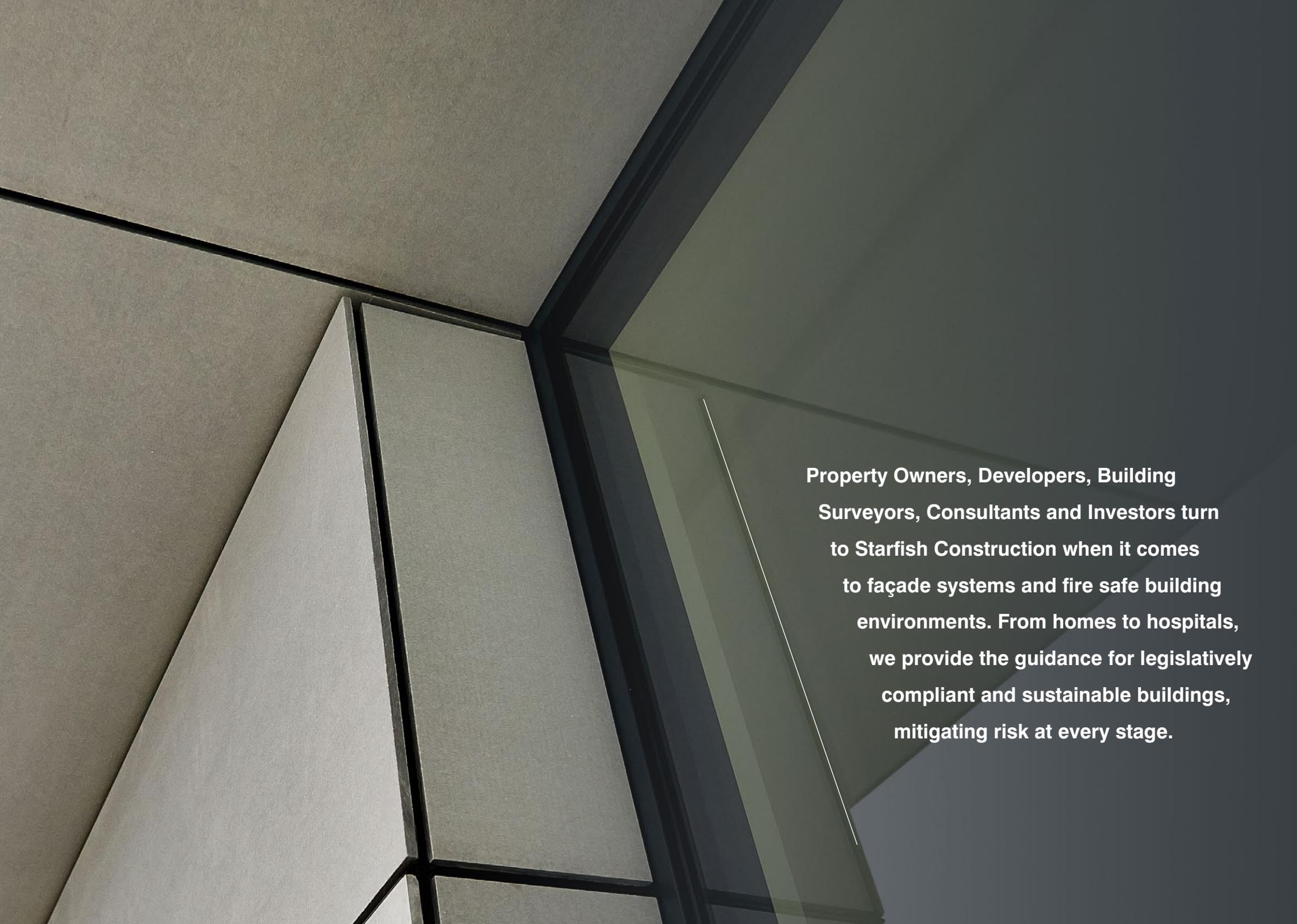


# Building Façade & Fire Safety



Your Informative Guide to  
Design, Material & Protection



**Property Owners, Developers, Building Surveyors, Consultants and Investors turn to Starfish Construction when it comes to façade systems and fire safe building environments. From homes to hospitals, we provide the guidance for legislatively compliant and sustainable buildings, mitigating risk at every stage.**

## Shaping the Built Environment

**Starfish Construction is a multi-faceted commercial and industrial construction services group, with diverse divisions that reflect our knowledge and expertise. We deliver building envelope and ground-up build solutions, complemented by our technical surveying division and design consultancy.**

As a company, we believe everyone deserves to be in a safe environment. Safety is paramount in everything we do and integrated across all our operations and supply chain. We mitigate risk through our strategy, processes and knowledge, ensuring buildings are safe, and people are protected.

Our business pillars are Cost-effectiveness, Safety, Sustainability and Legislation. We Diagnose, Design and Deliver, using best-in-class products to enhance how a building looks and performs. All our divisions provide stand-alone solutions and add further value by working seamlessly together. Our accreditations include BS EN ISO 9001, 14001, 45001.

**Starfish Construction carries £15 million worth of Professional Indemnity Insurance (PII) covering both the design and installation of our core services:**

- Building envelope and façade work
- Rainscreen cladding
- All types of trades work
- Internal fit-out solutions
- General construction

Our approach and expertise, combined with PII cover - protecting us as a business as well as protecting you, your property investment and reputation - means clients are confident with our overall project quality, budget management and safety. Insight, legislative knowledge and our customer relationship focus deliver results.

**Utilising our diagnostic surveys, In-house design team, technical specifications and our experience of system and substrate interfaces is crucial for minimising risk.**

We have prepared this insight document to provide you with a comprehensive guide to façade systems and their suitability across various building types. Although building façade is an ever-changing landscape, we provide the latest information from system design to legislation.

We're here to guide your decisions through a transparent and informed approach. Starfish Construction is a company you can trust with your property portfolio.



# Discover the UK's Façade Landscape

As you look across our town and city skylines, you won't fail to notice the wide variety of architectural design. Building heights, shapes, and façades vary significantly with each new structure as they try to stand out from their neighbours.

The façade and finish of a building is an enduring feature and is one of the few external elements that can change throughout its lifecycle. The aesthetics of the façade is certainly an important element, but safety is also a critical factor and has to be at the core of every cladding and façade project.

**Being safe in any building shouldn't be something we question, but since the Grenfell tragedy, the spotlight has centred on façade safety. The loss of life, perceived failures in health and safety legislation and changes in the law has forced the construction and building development sectors to refocus on a better awareness of cladding and fire prevention.**

The tightening of construction sector legislation will see 'Duty Holders' face longer-term liability and responsibility for fire safety and structural integrity.

Changes in survey reporting, valuations and insurance of high-rise residential blocks have seen many legal battles to decide who is responsible for carrying out remedial work. Leaseholders, building owners and pension fund managers face a projected cost of over £15 billion to retro-fit façade systems to comply with current building regulation amendments. Government funding is unlikely to cover the entire cost of replacement work required in the UK.

Much of the misconceptions and concern around cladding and rainscreen façades is a lack of understanding and information. The following pages will explain the differences and offer some clarity for stakeholders.

# Exploring Façade Cladding and Rainscreen Types



There are several types of materials used for façade cladding, with different performance ratings for fire safety. As an owner or property manager, understanding the differences in cladding types is vital.

As part of our Diagnose, Design and Deliver approach, our Project Managers detail and navigate customers through the façade options. Through our previous project profiles, we can demonstrate cost, façade solution options and longevity. Importantly, we deliver transparency and education, making all stakeholders aware of the safety implications of choosing different cladding solutions.

On the following pages, we have outlined typical façade cladding examples, summarising their appropriate uses and fire resistance.

**To design the solution, we must first diagnose the problem.**

# Fire Safety

## What You Need to Know

### Non-combustible to Flammable

Non-combustible means that the material does not contribute to the spread of a fire. The Euroclass grading system has determined that A1 is Non-combustible and A2 is Limited Combustibility, whereas B-F are combustible.

Using non-combustible materials helps to design out the risk factors, as they do not significantly contribute to a fire.

Non-combustibility is created by setting limits to the calorific content (PCS values). These limits depend on the materials used to produce the cladding. For combustible materials (B-F), the caloric value is not an essential consideration in manufacturing or determining its use.

### Flammable Materials

Flammable materials, such as Polyurethane (PUR) Euroclass E and F materials, are extremely combustible with a flashpoint at a very low temperature point.

### Fire Retardants

Fire retardants are additives that can be used with combustible materials to increase the ignition point. When exposed to the flames, fire retardants are consumed by the fire, slowing down the combustibility, but they do not stop it completely.



# Fire Resistance

Measuring and limiting the fire spread when ignition occurs in an area determines the fire resistance. The time a fire takes to start spreading between separate rooms, floors or exterior parts of a building is key to understanding fire resistance.

**The engineering, construction and condition of a building needs to be measured and assessed as part of a façade design solution.**

The time it takes in minutes for people to escape from a building in the event of a fire safely determines the fire resistance classification. These are detailed below:

## Euroclass Definition Description

Ref	Title	Effect
<b>A1</b>	Non-combustible	No contribution to fire
<b>A2</b>	Limited combustibility	Very limited contribution to fire
<b>B</b>	Combustible	Limited contribution to fire
<b>C</b>	Combustible	Minor contribution to fire
<b>D</b>	Combustible	Medium contribution to fire
<b>E</b>	Combustible	High contribution to fire
<b>F</b>	Combustible	Easily flammable

Fire barriers or cavity barriers are elements placed in the cavity of a façade to prevent the spread of fire within the cavity. When using non-combustible insulation and cladding (Euroclass A1-A2), the risk of fire spread via the cavity is limited. National building regulations or codes recommends the use of cavity barriers. There are two categories of fire barriers: vertical and horizontal.

2021 saw the UK leave the European Union. As the UK has always been at the forefront of fire safety and building regulations, there will be no immediate change to classification or safety legislation. Fire safety testing also conforms to the following international standards:

- **EN ISO 1182** Non-combustibility test
- **EN ISO 1716** Gross calorific potential test
- **EN ISO 11925-2** Ignitability test
- **DIN 4102-1** Fire test to building material



# Understanding Façade cladding

## 01 Aluminium Composite Panels or Materials (ACP or ACM)

These are flat panels consisting of two thin coil-coated aluminium sheets, bonded to a non-aluminium core. The standard ACP core is polyethylene (PE) or polyurethane (PUR). These materials are combustible and rated low in fire performance testing, typically Euroclass B. To improve their performance, they can be treated with flame retardants or even completely exchanged for a mineral core to enhance the reaction to fire performance. Their use is most common for external cladding, the façade of buildings, primarily for insulation and signage areas.

For context - ACM cladding (without A1 or A2 rating) was the façade cladding solution used on the Grenfell Tower. Deemed the primary combustible source material that allowed the fire to spread, the government subsequently banned ACM cladding without A1 or A2 rating, for use on high-rise residential 'buildings' external walls.

## 02 High-Pressure Laminate (HPL)

Made of resin impregnated cellulose layers and cured under heat and high pressure, HPL panels consist of about 60-70% paper and about 30-40% thermosetting resins. All these materials are combustible (Euroclass B-D) by nature and have a low reaction to fire performance. Adding flame retardants can improve the performance, but these materials' calorific content remains high.

HPL is a commonly used cladding solution, again not recommended for high-rise or high-risk buildings, but when used in the correct building type, they offer many benefits and aesthetic value.

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# Understanding Façade Cladding

## 03 Fibre Cement

Fibre cement is a composite material, made of cement reinforced with cellulose fibres. Fibre cement boards can be pre-painted or pre-stained, along with the option of adding a decorative coating before or after installation. The fire behaviour of fibre cement boards is excellent because of their low calorific content.

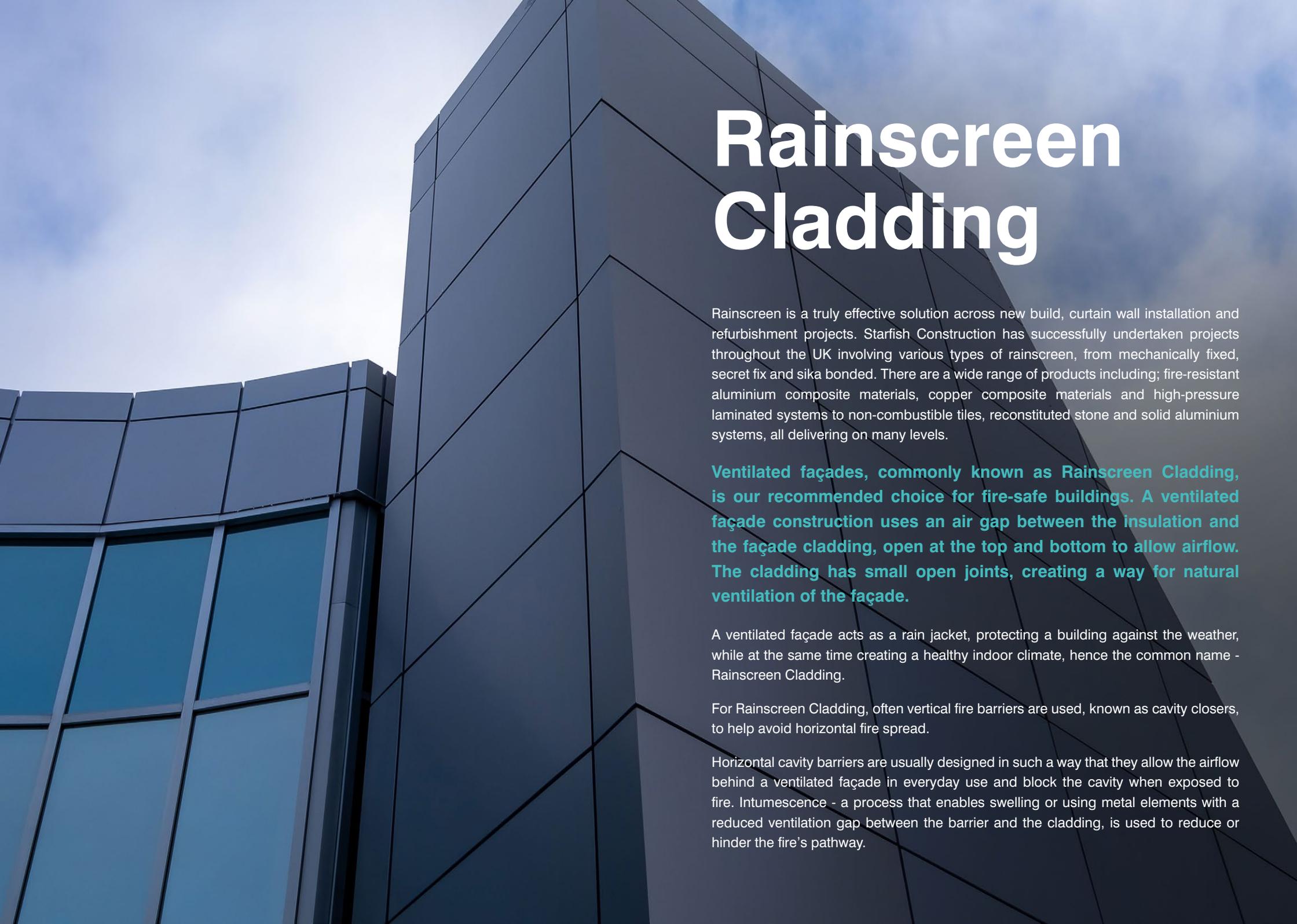
Fibre cement rainscreen is lightweight and versatile for façade construction. They allow building designers to achieve greater creativity, shorter construction lead times and improved thermal performance for their projects. Fibre cement panels also perform at Euroclass fire rating A2-s1, and d0 - produces no flaming droplets during combustion.

## 04 Non-combustible Solid Aluminium Panels

There is a wide range of A1 fire-rated aluminium rainscreen cladding panels and façade systems. Perfect for use on a diverse range of construction projects. A1 fire rated cladding systems are typically tested to BS 8414-2:2020 and is BRE 135 compliant.

## 05 Glass Rainscreen

Exterior safety glass is a visually impressive solution and is perfect for use in external glass rainscreen systems. Its strength and A2 fire rating enable it to withstand extreme weather, environmental conditions and fire. Its beautifully clean-cut and reflective finish add elegance to any building or structure.



# Rainscreen Cladding

Rainscreen is a truly effective solution across new build, curtain wall installation and refurbishment projects. Starfish Construction has successfully undertaken projects throughout the UK involving various types of rainscreen, from mechanically fixed, secret fix and sika bonded. There are a wide range of products including; fire-resistant aluminium composite materials, copper composite materials and high-pressure laminated systems to non-combustible tiles, reconstituted stone and solid aluminium systems, all delivering on many levels.

**Ventilated façades, commonly known as Rainscreen Cladding, is our recommended choice for fire-safe buildings. A ventilated façade construction uses an air gap between the insulation and the façade cladding, open at the top and bottom to allow airflow. The cladding has small open joints, creating a way for natural ventilation of the façade.**

A ventilated façade acts as a rain jacket, protecting a building against the weather, while at the same time creating a healthy indoor climate, hence the common name - Rainscreen Cladding.

For Rainscreen Cladding, often vertical fire barriers are used, known as cavity closers, to help avoid horizontal fire spread.

Horizontal cavity barriers are usually designed in such a way that they allow the airflow behind a ventilated façade in everyday use and block the cavity when exposed to fire. Intumescence - a process that enables swelling or using metal elements with a reduced ventilation gap between the barrier and the cladding, is used to reduce or hinder the fire's pathway.

# Why Rainscreen Cladding?

Years of industry research has shown that a ventilated façade has multiple and significant benefits compared to other building techniques. When you continuously expose a brick or concrete wall to rain, it acts like a sponge due to the materials' porous nature. The ventilated façades allow the water to drain in the cavity and any other humidity to evaporate through the air gap.

The façade cavity can get wet because of the open joints, and the moisture will quickly evaporate, thanks to the natural ventilation flow within the air cavity. A ventilated façade reduces the direct solar impact on the building and reduces the structure's thermal movement.

**The prevention of condensation build-up inside the façade will result from a well-designed and constructed rainscreen cladding solution. As the façade is “self-breathing”, you will significantly reduce algae and moisture problems.**

## Creating a Safer Façade

The use of non-combustible materials for insulation, sub-construction and façade cladding is necessary to avoid the “chimney effect”. The use of combustible materials can contribute to the risk of fire spread in the air gap.

It is essential in that case that non-combustible materials are specified. By doing this, you can have the best of both worlds: all the advantages of a ventilated façade and optimum fire safety.



A red fire extinguisher is positioned on the left side of the image, set against a dark, textured concrete wall with visible cracks. The extinguisher is a standard ABC type, featuring a red body, a black hose, and a red handle with a silver nozzle. The lighting is dramatic, highlighting the texture of the wall and the metallic components of the extinguisher.

# Fire Safety Testing Community

At Starfish Construction, our design expertise and innovative use of Rainscreen Cladding solutions throughout the UK's property sector not only enhances the aesthetics of buildings, but is a critical component in their safety. Rainscreen Cladding applications have seen a considerable rise over the last few years, and the value they can add to properties is a vital element of building infrastructure.

The evolution of Rainscreen Cladding is exciting. It can breathe new life into ageing properties, and add an effective, visually appealing finish to new build projects.

Cladding safety and the mitigation of fire risk is at the forefront of every project Starfish Construction undertakes. We have taken part in fire rating and combustibility tests with our supply partners and customers for several years.

Ensuring the selection of materials is correct from design to installation of any cladding projects is essential. Material style, colour and texture play a pivotal role in creating a façade that adds visual appeal to the surrounding area. Architects, planners, and Rainscreen Cladding designers continually look at the best solutions for a wide range of properties, although our technical expertise is the vital component for successful projects. Fire testing is an essential element that provides critical information for any cladding project, ensuring that all stakeholders are fully aware of their decision-making liabilities.

**Starfish Construction carries £15million of Professional Indemnity Insurance, covering design & installation of Rainscreen Façade Systems. This provides our clients with the additional security they demand.**

# Your project is in safe hands

Fire Safety should be the primary driver in all considerations of façade design and should always be at every project's core. Of course, many other elements combine to make a façade project successful, from aesthetics to durability, but fire safety should always be the essential element, from conception and with consideration for the future.

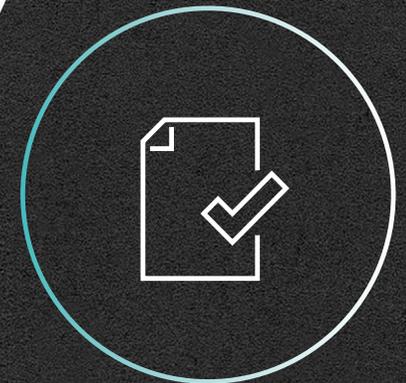
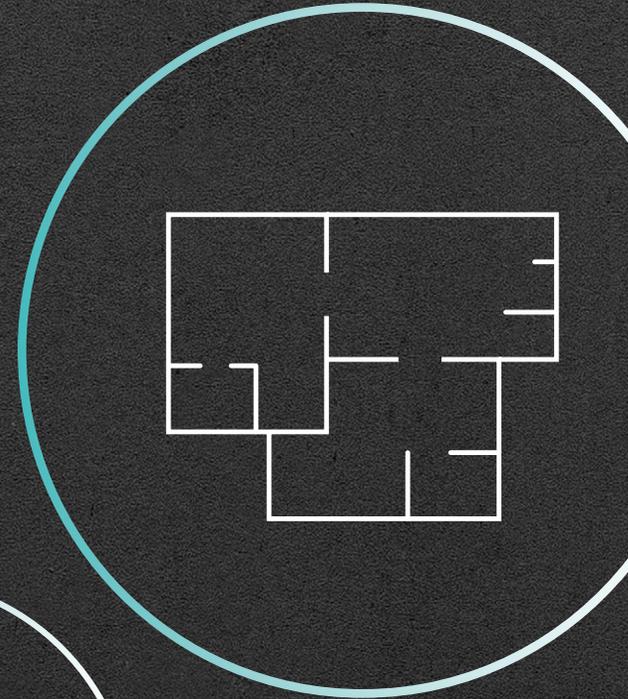
Starfish Construction recently constructed full-scale Fire Test Rigs, which were involved in BS 8414 full-scale test to BRE 135.

**The test's purpose was to ensure that a project met the enhanced building regulations following the Grenfell Tower tragedy. As a company, we welcome the updating of these regulations. By working with our property stakeholder client, we made a collective decision to carry out full-scale testing. The client's approach demonstrates their desire to 'do things right' and deliver safe and sustainable buildings.**

Starfish Construction's in-house design department and the testing institute chose a non-combustible or limited combustibility A1 or A2 solution. Part of the process included the encapsulation of any exposed Ethylene Propylene Diene Monomer (EPDM). The Grenfell Inquiry highlighted EPDM weatherproof seals as a combustible material, and the encapsulation process significantly improves the fire resistance of the material.

The creation of the test rig would replicate the exact construction process of the completed building. Over three individual tests, we collated data to reflect the reaction of the full build-up of every component within the Rainscreen Cladding zones on the project.

When you combine this with testing, professional installation and sustainability to all aspects of the building, this is ultimately driven by a safety-first approach.



# High-rise Buildings

**How do we define high-rise? In this instance it refers primarily to a building with a height of 18 metres or more with:**

- One or more dwellings - residential flats/rooms (excluding any room in a hotel, hostel or boarding house)
- Institutions - hospitals, care homes, sheltered housing
- Student Accommodation - dormitories in boarding schools, universities or colleges
- Schools built as part of the government's centrally delivered build programmes
- Any building which has a room for residential purposes - an office block penthouse

Height is an essential factor in fire safety. The risks increase as the height increases; evacuation from taller buildings is more complicated and takes more time. High-rises have more inhabitants or people who work in them, whereas average houses in comparison have more escape routes (windows, doors) and are therefore easier to evacuate when a fire occurs. That said, the use of combustible materials on a building 15 metres tall and not recognised as a high-rise still increases the risks in the event of a fire and can have a catastrophic outcome.

**As a company, we pride ourselves on a 'safety first' approach. We always offer recommendations which might go beyond legislation. Still, we feel offering the safest option is at the core of our philosophy.**

Often high-rise limits are based upon possibilities for firefighters reaching the fire using ladders or other equipment. With the rapid changes in the building environment, fire services cannot always use these methods, and these limits are part of the debate in defining new regulations for fire safety.

Post Grenfell, a policy was created banning combustible material on some newly built property with effect from 21 Dec 2018. The government has directed that Aluminium Composite Material (ACM) external wall systems, in certain circumstances, are to be removed from tall residential buildings. They also introduced guidance for cases where there may be other potentially combustible materials on existing tall buildings. These include but are not limited to Metal Composite Materials (MCM) faced with other metals such as zinc, copper, and stainless steel; High-Pressure Laminates (HPL); and rendered insulation systems.





# High-risk Buildings

High-risk buildings is a common term, when considering the effects of fire on particular buildings and their use. It's important to consider what properties fall into this category, what these terms mean, and what you should bear in mind to ensure optimum safety.

A high-risk building is a property where the impact of a fire can be catastrophic to life:

- **Hospitals**
- **Care homes**
- **Schools and further education**
- **Hotels**
- **Student housing**
- **And similar facilities that fall under the high-risk definition**

It is fair to say many buildings will fall into both high-rise and high-risk. These are buildings where many people live, sleep, or require care and cannot escape quickly or easily in a fire emergency. The risk of loss of life in a fire is high within this category of buildings. Also, property loss and the decreasing economic value of a high-risk building are aspects of particular attention.

**There are likely to be additions to the already vast properties falling under this category, as more investigations highlight potential risks.**

The likes of stadia and venues where many people gather and with limited or restricted escape routes are likely to fall under amended regulations. It is also essential to keep in mind the future use of a building. A structure currently not considered a high-risk building, could fall under the category within ten years if its usage changes. For example, an office building converted to a hotel or a care home. When assessing fire safety, it is necessary to bear in mind the safety of a building and its users throughout its lifetime. Using non-combustible façade cladding materials is the only way to design out the potential dangers of current or future high-risk buildings.

# Fire Safety Regulations

Let's ensure you are aware of the Fire Safety Regulations. When applying cladding and insulation in a rainscreen system, materials must meet building regulation Part B - fire safety.

## **The Requirement B4(1) of the Building Regulations states:**

“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.”

## **New Regulations Concerning High-rise and High-risk Buildings**

As of December 2018, the building regulations have changed. It now requires Euroclass A2-s1, d0 or Euroclass A1 for certain types of buildings as previously outlined.

### **Regulation 7 of the Building Regulations 2010 states:**

A relevant building with a storey at least 18m - all materials that become part of an external wall or specified attachment of this building should be of European Classification A2-s1, d0 or Class A1, classified under BS EN 13501-1:2007+A1:2009.

A relevant building is defined as any building containing:

- One or more dwellings.
- An institution.
- A room for residential purposes (currently excluding any room in a hostel, hotel or boarding house).

These include student accommodations, care homes, sheltered housing, hospitals and dormitories in boarding schools.

### **Approved Document B: Guidance Document**

Fire Safety Approved Document B provides further guidance and consists of 2 volumes:

- Volume 1 covers dwelling houses.
- Volume 2 sets the guidelines for all buildings other than dwelling houses, including High-rise buildings (above 18m) and multi-unit housing.

Approved Document B section B4 recognises the risks of using combustible materials within cladding systems, including extended cavities restricting the insulation combustibility and cladding over 18m.

Regulation 7 addresses other buildings, covered in section 12.4 till 12.6. Section 12.7 and 12.8 gives guidance on the application of fire barriers. In section 12.9 till 12.14, detailed advice is given for Regulation 7 - This section states the only acceptable classification method for materials is the appointed Euroclass classification.

# The Golden Thread

In the 2017 interim report following the Grenfell Tower Fire, Dame Judith Hackitt said: 'There needs to be a golden thread for all complex and high-risk building projects so that the original design intent is preserved and recorded.' The report stated, 'That any changes would be required to go through a formal review process involving people who are competent and who understand the key features of the design.'

In May 2018, the 'Building a Safer Future' - Independent Review of Building Regulations and Fire Safety final report, stated: 'The interim report identified the need for a 'golden thread' of information for all higher-risk residential buildings.

**Subsequent regulatory reviews and industry reports have also referenced 'The Golden Thread'. The Reformed Building Safety Regulatory System - Government response to the 'Building a Safer Future' consultation, published by the Ministry of Housing, Communities and Local Government in April 2020 states: 'Duty-holders will be responsible for creating and maintaining the golden thread of building information related to fire and structural safety.'**

The digital golden thread will ensure the original design intent. Any subsequent changes to the building are preserved and used to ensure continued safety. At the handover stage between Gateway three and occupation, critical information in relation to 'The Golden Thread' will have to be handed over from the Client to the Accountable Person. The Accountable Person will continue to be responsible for the golden thread, ensuring that the information remains accurate and up to date.

With a cladding façade, who carries end responsibility? Defining both legal and moral responsibility is a complicated matter. As the main contractor, we must produce high-quality work and use high-quality products which meet regulation and fire safety. We must also assist architects, and other stakeholders to ensure a safe building.

As every building is unique, our Diagnose, Design and Deliver approach provides technical surveying and a building design consultancy, delivering facts, transparency and strategy, that is all backed by expertise and legislation.

Ensuring fire safety is not just about choosing the right materials; the complete design, technical aspects and construction of a building all play a part in fire safety. Architects, contractors and owners need to be aware of the risks and interactions between all these factors.

**A building is for the future and shapes the environment for generations. Starfish Construction continually looks ahead, considering prospective legislation and where we can 'future proofs' a building for clients. National building regulations are seldom updated, except when incident forces review and change.**

We are a responsible façade and building envelope company, who work to design out potential issues before they become a problem. By specifying fire-safe rainscreen cladding, the risk factors associated with combustible cladding systems significantly diminishes risk and future-proofs your building.

No one can predict a significant change of use for a building. Still, careful planning and consideration, even decades in the future, can allow for a more sustainable and safe building throughout its lifetime.

**With knowledge at hand, you make the right decisions. We're here to guide you.**



For the most up to date guidance and advice contact

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