changes how tall buildings/structures are designed, constructed, and managed. The Act is intended to improve the standard of buildings and contains provisions, intended to secure the safety of people in or about buildings irrespective of height and/or number of storeys.

The Act impacts all levels of the industry imposing wide-ranging new duties designed to increase the accountability, transparency and oversight of industry participants and the construction and development of higher-risk buildings. The Act changes the legal obligation for all individuals and organisations to be competent in ensuring compliance with Building Regulations in both design and construction.

Insuring buildings with solar PV installations

The insurance industry is increasingly aware of these risks, with major providers publishing guidance relating to solar PV installations. Consulting firm JS Held states that insurers should know if a property includes roof-mounted solar panels so as to consider the potential risk[1].

Examples of guidance include AXA's 'Property Risk Consulting Guidelines'[2] which state "Do not install PV systems on combustible roofs" and Aviva's 'Loss Prevention Standards'[3] which state that "PV panels should not be installed directly on top of combustible roofs."

In line with this, ROCKWOOL believes that serious consideration should be given to the reaction-to-fire classification of building materials and how they can contribute towards fire spread. It is our opinion that by incorporating non-combustible materials into the roof system, the rate in which fire can spread may be reduced.

While it is not the case that providers will or should refuse to cover buildings where solar PV systems are present, it is a recognition that that the specification of non-combustible materials where possible is considered best practice.

1. *JS Held (April 2022): Solar Energy Panels: Blind Spots & Risks for Insurers and Owners*
2. *AXA (2021): Property Risk Consulting Guidelines – Photovoltaic Systems (PRC.2.1.8.)*
3. *Aviva (January 2020): Loss Prevention Standards – Photovoltaic Solar Panel Systems*

"Prior to deciding whether installation of roof-top solar panels is a sensible action, an owner should consider if the roof needs any structural modifications."

Dr. Ben Daee and
Dr. Khosvari for JS Held[1]

Mitigating risk

The use of non-combustible flat-roof materials, including insulation, is a straightforward way for designers and developers to address the fire hazards associated with the building envelope, including where solar PV is installed. Not only this, but to carefully examine the impact of penetrations and cabling associated with solar PV, rooflights, plant equipment or other applications which pass through the roof. Such penetrations should be factored into the risk profile, and the fire resistance rating attributed to the roof build-up.

This approach follows best practice guidance from some insurers, who may recommend that buildings they cover utilise non-combustible materials in high-risk areas such as the roof.

Significantly, it is also aligned with new guidance published by the Fire Protection Association (FPA) under its RISCAuthority research scheme. RISCAuthority is a membership group comprising a series of UK insurers that actively support expert working groups developing and advising best practice for the protection of people, property, business and the environment from loss due to fire and other risks.

In a 2023 Joint Code of Practice document entitled 'RC62: Recommendations for fire safety with PV panel installations', RISCAuthority recommended: "PV installations should be installed on non-combustible roofs meeting Class A1/A2 s1, d0 to BS EN 13501-1. Fires involving combustible roofs will spread quickly, without the benefit of any protection installed within the building. Adjoining or nearby buildings can potentially also be at risk."[1]

The organisation also addressed this topic in 'Need to Know Guide RE3: Rooftop-mounted PV Solar Systems'. Under the heading 'Essential risk control recommendations for PV solar installations', one item states: "Ensure roofing materials are non-combustible (Class A1/A2 s1, d0 to BS EN 13501-1) OR if installation on a combustible or partly-combustible roof is unavoidable, then apply a fire resistant covering."[2]

In the absence of solar PV-related guidance in the approved documents, there is nonetheless a groundswell of opinion that non-combustible specifications are the most sensible approach.

Within this, taking a fabric-first approach in which insulation is carefully considered can open up complementary routes towards energy self-sufficiency. While solar solutions contribute to a building's energy footprint by generating all or part of its power requirements, effective thermal insulation can reduce heat losses and gains to make a building more energy efficient; compounding solar benefits.

Non-combustible ROCKWOOL stone wool insulation, for example, delivers thermal performance while providing fire resistance and fire stopping within a flat roof build up. It is proven to achieve an 'A1' or 'A2-s1, d0' Euroclass reaction-to-fire rating, and is capable of withstanding temperatures in excess of 1,000°C.

ROCKWOOL HardRock Multi-Fix (DD), for example, is a BBA-approved insulation board for flat roof applications and has been fire tested to BS EN 1365-2 as part of a weight loaded steel deck flat roof system - achieving two hours' integrity and insulation performance.

Therefore, a recommended route available to developers, owners and insurers is to make certain that the buildings they are responsible for utilise non-combustible materials across flat roofs, balconies and terraces. When the right insulation is chosen, and through-roof penetrations are accounted for, performance that meets or exceeds building regulations requirements for thermal and acoustic levels can be achieved without compromising on fire resistance.

1. *RISCAuthority via the Fire Protection Association (2023): RC62: Recommendations for fire safety with PV panel installations, item 5.4.2*
2. *RISCAuthority via the Fire Protection Association (2023): Need to Know Guide RE3: Rooftop-mounted PV Solar Systems, item 4*

7. Simplifying flat roof specification

In England, Approved Document B provides guidance on how designers can meet building regulation requirements for fire safety...

But there are multiple routes to compliance, and different ways to demonstrate an appropriate level of fire protection in order to meet statutory building regulations requirements.

Supplements including BS 8579:2020 (Guide to the design of balconies and terraces) provide detailed guidance for specific applications – in this case façade attachments and accessories. For some sectors, specialist guidance such as HTM 05-02 (Health Technical Memorandum) or BB100 (Fire safety design for schools), can also influence decision-making.

Further building-specific guidance is provided by the Approved Documents.

Ultimately, against a complex legislative backdrop, one simple way to mitigate risk is to select non-combustible materials throughout the fifth façade and to ensure that all penetrations are adequately fire stopped. The trend towards increasingly multifunctional roofs with solar installations and social occupancy only strengthens this case.

In addition to building in passive fire protection benefits, taking a non-combustible approach can simplify specification, installation and insurance – reinforcing compliance and helping to uphold the golden thread of accountability.

ROCKWOOL stone wool insulation delivers:

Non-combustibility
Achieving an 'A1' or 'A2-s1, d0' Euroclass reaction-to-fire rating (EN 13501-1).

Fire stopping
A solution capable of supporting and protecting compartment zones, by delaying the spread of fire through penetrations.

Passive fire protection
Fire resistance performance supporting a building's structure, integrity and insulation according to the products selected.

For more information and guidance about how ROCKWOOL products support the fire performance of flat roofs, visit:
www.rockwool.com/uk/flat-roof-hub

Suggestions have also been made for unified accreditations or certifications to extend this simplicity and peace of mind to the final occupants or owners of a building:

> "Introducing a single accreditation body for green technologies [such as heat pumps, home insulation, and solar panels] would make it easier for people to find trusted installers and give consumers the confidence to invest in carbon-saving improvements"
>
> Gillian Perry,
> Major Loss Manager for Zurich Insurance UK[1]

1. *Gillian Perry, Zurich Insurance UK (November 2022) for the Fire Protection Association: https://www.thefpa.co.uk/news/insurer-calls-for-government-reform-to-curb-rising-solar-panel-fires*

8. What is sustainable roof design?

Energy efficiency and sustainability by design are clear priorities in modern building design – as this paper has covered, both passive and active measures are a factor.

> "Many modern methods of construction have been influenced by sustainable building components, which can add elements of risk if not handled appropriately."
>
> Zurich Insurance UK[1]

While it has been highlighted that this is not always the case, energy efficiency can be supported and sustainable construction achieved without compromising on fire safety.

Our sustainability credentials

ROCKWOOL stone wool insulation delivers against a series of sustainability criteria.

Over its lifetime, ROCKWOOL building insulation sold in 2023 will save 100 times the energy consumed in its production[2]

New, unused ROCKWOOL stone wool insulation produced in the UK can be accepted back at our Bridgend plant for recycling

Proven to retain its insulation properties, including its thermal performance, for over 65 years[3]

Thermal performance, with lambda values as low as 0.032 W/mK[4], supports energy efficiency and reduces heat gains and losses

All while maintaining an Euroclass A1 (non-combustible) reaction-to-fire rating

Euroclass	Combustibility
A1 **A2-s1, d0**	Non-combustible
B **C** **D** **E** **F**	Combustible: Will burn and may char or flame

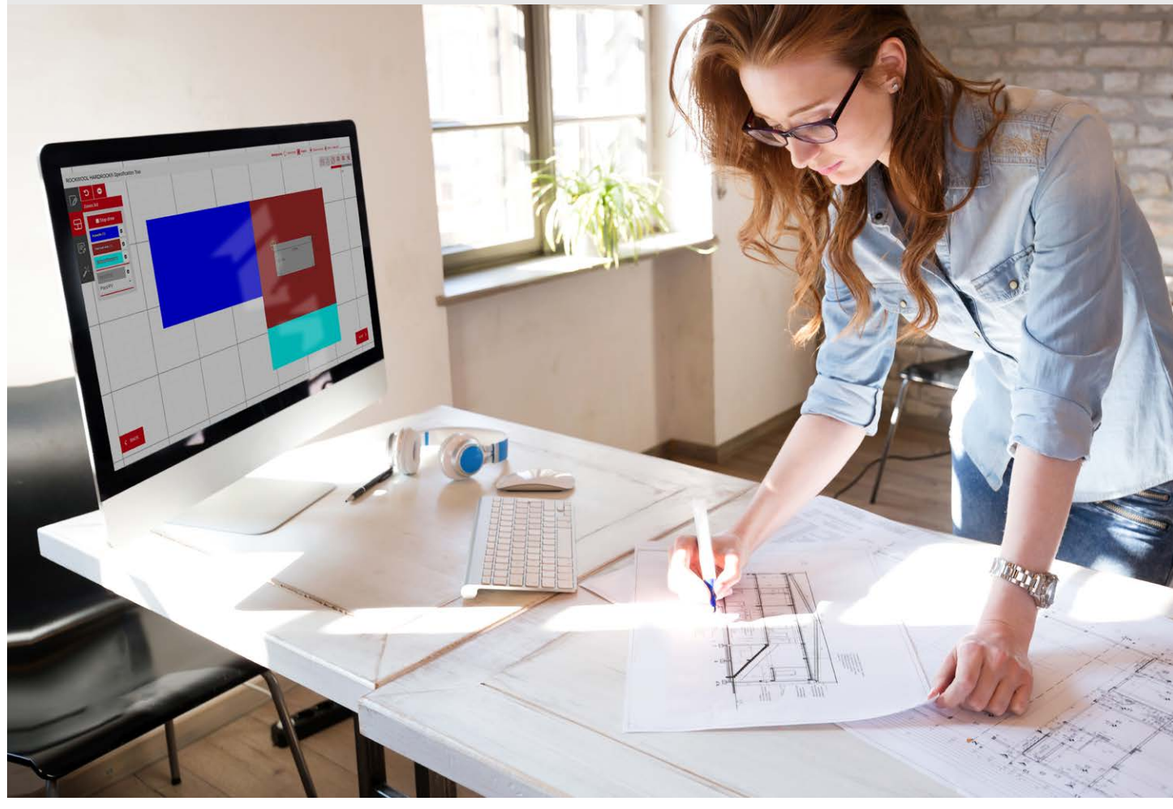
To find out more about the sustainability of ROCKWOOL stone wool, and ROCKWOOL as an organisation, please visit: **www.rockwool.com/uk/sustainability.**

1. *Zurich Insurance (December 2019): The Human Impact of Fire*
2. *Decarbonisation at ROCKWOOL: www.rockwool.com/group/about-us/sustainability/environment/decarbonisation*
3. *Testing conducted at the Danish Technological Institute in 2023, using ROCKWOOL products taken from an external wall system.*
4. *ROCKWOOL NyRock solutions: www.rockwool.com/uk/nyrock*

9. Further reading

The ROCKWOOL website comprises a wide range of technical information, specification support, best practice advice, interactive tools and product guidance.

- Flat roofs: Managing fire risk in the fifth façade >
- ROCKWOOL Red Book >
- ROCKWOOL FirePro® Book >
- High Rise Residential Sector Guide >
- Recladding with ROCKWOOL Guide >
- Technical Bulletin: Fire Classification of Bonded Insulation Materials >
- ROCKWOOL Learning >
- ROCKWOOL CPDs >
- U-Value Calculator Tool >
- Flat Roof Zoning Tool >
- Declarations of Performance >



Notes

July 2024

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Version 1.02 July 2024