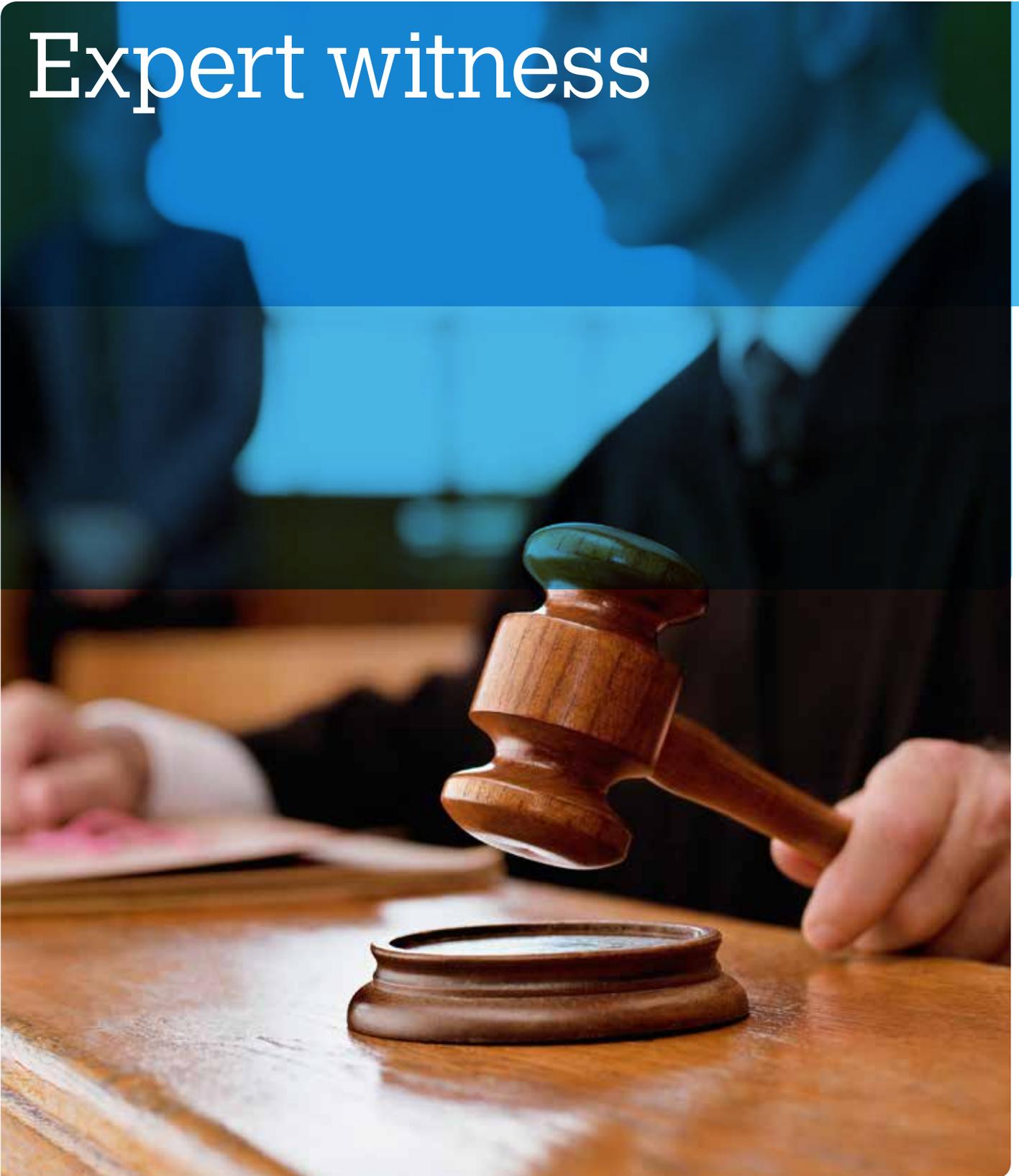


Expert witness



Overview of offering



BRE Group's internationally recognised experts provide a seamless, multi-disciplinary approach to the resolution of technical disputes, technical arbitration and bespoke expert witness services. Our highly qualified professionals provide unrivalled technical support, in-depth investigative analysis and independent, authoritative reports.

The BRE Group has been building a better world for over 90 years through cutting edge research, consultancy and testing services. Our unrivalled, independent knowledge is used across the construction industry and in the corporate world to create better buildings, communities and businesses.

Our history of working alongside local and central government means we have taken an active role in shaping legislation, developing existing codes and addressing the wider issues that will affect future standards such as safety, sustainability and utilisation of resources.

With expertise in every aspect of buildings and their construction, we can help you to prevent and solve problems wherever they arise – from corrosion in concrete bridges to inadequate fire stopping in apartment blocks.

We provide services to a wide range of clients

- Solicitors
- Insurers
- Loss adjusters
- Police
- Fire and Rescue Service
- National government
- Local government
- Private clients

We are experienced in a wide range of types of casework and legal disputes

- Post incident investigations
- Construction defects
- Litigation
 - Criminal
 - Civil
- Arbitration
- Mediation

We operate across the totality of the built environment; and our particular areas of practice are shown on the centrefold of this document.

Why choose BRE?

The BRE Group can draw on expertise developed from working with the built environment for over 90 years. We can assist with a number of different areas to help with investigations

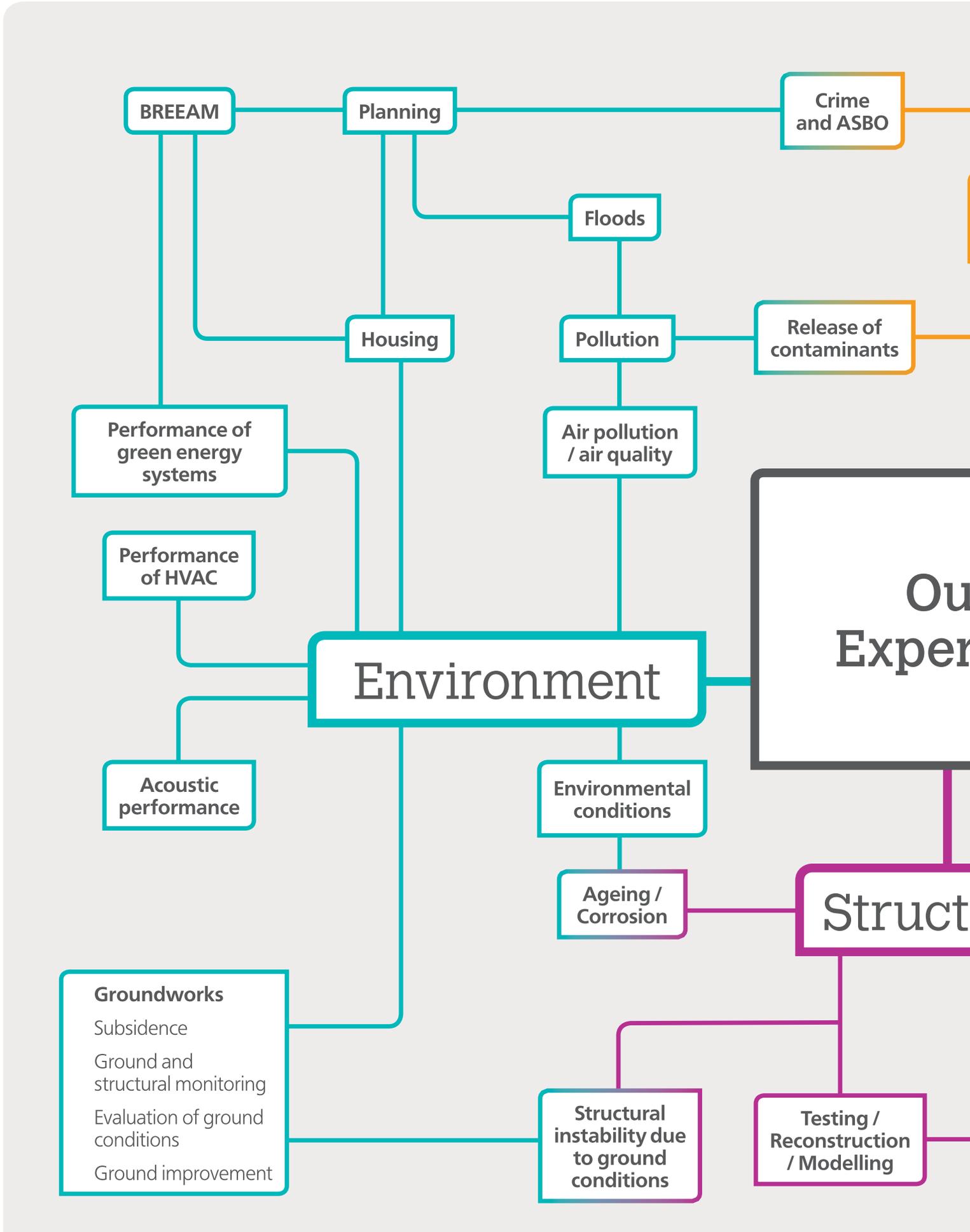
Backed by an extraordinary range of facilities, the BRE Group prides itself on being able to answer virtually any construction-related question. Created in 1921, we were the world's first dedicated testing and research organisation for the built environment and remain one of the world's leading, independent centres of knowledge in this field. Until 1997, we were part of UK Government, supporting the Building Regulations and related legislation and developing standards and guidance in support of those. Since our privatisation, we have become a national asset which provides services to both the public and commercial sector. We are wholly owned by a charitable trust, with trustees from across the UK built environment ensuring our independence and impartiality is maintained without question.

Our unique range of testing and experimental facilities support our expert consultancy capabilities. We can test against published standards, but regularly also develop dedicated procedures for new, unique or innovative products. We can also carry out bespoke reconstructions and experiments to investigate the circumstances of specific incidents.



Our test facilities include:

- A unique large fire laboratory which can fully characterise fires up to 20MW heat release rate
- Large scale structural test facilities, including a structural test hall capable of accommodating a four storey building and applying loads of up to 2,500 tonnes
- A wide range of fire testing facilities covering
 - fire detection systems and components
 - fire suppression systems and components
 - reaction to fire performance of construction products (i.e. flammability and toxicity)
 - fire resistance performance of construction products
 - external fire performance of roofs and building envelopes
- A wide range of material testing facilities related to
 - performance of timber and timber engineering
 - performance of concrete
 - performance of stone
 - other traditional and innovative construction materials and components
- Unique facilities for testing performance of renewable energy systems, and compliance to standards
- Two atmospheric boundary layer wind tunnels in which natural wind can be simulated for a vast range of environments
- One of the largest anechoic chambers in Europe and well equipped acoustics laboratories
- HVAC laboratories, including heat pump test facilities and environmental test chambers for full scale mock up testing of internal environments and HVAC systems
- Other facilities including
 - National collection of wood samples
 - Standard and high temperature drying kilns
 - Controlled condition test chambers
 - In-ground and out-of-ground field exposure sites
 - Artificial weathering equipment
 - Machine graders
 - Window joinery test facility
 - Electron and optical microscopy
 - Microbiological laboratory
 - Insect breeding and testing chambers
 - Racking rigs and engineering laboratory
 - Pilot scale composite manufacturing plant
 - Emissions laboratories
- Bespoke test facilities can also be constructed as required



Case study – Design Assessment: Reviewing the floor system of a South Asian airport

When newly-laid screed in a new airport terminal began curling and cracking, BRE provided design advice.

The problem

During the early phase of construction of one of the terminal's boarding gate wings, the airport found evidence of curling and cracking on the newly-laid screed. The engineering contractor had prepared a structural specification in order to solve the issues, which BRE was asked to assess by the airport's owner.

Our approach

Getting the briefs and specifications right at the beginning of any construction project is critical to its success. Drawing on 90 years' worth of experience of consultancy, BRE is able to provide independent advice to ensure that construction teams agree on the best solutions.

In this case, the engineering contractor had identified that the 70 – 90 mm screeds had cracked and curled, despite the fibre reinforcement that had been used. They suggested that the cracks should be repaired and screeding works continued.

Carrying out an extensive desk-based analysis of the drawings and specifications, BRE concluded that the screed should be reinforced with steel mesh and the screed mix changed to fit the proposed tiling layout. By changing the screed mix, it is possible to control shrinkage cracks that are unavoidable in the large screed bays when using a wet-concrete screed mix.

Our recommendation

BRE provided a specification for repairing the cracks that had already occurred in order that the stone floor tiles could be laid. BRE also gave a number of recommendations for the rest of the construction, primarily that semi-dry cement sand screeds should replace wet concrete screeds to minimise shrinkage. BRE also advised on the position of joints within the screeds and tiling and on specific technical details that arose during the construction.

Three causes of cracking and curling

- Failure to properly design movement joints
- Use of fibre reinforcement in place of steel mesh reinforcement
- Not allowing the screed to dry out fully before tiles are laid



Case study – Lakanal House tower block, Southwark, London

Fire broke out in the Lakanal House tower block in Southwark, London, tragically claiming the lives of six people on 3rd July 2009.

Using trusted knowledge, expertise and world-class facilities, BRE provided key evidence during the investigation and subsequent inquest.

Scene examination

Shortly after the fire, our forensic fire investigations team was called in by the Department for Communities and Local Government (DCLG) to examine the building and investigate the spread of fire. The scene investigation lasted for over a month and evidence gathered suggested that the fire spread was quick and unexpected and moved downwards as well as up to involve other floors.

A London Fire Brigade (LFB) investigation established that an electrical fault in a ninth floor flat started the fire.

Reconstruction and modelling

We were commissioned by the Metropolitan Police and LFB to stage a full-scale reconstruction of part of the flat at the centre of the investigations in March 2010. The structure was built in our Burn Hall in Watford, one of the largest fire test laboratories of its kind in Europe.

Data captured from our fire reconstruction and a number of other small-scale fire tests fed into the study using our in-house-developed computer modelling fire investigation software, JASMINE, allowing us to explain why fire and smoke spread through the building in the way that they did.

Our computational fluid dynamics (CFD) software was used to model the way in which the wind conditions at the time had contributed to this rapid fire spread and smoke logging.

This modelling was also used, under commission from the Office of the Chief Fire and Rescue Advisor, to explain how smoke from the fire affected the stairwell throughout the entire height of the building and may have affected fire-fighting operations and evacuation.

The findings from our investigations were used to help build up a timeline of the incident. The report of our findings was submitted to the Metropolitan Police and LFB and became a key part of the evidence at the inquest.

BRE also provided expert witness reports for the Police and Crown Prosecution Service (CPS).



Inquest

The fire at Lakanal led to one of the largest fire death inquests seen in Britain for many years and ran from the 14th January 2013 to its conclusion on 28th March 2013.

BRE provided an expert witness report to the coroner and gave evidence from our investigations on three days at the inquest.

The findings from our investigations helped inform the jury's verdicts as well as a number of recommendations sent by the coroner to the LFB, DCLG, London Borough of Southwark and the Fire Sector Federation.

These recommendations are sent under Rule 43 of the Coroner's Rules. The Rule states that the coroner may report circumstances to a person who they believe may have power to take action to try and prevent future repetition of the circumstances which may have contributed to the deaths in this case.

The future

A number of shortcomings brought to light during the Lakanal inquest will ultimately bring about changes in how high rise buildings are protected from fire. Our investigations into this tragic case will help contribute to the creation of safer homes in the future.

BRE Group

BRE is a world leading building science centre that generates new knowledge through research. This is used to create products, tools and standards that drive positive change across the built environment. BRE helps its government and private sector clients meet the significant environmental, social and economic challenges they faces in delivering homes, buildings and communities.

BRE is owned by the BRE Trust, a registered charity. The Trust uses the profits made by the BRE companies to fund research and education that advances knowledge of the built environment.

BRE Global

BRE Global Limited (incorporating LPCB & BREEAM) is an independent third party approvals body offering certification of fire, security and sustainability products and services to an international market. BRE Global's product testing and approvals are carried out by recognised experts in our world renowned testing laboratories. BRE Global Limited is custodian of a number of world leading brands including:

- LPCB for the approval of fire and security products and services, listed in the Red Books.
- BREEAM the world's leading environmental assessment method for buildings, sets the standard for best practice in sustainable design and has become the de-facto measure of a building's environmental performance.

About the BRE Trust

The BRE Trust is the largest UK charity dedicated specifically to built environment research and education. It was set up in 2002 to advance knowledge, innovation and communication in the built environment for public benefit. It commissions research that represents the spectrum of challenges faced by the built environment and publishes project findings which act as authoritative guidance to the construction industry.



BRE Group

Bucknalls Lane
Watford
United Kingdom
WD25 9XX

T +44 (0) 333 321 8811
E enquiries@bre.co.uk
www.bre.co.uk

BRE Trust

The BRE Trust uses profits made by BRE Group to fund new research and education programmes, that will help it meet its goal of 'building a better world together'.

The BRE Trust is a registered charity in England & Wales:
No. 1092193, and Scotland: No. SC039320.