

Fire Risk Assessment Protecting People, Property and the Planet





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

Fire Safety Risk Assessment

Life Safety and the Fire Safety Order

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.

How BRE Global can help with your Fire Risk Assessment Training

- Deliver courses to train staff to become fire risk assessors
- Train 'freelance' consultants to become fire risk assessors

Quantitative Fire Risk Assessment

The range of tools and techniques the team employ includes; analysis of UK fire statistics, event tree methods, and our in house Monte-Carlo model 'CRISP'. CRISP stimulates fire growth, smoke movement, detection, suppression, human behaviour and evacuation. BRE Global can also offer cost-benefit analysis for different fire safety systems and strategies.





Fire Engineering Design Consultancy

Buildings are becoming bigger, taller, deeper and more complex with multiple functions and occupancies.

Fire engineering is increasingly providing design solutions that facilitate function and aesthetics, reduce costs and ensure safety in complex buildings such as:

- Airports
- Healthcare Buildings
- Industrial Buildings
- Museums and Art Galleries
- Stadia
- Schools
- Shopping Centres
- Stations
- Tall Buildings
- Tunnels

BRE Global is a leader in the development of fire safety engineering guidance and associated standards/codes and the application of fire safety engineering principles to a wide range of buildings and structures.

With new buildings or projects it is particularly important to consider fire safety implications at the concept design stage and BRE Global can provide advice to architects, designers, and building controllers at all stages of project design and implementation.

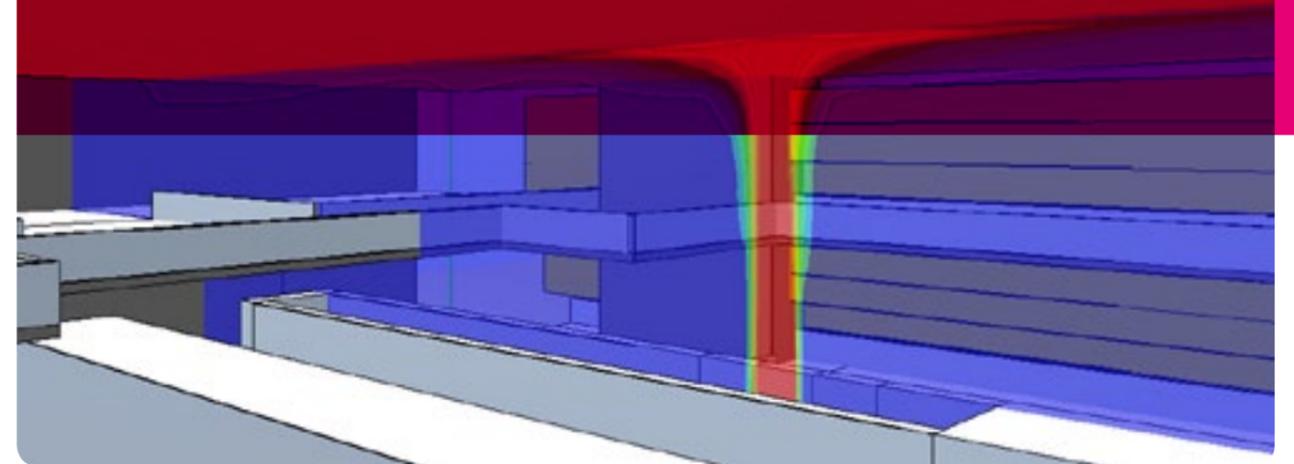
BRE Global's comprehensive range of services and expertise includes:

- All Forms of Risk and Hazard Assessment
- Compliance with Regulations
- Fire Detection and Alarm Systems
- Fire Modelling, Computational Fluid Dynamics (CFD) and Risk Assessments
- Fire Safety Management
- Interactions and trade-off between active and passive fire protection measures
- Material Performance
- Means of Escape
- People Movement and Egress Modelling
- Smoke and Heat Exhaust Ventilation System
- Structural Fire Precautions
- Suppression Systems

Successful fire safety design requires an understanding of the interaction between a number of different components, such as:

- Active Fire Safety Features
- Detection
- Fire Source
- Heat Transfer to the Structure
- Human Behaviour and Egress
- Smoke Movement
- Toxicity

BRE Global pioneered the original development and application of CFD for predicting the spread of smoke and heat from fires.



Computational Fire Engineering

BRE Global pioneered the original development and application of CFD for predicting the spread of smoke and heat from fires.

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:

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.

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.

OTHER CFD PACKAGES

BRE Global also uses other CFD packages such as SOFIE, FDS and CFX. BRE Global initiated the development of the benchmark SOFIE CFD code. FDS was developed at the US NIST laboratory for fire applications. BRE Global has extended its specialist fire modelling capability with CFX, a commercially available general purpose CFD package.

Human Behaviour In Fire and Emergency Evacuation Design

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.

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** tower block, East London: gas explosion and subsequent partial collapse
- 1973 **Summerland Leisure Complex**, Douglas, Isle of Man: a multi-fatality fire, partly the result of materials of construction
- 1974 **Nypro Works** at Flixborough
- 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 MoD store**: fire in high-racked pallet storage. Led to a series of tests carried out at Cardington comparing efficiency of conventional sprinkler heads in high-rack warehouses
- 1984 **Maysfield Leisure Centre**: laboratory reconstruction
- 1984 **York Minster**: study into a fire in the roof caused by lightning
- 1985 **British Airtours 737**: research carried out for the CAA
- 1985 **Bradford City Football Club**: investigation into the rapid spread of fire through the wooden grandstands at the football stadium
- 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. BRE Global specialists assisted with the on-site investigations
- 1992 **Windsor 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 investigation 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 fire in Mont Blanc Tunnel resulting in 39 deaths. BRE Global analysed and computer modelled the fire, and provided experts for the criminal investigation
- 2002 **Yarl's Wood**: detention 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 **Penhallow 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 modelling

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 Explosif) 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



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

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 world 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 (9mx9m hood) calorimeter with optional sprinkler protection
- 2MW (3mx3m hood) calorimeter with option of ISO 9705 room corner test (reference test for the Euroclasses)
- 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, gaseous extinguishing systems, sprinklers
- Computational Fluid Dynamics (CFD) and risk based computational fire modelling suite



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

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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

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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.

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