

Recent publications

Books

Achieving whole life value in infrastructure and buildings (BR 476)

The guide explains methods, techniques and tools to achieve whole life value in planning, commissioning and maintaining assets such as schools, offices, highways and repair and maintenance schemes. £45 (£30 for Connect subscribers).

Ventilation, air tightness and indoor air quality in new homes (BR 477)

This is a report on a study of ventilation and indoor air quality in 37 homes built in England since 1995. The aim was to assess whether the guidance in the 1995 revision of Building Regulations Approved Document Part F is effective at providing adequate ventilation and good indoor air quality in domestic buildings, and thereby minimising the risks to health and maximising the comfort of the occupants (see page 2). £32.50 (£20 for Connect subscribers).

Summertime solar performance of windows with shading devices (FB9)

This report provides data that can be used to quantify the ability of windows and shading devices to control summertime overheating. It covers different types of glazing (single, double or triple, with or without window film) with: external shading including overhangs and fins, screens and louvres, internal and mid-pane blinds, and combinations of the above (see page 11). £35 (£25 for Connect subscribers).

Good Building Guides

Practical guidance on building design and construction.

GBG 64 Tiling and slating pitched roofs

This three-part Good Building Guide deals with the upper surfaces of pitched tiled or slated roofing. It concentrates on those aspects of tiling and slating that are most important in ensuring good performance of the completed roof. The objective is to provide a summary of good practice.

- Part 1: design criteria, underlays and battens
- Part 2: plain and profiled clay & concrete tiles
- Part 3: natural and manmade slates.

Information Papers

The latest BRE research information and how to apply it.

IP2/05 Modelling and controlling interstitial condensation in buildings

This paper considers the models that are available to analyse the risk of interstitial condensation within structures. To run the models, certain properties of materials need to be known. The paper discusses the availability of data on these properties and the appropriate boundary conditions that should be used, and makes recommendations on which models should be used for different types of structure.

IP3/05 Composting in the construction industry

This information paper gives the main findings of a DTI funded project to determine the suitability of bioremediation and composting techniques for diverting construction and demolition waste (CDW) from landfill.

IP4/05 Costing sustainability: How much does it cost to achieve BREEAM and EcoHomes ratings?

One of the principal barriers to the wider adoption of more sustainable design and construction solutions is the perception that these incur substantial additional costs. A costing analysis, using real cost data for a broad range of sustainability technologies and design solutions, contradicts this assumption and demonstrates that significant improvements in environmental performance can be achieved at very little additional cost.

IP5/05 Self-sealing waste valves for domestic use: an assessment

Presents the results of an independent programme of laboratory and field testing to assess the performance of self-sealing waste valves under a range of operating conditions. It summarises the key features of the valve, and demonstrates its suitability for use as a waste valve for sanitary appliances, including discharges from unvented domestic water heaters and condensate from boilers and air conditioning units.

Prices

Good Building Guides are £12 each (£8 for Connect subscribers). Information Papers are £9 each (£6 for Connect subscribers).

To obtain any of the publications listed above or to subscribe to BRE Connect:
- www.BREBookshop.com
- Phone 01344 404407
- Fax 01344 714440
- email BREBookshop@IHSRapidoc.com



Diary of forthcoming events

24 May 2005 at the Prince's Foundation in London

An introduction to dynamic planning and design charrettes

The Design Charrette is changing the way communities, developments and individual buildings are planned and delivered. Already established as best practice in the US, the process is being employed in the UK by major clients, developers, architects and planning authorities. In this one-day seminar, leading exponents from both sides of the Atlantic explain the important role that the Charrette can play in guiding masterplanning and the design of buildings (see page 2).

26 May 2005 in the Corus Hotel, London

Fire safety in hotels

A free evening event to discuss hotel fire safety issues. The aim of this event is to give those attending the opportunity to raise any concerns they may have regarding the fire safety of their hotels, with BRE fire experts. At the event a BRE a user-friendly fire safety guide for hotels will be launched, to help hotel managers and staff meet their responsibilities for fire safety (see page 4).

28 May and 28 June 2005 at BRE, Watford

Smart homes need smart controls

A one-day workshop describing the benefits of the European Installation Bus (EIB) - one of the market leaders in European integrated home control systems with over 100 manufacturers producing EIB compliant devices - focusing on applications and giving a practical insight into technical operation.

6-7 and 28-29 June 2005 at ABE, Northampton

Fires safety engineering

In association with ABE, BRE/LPCB are offering this two day residential training course to provide Building Control and associated professionals with a basic understanding of fire engineering. The course will include specific case studies and will focus in detail on key experimental data.

6-9 June 2005 at BRE, Watford

OFFSITE2005

A major exhibition and conference that will demonstrate the ability of offsite and other modern methods of construction (MMC) to deliver quality homes, schools hospitals and commercial buildings that are creatively designed, energy efficient, sustainable and cost effective (see page 5).

16 June 2005 at Aberdeen Exhibition and Conference Centre

Waste minimisation in construction

Seminar about best practice in construction waste minimisation in Scotland, which provides an understanding of the complexities of construction waste legislation, the problems to be faced and overcome when dealing with waste minimisation on site, and the cost savings to be made (see page 4).

20-24 June and 11-15 July 2005 at BRE, Watford

Building services integration with EIB

European Installation Bus (EIB) technology delivers building performance through building services integration, reducing energy costs, enabling remote management and introducing life style benefits. This five-day course allows delegates to effectively deliver the benefits of EIB, and provide value-added service to clients. The course provides them with an understanding of the key elements of design, installation and commissioning of EIB systems.

22-23 June 2005 at BRE, Watford

BREEAM Offices assessor training course

Two-day training course to become a BREEAM for Offices assessor, covering the technical content of BREEAM for Offices and the details of the assessment process.
Contact: 01923 664462, breeam@bre.co.uk

6 July 2005 at BRE, Watford

Fire safety of products

This one-day course provides a general introduction to Fire and the Fire Testing of Plastics, Rubbers and Textiles. It describes the effects of fire parameters on burning behaviour, the various types of fire tests and their selection to specify materials and products of reduced flammability.

7 July 2005 at BRE, Watford

Building Regulations - Fire Safety Part B Consultation seminar

A consultation paper on Approved Document B - Fire Safety is due to be published. BRE, a key player in the consultation exercise for the review of Part B, is hosting a half-day seminar on the consultation paper and the background to it.

12-13 July and 7-8 September 2005 at BRE, Watford

EcoHomes assessor training course

A two-day course covering the technical content of EcoHomes and the details of the assessment process.
Contact: 01923 664462, breeam@bre.co.uk

13-15 September 2005 at BRE, Watford

resource05

Major energy efficiency, low carbon and renewable technologies conference and showcase. See Page 9 and www.resource05.com

Further information

For further information on these events and training courses contact (unless otherwise stated) BRE Events - 01923 664800, email events@bre.co.uk or visit www.bre.co.uk/events

BREconnect



BRE Connect is a subscription scheme that gives unrivalled access to BRE's expertise on buildings, construction, energy, environment, fire and risk.

For £130 a year BRE Connect subscribers receive:

- all BRE Digests, Good Building Guides, Good Repair Guides and Information Papers such as those listed on this page - totalling at least 50 publications each year - all building to form an invaluable reference tool
- a CD-ROM each year containing every BRE publication from that year in pdf format
- preferential pricing on a range of BRE books and other publications - such as those listed on this page - for which subscribers pay a significantly reduced price

For more information -

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CONSTRUCTING THE FUTURE

bre

Issue 24

OFFSITE2005 showcases latest MMC innovations

Standard for innovative housing

Renewable energy technologies

Avoiding air conditioning

Building with glass

SPRING 2005 ISSUE 24

bre

Constructing the future is circulated in association with Contract Journal.

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Constructing the future is published by BRE, the UK's leading centre of expertise on the built environment, construction, energy use in buildings, fire prevention and control, and risk management. BRE is owned by the BRE Trust, a registered charity with a mission to champion excellence and innovation in the built environment for the benefit of all.

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Comment

The cost of *not* using MMC

Most commentators would agree that the rate of housing supply needs to increase. Suggestions of how many extra dwellings are needed vary, but the Barker review of housing supply estimates that current build rates need to grow by some 39,000 homes per annum.

The overall rate of housing supply is at its lowest point since the 1950s. House builders are often blamed for the shortfall, but in reality it is almost entirely due to the decline in the level of local authority procurement. This has fallen from the order of 150,000 units per year up to the mid 1970s to almost zero by the early 1990s.

Whatever the reasons for the shortfall, it seems clear that reversing the trend is not going to be simple. Even at current build levels there are severe shortages of key skills on conventional construction sites, so it is unlikely that in the short term traditional construction techniques can deliver the necessary step change in housing supply.

Modern methods of construction (MMC) are seen as the solution, but here too there are hurdles to be overcome. While the MMC industry has the capacity to expand significantly, it will only invest in extra production capacity if confident that there will be a sustainable market for its products.

The market, though, is nervous, largely because of the cautious approach being taken by lenders and insurers. They have concerns about issues such as whether dwellings built by modern methods will retain their value over time and whether they can be cost-effectively repaired following incidents such as fire or flood. LPS2020, BRE Certification's new standard for innovative dwellings, should help to increase confidence in the end products (see page 7).

Other issues relate to quality and cost. Manufactured housing should result in higher quality dwellings because more of the construction process is undertaken in a controlled environment, and there is greater detailed design input for MMC and greater use of jigs and templates. An attempt to increase output by conventional construction may result in a drop in quality if greater use is made of semi-skilled and unskilled labour.

Cost is a very contentious issue. MMC is often perceived to be more costly than traditional construction, but there have been no rigorous comparisons. The perception of cost also varies. Private sector house builders are more concerned with the up-front costs of construction whereas housing associations are generally more interested in whole life costs. The National Audit Office is undertaking a study on costs, mainly from the viewpoint of housing associations, but perhaps the issue should not be what the cost is of MMC, but what will be the cost of not using MMC.

Keith Ross
Director for Innovation in Housing, BRE



Design charrettes

The term *design charrettes* may not yet be a familiar one to many, but charrettes are already established as best practice in the United States, and are used by a number of major UK clients, developers, architects and planning authorities to develop better buildings and communities.

The charrette process brings the client, design team and stakeholders together at the start of a development to create the best possible plan. During intensive, facilitated discussions, opportunities are identified to reduce waste and environmental impact, improve performance and enhance the well-being of communities and occupants. Substantial savings in construction costs and time are also often made.

The word *charrettes* derives from a pre-1900 exercise at the Ecole des Beaux Arts in France, where architectural students were given a design problem to solve in an allotted time. When time was up, the students would rush their drawings from the studio to the Ecole in a cart called a *charrette*, often jumping into the cart to finish drawings and invite critical comment on the way.

The term evolved to refer to the intense design exercise itself and refers to a creative process that is used to develop solutions to a design problem within a limited timeframe.

USA and the UK experts, including Bill Lennertz of the US-based National Charrette Institute, David Strong of BRE Environment and Hank Dittmar of The Prince's Foundation, will explain the use of charrettes in improving building and community design at a seminar in London on 24 May 2005.

For more information on the seminar, 'How to create demonstrably better communities and buildings', tel 01923 664800 or email events@bre.co.uk

Recycled and secondary aggregates

A number of recent research projects have been promoting the greater use of recycled and secondary aggregates.

The UK is already the leading user of recycled and secondary aggregates (RSA) in Europe, with around 25% of the aggregates annually consumed being RSA. But national targets have been set for RSA use to rise further – from 40 million tonnes in 2001 to 55 million tonnes by 2006.

One thing is certain – there will be no shortage of waste to choose from. Landfill Regulations and new directives from the EU relating to the compulsory recycling of electrical and electronic waste and road vehicles (the WEEE and the ELV Directives), mean there will be a proliferation of plastics and other industrial wastes that cannot be landfilled but could be potential RSA materials.

But if such materials are to be more widely used, specifiers and clients must have confidence in their long-term durability. One of the projects investigating RSA is aiming to promote its increased use as hydraulically bound mixtures (HBM), particularly in infrastructure applications. Funded by the Waste and Resource Action Programme (WRAP) and DTI, it will provide guidance to encourage HBM use by specifiers.

HBM is typically used in roads, car parks, heavy-duty paving (airport runways), dams, and flood and sea defences. It is widely used in continental Europe but less so in the UK, except perhaps for the use of cement-bound mixtures (CBM) as road base and sub-base. The first of a series of new European Standards for HBM has now been published, and the Highways Agency is in the process of including these in the UK specification for Highway works.

However, there are many potential uses for RSA across a range of sectors covering both buildings and infrastructure. The research project will produce technical guidance documents relating to the use of resources available on site and RSA as HBM, which will be published by WRAP this year.



RSA in HBM Seminars

In addition, WRAP and the DTI are funding two interactive seminars (one at BRE, Watford on 19 May 2005 and one in Leeds on 26 May 2005) to promote the real costs and technical benefits of paving and non-paving applications incorporating in-situ resources and RSA in HBM. The seminars are aimed at structural and civil engineering practices, contractors, local authorities, trade associations, consultants and universities.

The programmes cover the:

- market potential of HBM
- opportunities for resources available on site and RSA in HBM
- technical and economic benefits to industry
- case studies examples
- technical feasibility and guidance on using RSA in HBM in applications such as erosion protection, liners and piling platforms.

For information on attending these seminars contact Rachel Charleston
Email – charlestonr@bre.co.uk

Other RSA projects

Other BRE research that has been promoting the use of RSA includes projects:

- exploring the possible 'added value' that certain types of RSA have over primary alternatives in asphalt, concrete and concrete products (WRAP and DTI funded)
- using non-ferrous waste streams as bound aggregates – in particular slag from zinc slag production – specifically their suitability for road construction (BRE and industry partners)
- using small volume waste, ie waste materials that are generated in small quantities at many widespread locations (funded by DTI)
- demonstrating use of RSA through case studies (funded by WRAP and DTI)
- removing barriers to using RSA by specifying and improving service-life forecasting (a WRAP project).

For further information –
Flavie Moulinier, 01923 664200
Email moulinierf@bre.co.uk

Published guidance on aggregates from www.BREbookshop.com includes *The use of recycled aggregates in concrete (IP5/94)* and *Recycled aggregates* (BRE Digest 433).

Indoor air quality in homes

A study of ventilation and indoor air quality in 37 homes built in England since 1995, found that ventilation rates can be below design values and that guidelines for air quality can be exceeded in some homes.

The need for adequate ventilation of buildings is recognised as part of UK Building Regulations and guidance on meeting requirements is given in the 1995 revision of Approved Document Part F (ADF). The current provisions have been developed to allow the occupants to achieve a whole-house air exchange rate of about 0.5 air changes per hour (ach).

The aim of the study was to assess whether the guidance in ADF is effective at providing adequate ventilation and good indoor air quality in domestic buildings, and thereby minimising the risks to health and maximising the comfort of the occupants.

Simultaneous measurements of airtightness, ventilation, pollutants, temperature and relative humidity were made in homes during normal occupancy. Diary records of occupant activities and questionnaires on the occupants' perception of the indoor environment were also collected. The pollutants studied were: nitrogen dioxide, carbon monoxide, formaldehyde, volatile organic compounds (VOCs), and particulates.

Indoor air pollutant measurements were taken simultaneously with measurements of the air exchange rate of the indoor air with the outdoors using a perfluorocarbon tracer (PFT) technique. The airtightness of the structure was also determined for each home using a pressurisation test.

A report on the project discusses the relationships between air leakage, ventilation and indoor air quality, and will be of assistance to local authorities, architects, housing associations and housebuilders.

Ventilation, airtightness and indoor air quality in new homes is available from www.BREbookshop.com, tel 01344 404407, Email – brebookshop@ihrapidoc.com

News from BRE Certification

Exhibitions

Anyone planning visit any of the following shows would be very welcome to call by the BRE Certification stand to discuss any queries they may have – or just to say hello!

- International Fire Expo, NEC, 16-19 May – Stand no. D70
- IFSEC, NEC, 16-19 May – Stand no. E126
- NFPA, Las Vegas, 6-8 June – Stand no. 1939
- Interschutz, Hanover, 6 – 11 June, Stand no. K46
- OFFSITE2005, BRE, Watford, 6 – 9 June.

Website

The development of www.RedBookLive.com continues – a better search/browse facility has just been instigated and the following search parameters are now available:

- company name
- company location, ie any element of the address
- product trade name
- any supporting description, notes or scope.

The ability to display the section introductions when search/browse results are displayed has also been added. In addition, Red Books and CD ROMS can be ordered directly from the site.

Fire Safety Order

The Draft Regulatory Reform Order 2005 has now been published and is available to download from the Regulatory Reform Committee's web site at www.parliament.uk/regrefcom. It is listed as the Ninth Report of Session 2004-05.

To explain the implications of the new legislation, ODPM in conjunction with business stakeholders (BRE, ABE, CFA, IFE, ABI and FIC) will be running a series of seminars throughout England and Wales during 2005/2006. To register an interest in attending a seminar, email fire.safetyreform@odpm.gov.uk. The schedule of dates will be emailed to those registering as soon as it becomes available.

New Technical Approval

Protect Wunderlay has achieved a BRE Certification Technical Approval. Protect Wunderlay is a laminated membrane comprising a non-woven layer with a water resistant coating. All of BRE Certification's Technical Approvals can be found in Volume 2 of the Red Book, and certificates can be downloaded free of charge from the website at www.RedBookLive.com/technicalapprovals.jsp



LPS 1277

LPS 1277 *Requirements for the LPCB Approval and Listing of Alarm Transmission Systems and Equipment* has just been ratified by the LPC Fire and Security Board and will appear on www.RedBookLive.com shortly. Parties interested in applying for approval to this standard should contact Paul Drake at drakep@bre.co.uk.

Part P

For a limited period BRE Certification and ECA have reduced the application fee for Competent Person status to Part P to £350 plus VAT, which is a saving of nearly £200 on the original fee. The scheme is now running smoothly and more than now 650 Part P certificates have now been issued. For more information call 01923 664100

Tsunami reconstruction research

The BRE Trust has carried out a project to determine what longer-term research it might sponsor to help with the reconstruction of areas affected by the SE Asia tsunami.

As we are all aware, a major South East Asian earthquake on Boxing Day last year – measuring a terrifying 9.3 on the Richter Scale – created a huge tsunami that travelled across the Indian Ocean causing enormous damage and loss of life in Asia and Africa.

In its wake the tsunami left a massive need for reconstruction that may take many years to complete. Anxious to provide the most effective assistance possible, the BRE Trust* sponsored a project to assess how it and BRE might help those affected as they reconstruct their built environments.

The report of this assessment project indicated that there are many issues with which the expertise and experience held within BRE could help, especially in Indonesia, Sri Lanka and The Maldives. It has been concluded that BRE should focus on the latter two countries.

Some of the needs outlined by representatives of these countries, or determined from publications, require quick responses – for example to help with assessing structures and ground conditions. Other help may be provided on a medium to longer term basis during the reconstruction process.

To further assess how BRE can best use its expertise in The Maldives and Sri Lanka, Gerard Canisius, BRE's project manager for Tsunami Relief, visited the region in February to meet with government and public officials. 'While there are many opportunities to help the tsunami damaged communities,' says Canisius, 'these must be followed up with care and in a manner that is sensitive to the dignity of those affected.'

Both countries indicated that they were keen to use BRE's expertise in the reconstruction effort. But unsurprisingly, the scope of assistance requested is far greater than can be met with the resources available to the BRE Trust. In view of this, proposals have now been put to The Maldives and Sri Lanka regarding the reconstruction assistance that the Trust could potentially provide with the help of funds to be sought from international funding sources.

The BRE Trust is now considering what long-term research it might support from its own resources, which could provide information and guidance on damage assessment, suitable repair methods and reducing the effects of future natural disasters. The outcome of this research would be of assistance both to those affected by the tsunami, and other communities in the wider developing world that might be the victims of similar natural disasters.

BRE is currently working with the BRE Trust with a view to submitting a research proposal to its Trustees. The proposal will address those needs identified in the earlier assessment project, and will be developed with the participation of local experts.

For more information –
Gerard Canisius, 01923 664694
Email canisiust@bre.co.uk

* The BRE Trust is a Registered charity with a mission to champion excellence and innovation in the built environment for the benefit of all (www.bretrust.org.uk). The Trust owns BRE.

Both countries indicated that they were keen to use BRE's expertise in the reconstruction effort.



Geotechnics for building professionals

A new book, *Geotechnics for building professionals*, provides geotechnical engineering guidance for non-specialists – particularly those needing to make decisions about foundations. It simplifies this complex topic by bringing together years of expert published guidance into a single, unified format and approach.

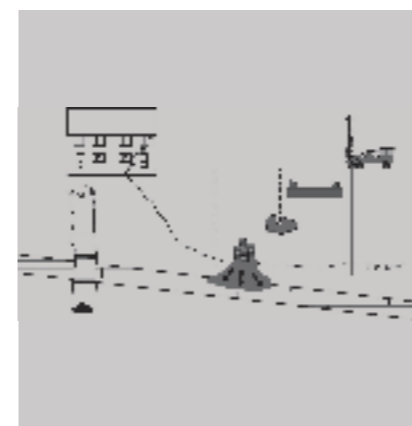
Foundations affect how the main structure of a building behaves and can be a major factor in determining its long term performance. 'Lack of attention to foundation design and construction can have undesirable and expensive consequences', says the new book's author Andrew Charles. 'But decisions about foundations for low-rise buildings are often made by people with a relatively limited understanding of the engineering of the ground'.

Geotechnics for building professionals has been written for such people – and their professional advisors – who may include architects, surveyors, loss adjusters, planners, insurance underwriters and property developers.

The new guidance will give building professionals a better understanding of the most important elements of geotechnics. It will enable them to ask the geotechnical specialist informed questions, and to have greater confidence in the answers they receive.

As well as giving an overview of ground behaviour and geotechnics, the publication focuses principally on shallow foundations for low-rise buildings – an area that is often overlooked – and discusses the physical and chemical hazards of building on brownfield sites in simple terms. It also gives guidance on the various solutions offered by geotechnical and geo-environmental engineering.

Geotechnics for building professionals can be purchased at www.brebookshop.com or telephone 01344 404407, Email – brebookshop@ihsrapidoc.com



Fire safety guide for hotels

The BRE Trust has published a guide to fire safety management of hotels to help hotel managers and staff protect themselves and their businesses.

The new guide introduces fire safety and the law, explains how fires start and spread and how they can be prevented. It also explains the basics of how to build a fire safety culture and how to carry out fire risk assessments. It provides a basic understanding of hotel fire safety features, including a fire safety checklist.

The guide is designed to complement the ODPM's forthcoming detailed guidance which is expected to be published later in the year. Fire safety in hotels is available from www.brebookshop.com. For further information on fire in hotel risk assessments and supporting training courses, contact Pauline Aitchison, 01923 664100, Email aitchisonp@bre.co.uk

Seminar

A fire safety in hotels seminar is being held on 26 May at the Corus Hotel in London. The aim of this event is to give those attending an opportunity to raise concerns they may have regarding fire safety in their hotels with BRE fire experts. Attendance is free of charge.

The agenda for the event is:

- 6.30pm: Registration
- 7.00pm: Welcome - Head of BRE Publications, Education and Training
- 7.05pm: The Hotel Industry - HCIMA CEO Philippe Rossitier
- 7.25pm: Discussion Panel on Fire Safety Issues with BRE experts
- 8.00pm: Buffet & Wine

To attend the seminar contact
Caroline McGill, 01923 664532,
Email – mcgillc@bre.co.uk



Scottish Building Standards

On 1 May 2005 a new building standards system came into force in Scotland. The Building (Scotland) Act 2003 gives Scottish Ministers in the Scottish Parliament the power to make building regulations, procedural regulations, fees regulations and other supporting legislation needed to provide a modern, flexible and responsive building standards system.

The system is intended to ensure that building work on new and existing buildings meets a reasonable standard, and:

- secures the health, safety, welfare and convenience of persons in or about buildings, and of others who may be affected by buildings or matters connected with buildings.
- furthers the conservation of fuel and power
- furthers the achievement of sustainable development.

The Scottish Building Standards Agency (SBSA) was established in June 2004 to fulfil the duties placed on the Scottish Ministers by the Act. The Agency's establishment follows the revision over the past four years of the whole of the building standards (formerly building control) system for Scotland. This revision also sees a shift from the many prescriptive and performance standards to the use of fewer functional standards supported by guidance as a means of regulating construction.

The Sections forming the new regulations (which reflect the six essential requirements of the EU Construction Products Directive) are listed in the table below, and shown against the corresponding parts of the Technical Standards that they replaced on 1 May.

Section	Content	Previous corresponding parts of Technical Standards
0	General	A, B
1	Structure	C
2	Fire	D, E
3	Environment	F, G, K, M, R
4	Safety	N, P, Q, S
5	Noise	H
6	Energy	J

For further information – Stephen Garvin, 01355 576200, Email garvins@bre.co.uk

In brief

Climate neutral at resource05

An issue facing the organisers of resource05 – a showcase of energy technology designed to reduce carbon emissions – was the additional CO₂ generated as a result of the event itself. These would include emissions from delegates' travel and the venue's energy use.

The answer was to offset the event's emissions through an organisation called Climate Care (www.climatecare.org), who will reduce an equivalent amount of CO₂ emissions through their projects. Climate Care develops projects that avoid, reduce or absorb greenhouse gases through renewable energy, energy efficiency and forest restoration.

For example, it is working with housing developers in South Africa to install energy efficient lighting into people's homes. New houses are normally fitted with 60W or 100W bulbs, but the Climate Care scheme is providing 14W energy efficient lamps instead.

resource05 is a three-day programme of demonstrations and seminars on integrating renewable energy and low carbon technologies into buildings (see page 9), being held on 13-15 September 2005 at BRE, Watford. For more information - 01923 664800, www.resource05.com.

Cutting Scottish construction waste

The Scottish construction and demolition industry currently produces waste at a level that is expensive and unsustainable, and impacts directly on bottom-line profits.

Achieving best practice in minimising construction waste in Scotland will be the focus of a seminar, at the Aberdeen Exhibition and Conference Centre on 16 June 2005, jointly supported by BRE, the Scottish Environmental Protection Agency (SEPA) and Environwise.

Aimed at site and environmental managers from construction companies – along with local authorities, construction, surveying and architectural professionals, academic institutions and housing associations – the seminar will explain how good practice in design considerations, construction methods and site activity can reduce waste and save money.

For more information – 01355 576200
Email – walkerl@bre.co.uk
or visit www.bre.co.uk/events



OFFSITE2005 SHOWCASES THE LATEST INTERNATIONAL MMC INNOVATIONS

OFFSITE2005 will be the largest and most ambitious event on off-site and modern methods of construction (MMC) ever seen in this country.



OFFSITE2005 will combine full-scale exhibits of building systems from around the world – many of which have never been seen before in the UK – with a case-study based seminar programme demonstrating how MMC can deliver quality homes and buildings to time, budget and sustainability standards.

English Partnerships' innovative Summit Townhouse, which was widely featured in the media earlier this year, will be one of several full-scale exhibits at the event.

The Townhouse dominated the Delivering Sustainable Communities Summit in Manchester on 31 January – 2 February 2005. Hosted by John Prescott, and attended by Tony Blair, Gordon Brown and other Government ministers, the Summit brought together more than 2000 experts from across the UK and overseas to discuss sustainable communities.

Designed to show how modern methods of construction can reduce construction costs and raise quality and environmental performance, the Townhouse was dismantled after the Manchester Summit, and will be reassembled at BRE's Watford site for OFFSITE2005 from 6 – 9 June.

The three-bedroom house is constructed using a panel and modular system devised by Fusion Building Systems. It ticks all the boxes needed to achieve an EcoHomes 'Excellent' rating and includes a raft of features aimed at making it a potential blueprint for new affordable and mid-market homes, including:

- a two-storey sunspace that acts as an environmental buffer
- good acoustics and environmental insulation
- reduced consumption of energy and water
- facilities for recycling
- the ability to use alternative energy sources
- the incorporation of urban design principles such as Secured by Design.

Century Homes, Europe's largest Timber Frame Manufacturer, will be displaying a full-scale house showcasing timber frame as a cost effective MMC. The structure will incorporate a range of innovative features and has been designed with energy efficiency in mind. U-Values of 0.27 will be demonstrated which will comply with changes to Building Regulations.

The structure features no internal load bearing walls. This provides an internal space that can be easily changed for future occupiers – along with the associated savings in foundations. The system uses I-beam technology in the floor to achieve this. The I-beam also features pre-service pop outs to facilitate the fitting of services on site, thus making the build process more efficient.

Century Homes will also feature its unique pre-fitted wall insulation along with a new innovative exterior cladding system – novabrick, a brick system that has a traditional appearance, but uses no mortar and offers a rapid construction system.

The Concrete Centre will promote some of the many MMC innovations in the concrete industry such as:

- Thin-joint mortar, which allows the mortar depth to be reduced from 10mm to just 2mm. Speed trials have shown that a wall of blocks and thin joint mortar can be laid twice as fast as that built with traditional mortar.
- Insulating concrete formwork (ICF) offers extremely high levels of thermal performance and speed of construction. It consists of twin-walled, expanded polystyrene panels or blocks built up to create formwork for a building's walls. This is then filled with ready-mixed concrete to create a robust structure with the panels or blocks remaining to provide high levels of thermal insulation.
- Tunnel form, a fast-track MMC well suited to repetitive cellular projects such as apartment blocks. In-situ concrete is poured into two half-tunnel forms that together form the walls and ceilings of a room. When this process is repeated, generally on a 24-hour cycle, residential units can be created very rapidly.

Hanson will be exhibiting a full-scale, three-storey building, featuring a below ground basement, built using off-site construction techniques and with a mind to future changes in Building Regulations. It will showcase Hanson's

- pre-fabricated, thin joint, blockwork panels with insulated cavity thin joint lightweight blockwork walls
- Wonderwall – an insulated composite panel system with brick slip facing
- Jet Floor flooring system – pre-stressed T beams with EPS blockwork infill
- twin-wall system for basement construction using insulated precast concrete permanent formwork wall panels that resist ground pressure
- Omnidec – precast permanent formwork flooring system
- Hollowcore flooring – prestressed precast concrete floor units
- Uniflight – precast concrete staircases
- box culvert – used as cellar, garage, storage – existing box culvert system traditionally used for diverting rivers and water supplies.

The building will be left on the BRE site for two years after the event for demonstrations and training.

Insulating Concrete Formwork Association (ICFA) will demonstrate the speed and practicality of ICF construction with a daily live build programme. The walling system is designed to exceed the requirements of the Building Regulations in regard to fire, thermal and acoustic performance.

ICF is suitable for all types of building, from domestic properties to commercial and public sector buildings. The method of construction is based on the rapid assembly of formwork components which lock together to form the walls prior to being filled with concrete. The resilient nature of the materials used in the construction have long life expectancy and are resistant to flooding, so minimising any repair costs following a flood.



Photograph courtesy of Century Homes



Photograph courtesy of ICFA



Photograph courtesy of Ruukki



Photograph courtesy of Scottsdale Construction Systems



Photograph courtesy of Terrapin



Photograph courtesy of Van Elle

Ruukki will construct an extensive outdoor display to show off the capabilities of systems providing a complete off-site constructed solution, which include:

- roofing elements especially suited to industrial buildings, warehouses, sports halls and large-scale housing
- off-site constructed elements for use in walling applications that can accommodate almost any form of conventional cladding, including rainscreens and profiled sheets. They are often delivered to site with windows, doors and façade cladding already fitted.

Scottsdale Construction Systems who specialise in the manufacture of automated roll forming technology and CAD software systems, will be demonstrating technology for:

- modular construction – a fully fitted module manufactured by Stoneguard-Protec offering a cost effective framing solution for multi-storey modular construction
- new truss framing technology – the UK launch of Scottsdale's fully automated and engineered truss system, from CAD plans through to roll forming, fabrication and site installation.
- roll forming technology – a demonstration of framing and truss roll forming plant from CAD concept to production of components for:
 - multi-storey modular construction
 - residential house/apartment steel framing
 - bathroom/kitchen pod frames
 - commercial building external framing for cladding systems
 - roof truss technology.

Terrapin will display two accommodation modules constructed from a rigid light steel frame that enables them to achieve high super-imposed loading characteristics in multi-storey structures. The exhibit is part of a £2 billion MoD project to provide living, training, working, recreation and welfare facilities for 3,500 MoD personnel and civilian staff. It is the largest MMC project ever seen in this country. One of the modules at OFFSITE2005 will be fitted out as an individual bedroom with en-suite shower room, carpets and curtains, fully equipped with wardrobes, cupboards and a study area. The other module will be a living room.

Van Elle, will be demonstrating their Smartfoot pre-cast, post-tensioned foundation technique, which brings many of the benefits of off-site manufacturer to foundation construction, and officially launching the new Litefoot foundation innovation.

In addition to many full-scale outdoor displays, there will be an large indoor exhibition at OFFSITE2005 holding around 50 displays of the latest in modern methods of construction.

For information on attending OFFSITE2005, phone 01923 664800, Email offsite2005@bre.co.uk or visit www.offsite2005.com



Photograph courtesy of English Partnerships

STANDARD FOR INNOVATIVE HOUSING

If modern methods of construction (MMC) are to succeed in revolutionising house building, they must gain the confidence of the construction, mortgage and insurance industries. Independent certification of MMC against a recognised standard aims to make this happen – a newly developed standard is now being calibrated with the help of an expert group of industry representatives.



As can be seen in the article on page 5, modern methods of construction, including off-site manufacture (such as panelised or volumetric pod construction), have very much arrived on the UK construction scene. Over the next ten years they are expected to revolutionise the way buildings are designed and built – particularly housing.

Many factors are influencing this development, including Government policy (John Prescott's push for greater development in the South East growth areas), improved quality resulting from factory methods of manufacture, shortage of skilled workers, and the needs of social housing providers. Numerous reports, including Egan and the recent Barker review of housing have recommended greater take-up of modern methods of construction, and off-site manufacture in particular.

So why haven't we seen more of this approach yet? For one thing, there was a lot of bad publicity associated with 'pre-fabricated' buildings after the War. Also, the construction industry tends to be conservative, and is reluctant to change while tried and tested masonry construction, and modern timber frame, maintain a high value in the market and sell well.

But it's not just the construction industry that has reservations. Mortgage lenders and insurers are wary of new technologies, many lenders maintaining a 'black list' of building systems on which they are unwilling to offer a mortgage.

Insurers have issues around the resilience of these new systems to typical threats, such as fire in the kitchen, burst pipes, wind, flooding, theft, etc. Insurers also need to know what the implications are for the reparability of the systems in terms of the cost and speed of repair. Lenders have specific concerns about the durability and the whole life cost of maintaining such properties, and what effect this has on the value of the property and the security of their loans.

'Switching to new construction systems means committing to major changes in the way we build homes,' says Roger McAnoy of Taylor Woodrow, who is representing the House Builders Federation on the LPS 2020 calibration Expert Group. 'Before investing in these systems, we not only have to be confident that modern methods of construction will deliver best value to our customers, but also will satisfy regulation controls and the concerns of mortgage lenders and insurers.'

New standard

BRE Certification is developing a technical standard to set performance requirements for the new generation of building systems for dwellings. It aims to help address the concerns of mortgage lenders, insurers and others, to tackle some of the perception problems around the new systems, and to encourage the development of high quality products.

'The introduction of non-traditional systems doesn't have an entirely successful history,' says David Hylton of Nationwide (who represents the Council of Mortgage Lenders on the LPS 2020 calibration Expert Group), 'so there is a confidence gap to be bridged. Lenders have to be satisfied that a building is well designed and constructed, using reliable components and able to last well beyond a full mortgage term, without unreasonable expense.'

'Lenders make a long term commitment when granting a mortgage. We need to ensure that doubts over the life expectancy of the property, don't force lenders into shorter terms, with consequent impacts on affordability. There are currently many standards, but our ideal is just one that we can rely on in conjunction with more general inspections.'

The Standard for Innovative Methods of Dwelling Construction, LPS 2020, has the support of the Council of Mortgage Lenders and the Association of British Insurers, and of construction sector interests. An extensive programme of development and stakeholder consultation workshops, resulted in the launch of the draft standard at the ODPM Sustainable Communities Summit in Manchester in January 2005.

It will provide a route to certification for innovative building systems, sub-assemblies and elements, which are not wholly covered under current recognised standards and codes for dwelling construction, and have a limited track record of service in dwelling construction in the UK. LPS 2020 sets out requirements for performance and methods of verification, but not for specific materials, dimensions or design approaches – it therefore does not discriminate against any material type or form of construction.

The standard has been designed to meet the variable needs of different approval bodies, regulators and warranty providers, which currently result in manufacturers having to go through several expensive and time consuming testing and assessment procedures to satisfy each body. It also addresses the current inconsistency of approval that results from the negotiation

process between manufacturer and approval body, which is dependant on the product and how it is intended to be used. This inconsistency makes direct comparisons difficult as no two approvals are the same, especially for insurers and lenders who are trying to understand and control risk.

LPS 2020 standard aims to:

- provide a single and consistent method for assessing the design and performance of innovative building systems that do not have an adequate track record in service in the UK
- ensure that the manufacture/factory production of innovative systems is controlled
- complement the control and inspection functions of existing warranty providers and building control
- check buildability and produce a checklist of key items to be inspected on site to ensure adequate performance in the final dwelling
- give confidence to insurers, lenders and owners that innovative systems will perform adequately
- achieve equal treatment for insurance and lending as given to conventional dwellings under normal insurance and lending terms
- enable manufacturers to demonstrate optional enhanced performance of specialist systems, eg enhanced flood resistance or fire performance or reduced environmental impact
- maintain a database of approved innovative systems constructed and their location to be used to trace systems for future maintenance.

This standard is one of a suite of Loss Prevention Standards (LPS) that have been prepared by BRE Certification Ltd, and currently comprises the following:

LPS 2020: This is the core standard of the suite and covers generic performance requirements applicable to innovative dwelling construction. For applicants seeking LPS 2020 certification of elements and building systems, compliance with this standard is mandatory.

Building systems and elements will be expected to perform to the minimum requirements of Building Regulations for safety, functionality and durability. In addition, they will be assessed for a range of characteristics including durability, resilience, reparability, whole life performance, adaptability and the provision of guidance on installation and maintenance. Suppliers will be required to undergo regular audits of their

factory production control systems, which contribute to ongoing quality and to help provide assurance that each unit delivered will perform as intended.

The suite of LPS standards also provides optional additional requirements for systems designed for enhanced performance. Compliance with these performance requirements is required when they are included either in specific dwellings specifications or when a dwelling supplier wants certification to this higher standard. These standards comprise:

- LPS 2023:** This covers enhanced fire performance and is intended to be used where dwellings are at high risk of fire spread or growth, and where the resulting fire is likely to cause significant damage to the building itself, and/or significant disruptions to the intended use of the building.
 - LPS 2024:** This covers enhanced energy performance and is intended to be used where dwellings must achieve a higher level of energy performance, as recommended by the Energy Savings Trust's best practice guidance for 'Energy Efficiency in New Housing'.
 - LPS 2025:** This covers the security performance of dwellings and is intended to be used where they must achieve a higher performance for the prevention of unauthorised entry.
 - LPS 2026:** This covers flood resilience and is intended to be used where dwellings are likely to be constructed in high-risk flooding zones.
 - LPS 2027:** This covers environmental profiling of dwelling components and will be used to evaluate the environmental impact of the dwelling system.
- The LPS 2020 standard – and any of the optional standards selected – will be used in association with detailed site and configuration specific design procedures, and existing site installation /quality control supervision.

Calibrating the standard

The calibration of LPS 2020 involves a systematic review to refine specific details and ensure it can effectively integrate product assurance, design assurance and on-site quality assurance.

Product assurance can be implemented by extending the scope of existing recognised product certification and technical approvals (ie BRE Certification, BBA, etc). On-site quality assurance can be implemented by extending existing site-based inspection services provided by Building Control and warrantee providers such as NHBC and Zurich.

Quality assurance of the design process is less straightforward. It needs an approach that covers the professional skills involved and links to the design checks and approval process adopted by building control and planning. It is crucial that the standard interfaces smoothly with the operations of on-site inspectors such as building control and warranty providers.

An Expert Group of house builders, mortgage lenders, insurers and others, has been set up to oversee the calibration of the standard. Members of this group, which is chaired by Keith Ross of BRE, includes representatives from the:

- Association of British Insurers (ABI)
- Council of Mortgage Lenders (CML)
- National House Building Council (NHBC)
- House Builders Federation (HBF).

Once the final approved standard is published, manufacturers and suppliers can apply to BRE Certification and its licensees for the certification of their systems and components against the standard. The certification process will assess and validate claims of performance, technically evaluate designs and specifications, and regularly audit the quality control of factory operations.

The scheme document sets out the application process, appraisal procedures, how pre-existing test and other information will be handled, pass/fail criteria, performance grades, factory production control requirements and other matters.

More information can be obtained from BRE Certification, enquiries@bre-certification.co.uk, Tel: 01923-664100.

Demonstrating MMC's ability to deliver quality:

- homes
- schools
- hospitals
- commercial buildings

that are:

- creatively designed
- energy efficient
- sustainable
- cost effective.

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June 2005

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RENEWABLE ENERGY TECHNOLOGIES

Combining energy efficiency with the installation of renewable energy technology can be a very effective way of demonstrably improving a building's energy performance.



Photograph courtesy of Renewable Devices



Renewable energy technologies have now largely discarded their 'alternative' tag. Formerly of interest only to committed 'greens' and trendy designers, renewable technologies are an increasingly mainstream and familiar source of energy, and a key element of Government energy policy.

One of the issues influencing that policy is the EU Energy Performance of Buildings Directive – which comes into force in January 2006 – requiring minimum energy performance standards to be set for new buildings and large buildings being refurbished. It also requires the provision of energy performance certificates whenever buildings change ownership or tenancy.

There are few better ways of improving energy performance and demonstrating a commitment to energy efficiency, as well as safeguarding against future energy price rises, than using renewable energy. So important is this technology to the UK's energy and emissions targets, that the Government is committed to increasing the proportion of UK electricity from renewable sources to 10% by 2010. This is a very ambitious aim when you consider that in 2000 the UK generated just 1.3% of its electricity this way.

Renewable energy technologies

Renewable energy technologies offer virtually free energy in return for an initial capital outlay. There are currently two main Government grant schemes that help with equipment and installation costs – the BRE-managed Clear Skies scheme which provides support for a range of technologies in public-sector buildings such as hospitals, schools and community buildings, and the PV Grants scheme which provides funding towards the costs of photovoltaic systems. A new initiative to supersede both schemes is planned for sometime in 2006.

The most familiar sources of renewable energy are the wind and the sun.

Wind turbines

Wind energy is one of the most cost effective methods of renewable power generation. Wind turbines typically have three blades mounted on a horizontal axis, which is free to rotate in the wind on a tower. The blades drive a generator, either directly or via a gearbox, to produce electricity that can link to the grid or charge batteries.

Modern, quiet wind turbines are increasingly seen in lower-density urban areas, where ease of maintenance and immediate connection to the grid – or the direct use of the electricity in a building – can make them cost effective, despite lower wind speeds than in open areas.

While large wind turbines are generally less suited to dense urban areas, a number of companies are developing small, roof mounted turbines. If successful these are likely to be an increasingly popular way of providing buildings with energy.

Wind turbines are available with outputs ranging from 600w to 3.6 MW. Average wind speed is the main factor affecting output. It varies for different areas of the UK, but increases with the height of the turbine above the ground. A database on www.bwea.com can be used to predict the approximate wind speed at a particular set of co-ordinates at different heights, although for larger commercial installations it is advisable to measure the wind regime at a given site for a number of months.

According to the Clear Skies grant scheme website (www.clear-skies.org) the typical cost of a small wind turbine ranges from £2,500 - £5,000 per kW installed. The Clear Skies site has a list of registered suppliers that must be used by those applying to the programme.



PV roof tiles – Solar Century's stand at the resource04 renewable energy technology showcase



Fitting photovoltaic panels to Newcastle University's Devonshire Building (courtesy of Newcastle University)

Photovoltaics

Photovoltaic (PV) systems convert energy from the sun into electricity through semi-conductor cells that are connected together and mounted into modules. Photovoltaics supply electricity to the building they are attached to or to the electricity grid. Electricity can be sold to the National Grid when the amount generated exceeds local needs.

PV systems require only daylight, not sunlight, to generate electricity (although more electricity is produced with more sunlight), so they can produce energy in overcast or cloudy conditions and can be used successfully in all parts of the UK.

Photovoltaic cells come in modular panels that can be fitted to the tops of roofs (looking similar to rooflights) and in slates or shingles that are integral parts of the roof covering (looking similar to normal roof tiles). Photovoltaic cells can be incorporated into glass atria walls and roofs, or used as cladding or rain screens on building walls – this is particularly suitable for prestige offices.

PV systems can be discreet when designed as an integral part of the roof. An 'invisible' design using slates or shingles, as opposed to an architectural statement, is likely to be preferable in sensitive areas.

Ideally, photovoltaics should face between south-east and south-west at an elevation of about 30°-40°, but even flat roofs in the UK receive 90% of the energy of an optimum system. They are particularly suited to buildings that use electricity during the day, such as offices, retail premises and schools.

There is rarely a standard PV project so it's difficult to give cost details, but ball-park figures for fully installed systems are:

- £5000 - £8000/kWp for a 1kWp (the peak output of the panel) roof mounted system
- £10,000 - £15,000/kWp for façade or atrium systems.

See www.est.co.uk/solar for details of grants for PV systems.

Solar water heating

Solar water heating systems use a heat collector, generally mounted on the roof, in which a fluid is heated by the sun. The fluid heats up water stored in the building. As these systems can function in diffuse lighting conditions, they work successfully in all parts of the UK.

They are suitable for any building type that has sufficient year-round hot water needs and a south (or south-east/south-west) facing roof. Offices, retail units or other buildings with canteens, washrooms, etc, are particularly suited to this technology.

Likely cost details, and a list of registered suppliers and installers, are available at www.clear-skies.org.

Other systems

Among several other renewable energy technology systems are:

- Biomass heating – biomass, usually in the form of wood chips or pellets, can be burnt to provide heat in buildings
- Ground source heat pumps – these draw heat from the ground, concentrate it and deliver it to the building
- Ground sourced cooling – space cooling for a building can be provided by circulating water cooled directly by the ground
- Fuel cells – currently being developed and trialled, fuel cells convert energy stored in chemical form into electricity - as do batteries, but fuel cells use externally supplied fuel (hydrogen) and so do not need recharging
- Biogas – obtained from the breakdown of organic materials by bacterial action (eg landfill gas from waste sites) or enhanced digestion methods.
- Hydro turbines – are turned by water to generate electricity – most hydro power is produced in hilly areas or river valleys.

More information

More information on renewable energy technologies is available in the London Renewables publication 'Renewable energy toolkit for planners, developers and consultants', which is available at <http://www.london.gov.uk/mayor/environment/key-documents.jsp>.

resource05

The latest renewable energy and energy efficiency developments will be on display at **resource05**, a three-day showcase being held at BRE near Watford on 13-15 September 2005. Leading industry figures will discuss advances in low carbon technologies and how they are being applied in building projects across the UK.

Indoor and outdoor exhibitions areas will showcase a wide range of products and materials – solar thermal, advanced insulation, innovative cooling, biomass boilers, lighting, photovoltaics, ground source heat pumps and many others.

For more information on **resource05** contact BRE Events on 01923 664800, Email events@bre.co.uk or visit www.resource05.com.



The renewable energy and low carbon technology conference and exhibition

www.resource05.com



AVOIDING AIR CONDITIONING

Air conditioning use is rising by 8% annually in the UK, which could lead to 6 million extra tonnes of carbon emissions per year by 2020. Despite this, a Harris Research Centre study found that 89% of occupants prefer buildings without conventional air conditioning.

Where solar gains are a major issue (and in fully glazed buildings they can give up to ten times the heat gains of office equipment or lighting), shading can have a substantial impact, in some cases avoiding the need for air conditioning altogether. A study in Sweden estimated potential electricity savings of 3.8TWh per year (2.7%) in non-domestic buildings.

A BRE case study estimated that installing air conditioning (a/c) in a typical 1960s open-plan office would require an extra 55kWh/m²/year, resulting in overall a/c running costs of £15/m²/year. The same study showed that comfort could be achieved at zero cooling energy consumption, with a combination of solar shading (either mid-pane or external) and night ventilation. The extra cost of such measures will usually be substantially less than that of installing cooling. The calculations also showed that even in a building where cooling had already been fitted, the shading could pay for itself in under five years.

The use of air conditioning can be reduced or avoided with the following techniques.

1. Building layout planning

The layout of buildings and rooms can maximise the benefits of sunlight and minimise any disadvantages. Where possible, the main façades of buildings should face north and south – this makes shading easier and allows the use of winter solar gain where this would be beneficial. Spaces where overheating would be critical can be placed on the north side of buildings.

2. Choosing appropriate window area

The window area can be limited – solar heat gain is roughly proportional to window area – but reducing it can also limit the daylight and view out. For offices and similar side-lit buildings, the BRE *Environmental Design Guide* gives tables that show the impact of window area (and other design parameters) on peak temperatures, and other useful design guidance.

3. Solar shading

A British Blind and Shutter Association guide details the different shading types and gives a list of suppliers, and a BRE Report *Solar shading of buildings* also gives detailed advice on solar shading. Generally, external shading devices and reflecting glazings are more effective at blocking solar gain than internal shading devices. Mid-pane shading has an intermediate level of performance.

External shading

External shading is particularly appropriate for heavily glazed buildings where solar heat gain would otherwise be a major concern. A simple overhang can be highly effective at blocking high angle summer sun. They work particularly well on south facing windows. In brise soleil form, they can be clipped on to an existing façade. They do not hinder opening of the windows, and a full view out is retained.

The light shelf is a form of overhang installed part way up a window, typically just above an occupant's head height. Extra daylight can enter the space by reflection from the top of the shelf, passing through the glazing above it.

In a range of building types, an awning can be an attractive and simple-to-install way of providing a retractable overhang.

A variety of external blinds are available, and these provide more flexibility in use than a light shelf or overhang. External venetian blinds, other types of external controllable louvres and external roller blinds can be retrofitted. Where having a view out is important, retractable blinds with occupant control are the best option.

Solar control glass and film

A wide variety of solar control glasses are available and have been extensively used in commercial buildings. There are two main types: absorbing glasses that are body tinted, and reflective glasses that have a special coating. Reflective glasses are usually slightly better at rejecting incoming solar gain. Absorbing glass heats up more when the sun is on it, and some of this heat can reach the inside of the building.

Solar control films can be easily added onto flat glazing. Although less durable than glazing, they are easy to retrofit to existing buildings.

As with fixed systems, both glazing and solar films will reduce useful winter solar gain and daylight. Advanced glazing is now available that can control overheating while admitting reasonable levels of daylight. The glass has a spectrally selective coating that reflects infrared radiation while admitting visible light. The coating also reduces heat loss in winter in the same way as a conventional low emissivity glass. Some forms of solar control film also have this type of coating.

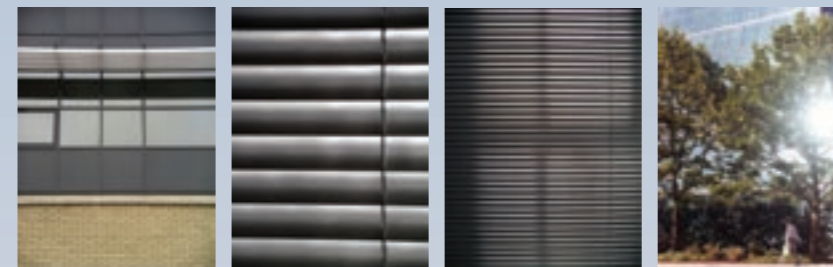
Mid-pane blinds

In double glazed units, mid-pane blinds can be an unobtrusive way to help control solar heat gain. Their solar performance will generally be intermediate between that of external and internal systems. In a sealed unit, a mid-pane blind will get dirty less quickly than an external or internal blind. Various options are available to allow them to be controlled from inside the building.

Internal shading

Internal systems can contribute towards solar heat control, but tend to be less effective than their external or mid-pane counterparts. Incoming solar gain can be absorbed by the shading device and convected or reradiated into the interior. Fabrics with a solar reflecting coating, or a metallised finish to the reverse, will help reflect out this solar heat and offer a better solar shading performance than conventional fabrics – so systems that incorporate reflective materials usually have lower heat transmittances.

As the need for shading changes throughout the year in most buildings, adjustable shading is often the best option, but it does have some disadvantages – it can be more costly and harder to maintain as the moving parts can fail.



4. Thermal mass

An exposed heavyweight structure with a long response time will tend to absorb heat, resulting in lower peak temperatures on hot days. However, appropriate nighttime venting and acoustic requirements will need to be taken into account.

5. Natural ventilation

A reasonable level of ventilation will always be needed in buildings to maintain indoor air quality. The ability to switch to a much higher air change rate can be a very effective way of controlling solar overheating. This can be achieved by wind driven ventilation through conventional windows, particularly if cross ventilation is possible, and by using the solar heat itself through stack effects to vent hot air out at a high level.

6. Reducing internal gains

Internal gains can be reduced, for example by specifying energy efficient equipment, lamps and luminaires, or controls to switch off lighting and other equipment when it is not required.

Calculating solar performance

The Building Regulations (Part L) limit solar overheating in buildings other than dwellings. In the 2005 regulations these provisions may be extended to dwellings as well. Appendix H of the 2002 Part L Approved Document (AD) gives guidance on the calculations, using the shading coefficient. This works well for glazing and some forms of blind, but drastically underestimates the influence of other techniques like overhangs, light shelves and external louvres. An overhang or awning for example, will preferentially block high angle summer sun – the shading coefficient, which assumes incoming radiation at normal incidence, takes no account of this.

BRE has developed an alternative measure of summertime shading performance. This is the 'effective g value' or 'effective summertime solar transmittance'. For a given window system this is the solar gain on peak radiation days in May– August through a window with a shading device, divided by the solar gain through an unshaded, unglazed aperture for the same period.

Methods have been derived to enable this to be calculated for a range of windows and shading device types.

A recently published BRE Trust Report Summertime solar performance of windows with shading devices (available from www.brebookshop.com), gives detailed data for a wide range of systems, and shows how the data can be incorporated into calculations.

The tables in this Report give data for the full range of window orientations. Some shading device types (for example horizontal louvres) block most solar gain when they are on a south, south-east or south-west facing window. In contrast, vertical louvres usually perform best on north-east or north-west facing windows.

The transmittance of the solar shading on its own may differ from the overall transmittance when it is placed either outside, inside or between the panes of a window. This can be evaluated using the methods in British Standard BSEN 13363-1. A CD attached to the BRE Trust Report gives a design tool to enable the overall effective g value of a window and shading device combination to be found from the data for the individual components.

A section of the Report covers the effect of external obstructions, which the data show can have quite a big impact (typically 25-40%) on the solar gain received by a window in summer – especially for north-east, east, north-west and west orientations. Traditional calculation techniques, which assume an unobstructed window, are therefore likely to overestimate solar overheating in urban areas.

The BRE Trust is hosting a free seminar on 7 July at its Garston site, on quantifying shading device performance. The seminar will also include a presentation on the latest developments in the Building Regulations.

For further information - Paul Littlefair, 01923 664874, Email littlefairp@bre.co.uk
The BRE publications referred to above are available from www.BREBookshop.com, tel 01344 404407, Email BREbookshop@IHSRapidoc.com

Fire safety guide for hotels

A BRE Trust publication on fire safety management of hotels:

- hotel fire safety and the law
- how fires start and spread
- how fires can be prevented
- building a fire safety culture
- fire risk assessment
- hotel fire safety features
- fire safety checklist



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BUILDING WITH GLASS

Glass use in buildings has never been more popular than it is today. Magnificent buildings are being constructed that rely on glass to achieve the desired architectural impact, whilst supplying daylight to living and working spaces.

Glass and glazing systems come in many types, but all need to address the following issues:

- good daylighting standards
- energy efficiency
- safety
- durability
- weathertightness.

In addition, security and loading on the glass also need to be considered.

BRE has been actively involved in glass and glazing research and consultancy in recent years. Some of the issues addressed in this work are outlined here.

Factory glazing of windows for improving the whole life performance of insulating glass units

This project, funded by DTI and industry partners, looks at the potential benefits of glazing insulating glass units (IGUs) in the factory as instead of on site. Poor glazing can cause the failure of insulating glass units, and this can often be attributed to lack of control or lack of skill applied on site. Poor quality products have also been a source of problems in the past.

The project has involved developing a specification document for the factory glazing of windows. This document gives guidance to window manufacturers and specifiers at the various stages of production. It also includes guidance on storage, transportation, handling, installation and maintenance. Good practice with respect to glazing in the factory, and in the quality of IGUs and frames, is encouraged in the specification.

The document has been assessed through experimental work in which factory glazed windows were produced and tested using the specification, and also through the involvement of leading industry experts. It will be published in spring 2005, and will supplement existing guidance on IGUs and glazing, which includes:

- BRE Report BR280: *Double-glazing units: a BRE guide to improved durability* (S L Garvin and T R E Blois-Brooke), CRC Ltd, 1995.
- BRE Digest 495: *Insulated glazing units* (S L Garvin), CRC Ltd, 2000.

Structural assessment of glazing under abnormal loads

This ODPM-funded project began in October 2003, in association with Buro Happold, and is focussing on the assessment of structural glazing systems under abnormal loading. It aims to inform the development of Building Regulations related to the structural performance of buildings.

The properties of glass do not lend themselves to excessive loading from diverse climatic events, or from the current terrorist threats. The focus of this work is to examine the different loads that could be experienced by a glazing system and how that system is likely to cope.

Abnormal loads investigated include explosions, extreme thermal shock, wind-driven debris, excessive wind pressure and human impact. The collapse mode behaviour of different glass options and glazing systems have been explored in this work, together with relevant standards and codes that are applicable.

Impact test standards for glass

BRE recently investigated the performance of safety glass as a result of the change from BS6206 to BS EN12600 for the impact test related to human safety. The European test method was published in 2002 and replaces the current British Standard.

This change is significant because the test method differs as a result of the type of impactor used. Instead of a 45kg lead shot filled leather bag, the European Standard uses a 50kg steel weight with a double tyre. The nature of the impact is therefore slightly different during the test.

ODPM commissioned BRE to undertake a comparative study to ensure that there is no potential for reduced safety as a result of the change, and to assess the implications for Building Regulations.

A thorough test programme was undertaken using annealed, toughened, laminated, wired and filmed safety glass. The results indicated that there is no potential reduction in safety performance as a result of the change in standard.

These results and their implications for specifiers and the Building Regulations are now available in a BRE Information Paper IP01/05: *Impact test standards for glass: Comparison of BS6206 and BS EN12600* (S Garvin, C Newman, P Dillon and D Kelly), CRC Ltd, 2005.

Reducing risks from overhead glazing

Building Regulations do not cover the safety of overhead – or slope – glazing at present. However, there have been a number of incidents where overhead, or even vertically glazed glass, has broken and fallen causing near misses and occasional injury to people. ODPM therefore commissioned BRE to look into the occurrence of overhead glazing breakage, the causes and what can be done to reduce the risk.

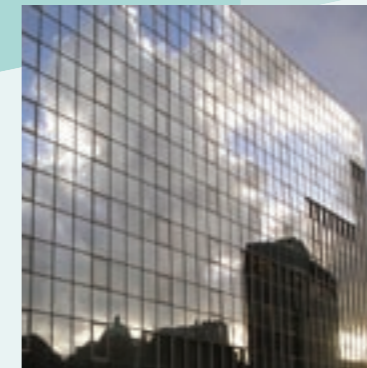
Glass of different types can break in a variety of ways and the nature of the risk depends on the type of glass, the use of the building and the building design. In addition, different risks are presented depending on the actions and activities of those using or carrying out maintenance on the building. A BRE Report has recently been produced on the risks involved in overhead glazing – the same approach can also be applied to other forms of glazing. It covers the following areas:

- the uses and types of glass and glazing in slope glazing
 - factors associated with glazing failure
 - risk assessment and risk management
- The report – BR471: *Sloping glazing: Understanding the risks* (D Kelly, S Garvin and I Murray), CRC Ltd, 2004 – gives examples for use by specifiers and designers, and considers a full list of references.

Operative safety in highly glazed buildings

There is currently a drive to improve the construction industry's safety record. As a contribution to this, BRE Scotland has been carrying out a DTI Partners in Innovation project entitled *Development of novel risk based guidance for the glazing of highly glazed buildings*.

Highly glazed buildings contain large amounts of glass that is often at a great height above ground level. They can therefore present significant risks to those involved in constructing and maintaining them.



Glass and glazing

For expert consultancy on Using glass in building:

- weathertightness
- durability
- loading
- safety
- security
- energy efficiency
- daylighting
- standards, testing and certification.

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The research has involved:

- An initial study of the current approach to safety in the whole life cycle of highly glazed buildings (design, construction, maintenance and deconstruction stages). The type and number of accidents that occur were investigated through a stakeholder workshop, a survey and a review of the current state of the art.

- Site-based studies of design, construction, maintenance and deconstruction of some examples of highly glazed buildings. These were developed into case studies, and allowed the identification of generic hazards for the glazing of such buildings.

- The development of risk models, allowing the identification, assessment and management of risks during the design, construction, maintenance and deconstruction stages of highly glazed buildings.

- The preparation of risk-based guidance for the glazing of highly glazed buildings. This is nearing completion and includes tables of the likely hazards, risk assessment, and appropriate risk management action for the design, construction, maintenance and deconstruction stages. A risk assessment and risk management worksheet has been developed, as have case study examples.

The guidance will be published later this year and is aimed at all practitioners involved in the glazing of highly glazed buildings.

The publications listed above are available from BRE Bookshop at www.BREBookshop.com, or tel 01344 404407, Email BREbookshop@IHSRapidoc.com

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