Fire Risk Assessment
Protecting People, Property and the Planet
In an ever increasingly regulated world, architects, owners and managers have a duty to ensure that new and existing buildings meet regulatory requirements. These requirements are aimed at protecting the people who use or visit the buildings, the building structure itself and the surrounding environment.

The complex and technical nature of fire science and engineering can be bewildering and overwhelming to the untrained and inexperienced. Architects, owners and managers are faced with trying to identify the risks associated with fire; how these risks may affect the building, people and the environment; and how to mitigate those risks and ultimately comply with regulation and the law.

BRE Global has the skills, expertise and facilities to help you meet the challenges associated with fire safety and risk assessment.

With over fifty years of experience in research, consultancy and fire investigation; and one of the largest and most advanced fire experimental facilities in the UK, BRE Global works with many stakeholders to solve a diverse range of problems.

These include:
- Architects/Designers
- Fire and Rescue Services
- Government
- Healthcare Providers
- Insurers
- Legal
- Local Authorities
- Manufacturers
- Police
- Transport Industry (Aerospace, Maritime, Rail, Road)

The unique structure of BRE Global as a trading subsidiary of the BRE Trust, the registered research and education charity, means that BRE Global is truly independent of any market sector – its advice is internationally acknowledged as being authoritative, based on the relevance and experience of its recognised world experts.

BRE Global’s services include:
- Approval and Listing
- Business Continuity Planning
- Computer Modelling
- Drafting of Guidance
- Expert Witness
- Fire Investigation
- Fire Safety Design Consultancy
- Fire Safety Design Reviews
- Fire Safety Engineering Consultancy
- Fire Safety Management
- Property Protection
- Research and Experimentation
- Risk Assessment
- Structural Fire Engineering
- Suppression Systems
- System Tests (e.g. in situ hot smoke tests)
- Testing (includes large-scale)
- Training

Good fire safety management is essential for protecting lives and property. A fire risk assessment will assist in identifying the fire hazards and risks for an organisation.

In England and Wales, the Regulatory Reform (Fire Safety) Order 2005 requires the ‘responsible person’ (usually the employer) to carry out a number of duties, including the need to carry out a fire risk assessment of their property. Similar requirements apply in Scotland and Northern Ireland.

BRE Global is able to help organisations carry out fire safety reviews and fire risk assessments of individual buildings and/or the whole estate (both during the design stage and after completion or occupation), and to help develop the organisation’s fire safety strategy.

Guidance Documents
BRE Global assisted Communities and Local Government (CLG) in the drafting of a number of their guidance documents for the Fire Safety Order and assisted the Department of Health in the drafting of HTM 05-03 Part K (Guidance on fire risk assessments in complex healthcare premises). BRE Global also provided the lead contributions to the sections on the management of fire safety for BS 9999:2008 and CIBSE Guide E.

Business Continuity and Environmental Protection
The services that BRE Global offers also include business continuity and environmental fire risk assessment, hazard audits (qualitative risk assessments), fire load surveys and general fire system assessment.
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Computational Fire Engineering

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CFD models solve the fundamental equations describing the fluid flow and heat transfer phenomena associated with fire. They are able to predict the movement of smoke in geometries of arbitrary complexity and with the advent of performance-based codes are increasingly being used as general tools for fire safety engineering.

BRE Global has developed a number of computer modelling tools for the simulation of the above phenomena.

The modelling tools available are:

- **CRISP**
  - CRISP is a Monte-Carlo simulation of entire fire scenarios, used in fire risk assessment. Thanks to its detailed, state-of-the-art algorithms for human behaviour, it can also be used in a stand-alone ‘people’ mode for prediction of the human response in fire, including egress from buildings.

- **JASMINE**
  - JASMINE has been applied to numerous fire scenarios and has been validated rigorously against fire experiments. It is the most extensively validated CFD package for fire simulation available.

- **OTHER CFD PACKAGES**
  - BRE Global also uses other CFD packages such as SOFIE, FDS and CFX.

BRE Global has a proven and internationally recognised expertise in the field of human behaviour in fire and emergency evacuation design. It has been at the forefront of the application of research in the development of regulatory tools and systems. Through the extensive research programmes into human behaviour in fire incidents and experimental evacuation studies, BRE Global has developed a unique knowledge and understanding of the factors controlling occupant escape behaviour (such as alarm systems, fire safety management, occupancy type and building complexity) important for the development of effective evacuation strategies.

BRE Global uses this knowledge base to develop methods for the quantification and modelling of human behaviour during emergencies, which have been incorporated into engineering calculation and computational tools. We understand the impact on physical means of escape provisions, which constitute one of the greatest restraints and cost elements in building design and construction. The BRE Global computer model tool CRISP is used to simulate human behaviour.

**Human Behaviour In Fire and Emergency Evacuation Design**

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**Fire Engineering - Technical Advisor / Peer Review**

Fire engineering is increasingly providing architects and contractors with design solutions that facilitate function and aesthetics and reduce costs. But where fire engineers have used analysis or computational models or are proposing innovative strategies, it is often difficult to judge whether equivalency with approved codes and standards has been achieved particularly in complex buildings.

BRE Global can act as technical advisors to enforcers, and can offer peer review of fire-engineered design.
BRE Global investigations and reconstructions include:

1968
Ronan Point: lower block, East London gas explosion and subsequent partial collapse

1973
Summerland Leisure Complex, Douglas, Isle of Man: a multi-facility fire, partly through of materials of construction

1974
Nyro Works at Fiddler’s Ferry

1978
Fire in the sleeping car train at Taunton, Devon

1979
Woolworths store fire, Manchester – results of this investigation led to changes to UK fire legislation. BRE Global conducted a large-scale re-construction

1981
Stardust Disco, Dublin: BRE Global conducted a large-scale re-construction

1983
Donnington Mobstore: fire in high-raked pallet store. Led to a series of tests carried out at Cardington comparing efficiency of conventional sprinkler heads in high-risk warehouses

1984
Mayfield Leisure Centre: laboratory reconstruction

1984
York Minster: study into fire in the roof caused by lightning

1985
British Airways: research carried out for the CAA

1986
Bradford City Football Club: investigation into the fire and cause of the fire

1987
Kings Cross: underground station, London: BRE Global undertook laboratory tests and computer modelling

1988
Fires on the Piper Alpha accommodation module and the Ocean Odyssey: mobile oil drilling platform in the North Sea

1992
Windermere Castle: re-creation of the early stages of the fire

1996
Channel Tunnel: fire on a commercial vehicle transporter train. BRE Global specialists led the on-site investigations for the Channel Tunnel Safety Authority

1999
Ladbroke Grove (West London): train crash collision and subsequent fire involving two trains

1999
Mont Blanc Tunnel: – major road tunnel fire, Mont Blanc Tunnel resulting in 58 deaths. BRE Global analysed and computer modelled the fire, and provided experts for the criminal investigation

2002
Yar’s Wood: detainee centre fire. BRE Global specialists assisted with the on-site investigation

2004
Rosepark care home: BRE Global carried out large-scale reconstructions

2004
Bethnal Green: BRE Global analysed and computer modelled the fire and provided experts for the inquest

2005
Stevenage: BRE Global analysed and computer modelled the fire

2006
Star Princess: research carried out for MAIB

2007
Penrhoslon Hotel, Newquay: BRE Global analysed and computer modelled the fire and gave expert witness support to the inquest

2007
Atherstone on Stour: BRE Global assisted the Police with the analysis of the fire

2008
Royal Marsden Hospital, London: investigative support and finite-element modeling

Fire Investigation and Expert Witness

BRE Global has a fifty year history assisting with fire investigations and expert witness services.

BRE Global carries out fire investigations for Government to learn lessons, improve regulations, examine performance of the building and the management of the incident.

BRE Global can provide independent specialist help to other investigations and act as an expert witness. BRE Global also carries out audits and fire investigations for insurers.

As well as site investigations, laboratory work can be undertaken to examine the fire behaviour of particular items or to re-create the conditions in a particular fire.

Mathematical models are used to test hypotheses or to investigate unusual phenomena. Databases such as the Communities and Local Government (CLG) Annual Fire Statistics can be examined to place the generic fires investigated into a broader context.

BRE Global can also provide consulting specialists, with multi-disciplinary groups of scientists, engineers and geologists available, to carry out safety audits on a whole range of fire and explosion issues such as:

- ATEX (Atmosphere Explosive) Directives
- DSEAR (Dangerous Substances and Explosive Atmosphere Regulations 2002)
- Dust/gas explosion risk assessments
- Hazardous area zoning
- Advice on use of equipment in potentially flammable atmospheres

Scientific Capabilities

The research and consultancy work is underpinned by BRE Global’s world-class expertise in:

- Combustion Products and Combustion Toxicity
- Fire Detection and Alarm Systems
- Fire Investigation and Forensic Science Support
- Fire Regulations and Codes
- Fire Research, Fire Engineering and Fire Management
- Fire Risk Assessment and Risk Modelling
- Fire Suppression
- Fundamentals of Fire, Development of Fire Science
- Human Behaviour, Evacuation and Means of Escape
- Interaction Between Fire and People
- Mathematical Modelling Using Advanced Modelling Methods, and Model Validation
- Reaction to Fire of Materials
- Smoke Control
- Spontaneous Combustion
- Structural Fire Protection

Fire Test Facilities

BRE Global has extensive and unique fire test class facilities, including:

- Burn hall with smoke management used for determining heat release rates for input to Fire Safety Engineering design
- Fire resistance furnace hall with smoke management
- 10 MW (9m x 9m hood) calorimeter with optional sprinkler protection
- 2MW (3m x 3m hood) calorimeter with option of ISO 9705 room corner test (reference test for the Eurocodes)
- Sprinkler performance and distribution test facility
- LPS 1230 Fire suppression (halon replacement evaluation) performance facility
- BS 8414 external cladding test facility
- LPS 1181 sandwich panel performance test facility
- BS 476: all parts relevant to the Building Regulations (reaction to fire and fire resistance)
- All European fire tests relevant to the Building Regulations (reaction to fire and fire resistance)
- All three of the fire test methods that constitute DD ENV 1187 for external fire performance of roofs
- Facilities for sampling and analysis of chemical species
- Ad-hoc space for fire reconstructions and experiments
- Analytical chemistry facilities for sampling of chemical species
- Miscellaneous large-scale and intermediate-scale experimental rigs for studying linings, cable, other linear products
- Fire detection and fire suppression testing to European and International standards; includes heat and smoke detectors, alarm panels, gaurus, extinguishing systems, sprinklers
- Computational Fluid Dynamics (CFD) and risk based computational fire modelling suite

Fire Safety in Transport

Fire safety in transport systems can pose its own set of unique and challenging problems for designers, builders and managers. BRE Global’s expertise in safety research, consultancy and testing on transport systems and transport infrastructure can help to understand the risk associated with, for example.

- Aerospace
- Airports
- Bridges
- Maritime
- Rail
- Road
- Stations and Interchanges
- Tunnels

BRE Global can provide:

- Innovative fire safety concepts
- Assessment of new products, including ad-hoc experiments and standard fire tests
- Design and management system reviews, including the application of fire regulations, codes and standards, fire statistics and the wider aspects of safety and security
- On-site inspections, third party certification and safety system approvals
- Experimental and theoretical research covering all aspects of fire safety from passive fire protection to the interaction between fire and people
- Fire investigation, and forensic science support, both theoretical and experimental
About BRE Global

BRE Global is a trading subsidiary of the BRE Trust, the registered research and education charity which owns the BRE Group.

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.

Further information visit
www.bre.co.uk

BRE Group Companies

BRE
BRE is a unique research based consultancy and testing organisation offering expertise in almost every aspect of the built environment. We help clients create better, safer and more sustainable products, buildings, communities and businesses and we support the innovation required to achieve this.

www.bre.co.uk

BRE Training
BRE Training is a leading, high quality training provider and assessment centre for programmes leading to national vocational qualifications with CPD and other courses focusing on Energy, Sustainability, Fire, Regulation/Legislation, Security, Innovation, Health and Safety, Intelligent Buildings, Specification and Design.

www.bre.co.uk/training

BRE Ventures
BRE Ventures uses the Group’s expertise to take to market new ideas needing development, testing or certification, and to generate income for inventors and all those involved with the commercialisation process.

www.bre.co.uk/innovationden

Through the S-Plan, the BRE Group of companies has set challenging targets to improve the environmental performance of its businesses.

www.bre.co.uk/splan