

PUBLICATIONS

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BUILDING ELEMENTS AND STRUCTURES

Building Elements

BEST SELLER: Building Elements series and Understanding dampness

This indispensable series provides construction professionals with a comprehensive range of information about the main elements of a building: roofs, floors, walls, services and foundations. Understanding dampness complements this series by providing important information the maintenance of protection against dampness, and remedies for the problems dampness can cause.

Each of the 6 books in the series deals with the principles and reasons behind best practice. Over 1,000 pages of extensively illustrated practical details, descriptions and best practice advice. An excellent reference tool.

Over 10,000 copies of these publications have been sold!

BRE, AP243, Collated set
ISBN: 978-1-86081-301-6 **£195.00**

CLADDING

Metal cladding: assessing the thermal performance of built-up systems which use 'Z' spacers

This Paper describes a method for determining the thermal performance of insulated double-skin metal roof and wall systems used in the UK that incorporate Z spacers. It can be used to demonstrate compliance with the 2002 Building Regulations. The method takes account of the thermal bridging caused by the metal connecting paths between inner liner and outer sheet.

BRE, IP10/02, 2002, 8pp
ISBN: 978-1-86081-580-5 **£9.00**

Metal cladding: assessing thermal performance

This paper describes procedures for determining the thermal performance of some types of insulated double-skin metal roof and wall systems commonly used in the UK. The procedures take account of the thermal bridging caused by the various metal connecting paths between inner liner and outer sheet and are more realistic than other simplified methods and provide a more accurate assessment of the thermal performance of such systems.

BRE, IP5/98, 1998, 4pp
ISBN: 978-1-86081-201-9 **£9.00**

The use of glass-reinforced cement in cladding panels

Summarises Report BR49, which reports a survey of the incidence of cracking in service of grc cladding panels at 35 sites.

BRE, IP5/84, 1984, 4pp
£9.00

Reinforced plastics cladding panels

Outlines the materials and moulding techniques used in the manufacture of glass-fibre reinforced plastics cladding panels and compares some of the finished panels with those of other materials.

BRE, DG161, 1973, 8pp
ISBN: 978-0-85125-124-0 **£15.00**

Assessing the fire performance of external cladding systems

A test method

This test method enables an assessment to be made of the behaviour of non-loadbearing exterior wall assemblies, including external cladding systems, rainscreen overcladding systems, external wall insulation systems and curtain walling when exposed to an external fire.

BRE, FN9, 1999, 16pp
ISBN: 978-1-86081-290-3 **£25.00**

Wall cladding defects and their diagnosis

Deals with non-loadbearing cladding and gives guidance on spotting latent defects likely to lead to rain penetration or dislodgement.

BRE, DG217, 1977, 8pp
ISBN: 978-0-85125-160-8 **£15.00**

Wall cladding: designing to minimise defects due to inaccuracies and movements

Describes the factors influencing rain penetration and dislodgement of non-loadbearing cladding and facings, and the critical points to consider in design.

BRE, DG223, 1978, 8pp
ISBN: 978-0-85125-164-6 **£15.00**

Insulated external cladding systems

Government policy and rising public awareness of the advantages of reducing greenhouse gas emissions and of saving energy has led to the development of systems and materials which meet these aims. This Guide explains how insulation can be applied to external walls and how to reduce some of the associated technical risks.

BRE, GG31, 1999, 6pp
ISBN: 978-1-86081-292-7 **£9.00**

Cladding: a bibliography of selected publications and standards 1970-90

This bibliography lists publications containing proven data and widely accepted methodologies that are of direct use in design of cladding; and publications which support,

clarify and extend the established knowledge and to national and international standards relevant to cladding.

BRE, BR194, 1991, 158pp
ISBN: 978-0-85125-480-7 **£67.50**

DOORS, WINDOWS AND GLAZING

Impact standards for glass

Results of research to determine the impact energy and forces extended during glass and human impact rests. Comparison of tests used in BS 6206 and BS EN 12600.

BRE, IP1/05, 2004, 8pp
ISBN: 978-1-86081-736-6 **£9.00**

Whole life performance of domestic automatic window controls

The potential for increasing the use of automatic windows in housing for elderly or disabled people, children and shorter people, and for inaccessible locations such as rooflights is significant. Purchasers should consider whole life costs, as well as initial costs of the controls, as maintenance can significantly affect ongoing costs. Automatic window controls generally work well when installation is good, and user satisfaction is high. However, poor installation can lead to failure or the need for maintenance.

BRE, IP3/02, 2002, 16pp
ISBN: 978-1-86081-539-3 **£9.00**

Hot air repair of PVC-U profiles

BRE has investigated the effectiveness of hot air repair techniques on dents in PVC-U profiles, typically seen as a result of damage caused by a burglar. Satisfactory repair on PVC-U frames requires a high level of training and skill. Where feasible, it is a more cost-effective and environmentally friendly solution than replacement. Trials on colour fastness of repaired profiles under conditions of artificial weathering indicate no significant effects on colour or gloss.

BRE, IP12/01, 2001, 6pp
ISBN: 978-1-86081-487-7 **£9.00**

Heat losses through windows

Shows that heat losses through windows are affected by radiator siting (under the window or on a side wall), by sill depth, curtains, double glazing and low-emissivity glazing, and that trickle ventilators have little effect on heat loss. Describes a useful experimental strategy for measuring heat losses through windows and concludes that more research is needed into the influence of window geometry.

BRE, IP12/93, 1993, 4pp
£9.00

Falls from domestic windows

This paper and its companion IP 18/93 summarise statistical studies of the occurrences of falls from windows and balconies using data from the Home Accident Surveillance System and coroners' inquest notes. They describe the principal findings and likely implications for designers and occupiers of dwellings.

BRE, IP17/93, 1993, 4pp £9.00

Window to wall jointing

Provides information on the detailing which, under test conditions, has been found to be effective in preventing water penetration across a range of window-to-wall joints.

BRE, IP7/83, 1983, 4pp £9.00

Ergonomic requirements for windows and doors

Suggests ergonomic requirements for windows and doors, derived from test data on the functional strength of people.

BRE, IP2/82, 1982, 4pp £9.00

The selection of window hardware by performance

Provides guidance on the selection by performance of selected items of hardware, namely hinges, fasteners and stays, for use on windows up to 1 m² in area.

BRE, IP16/82, 1982, 4pp £9.00

The selection of doors and doorsets by performance

In the absence of generally-available guidance, this paper provides information to aid specifiers in the selection of doors and doorsets.

BRE, IP2/81, 1981, 4pp £9.00

The weatherstripping of windows and doors

Identifies the main types of seal known to be available, outlines broadly the merits and disadvantages of each, and provides general guidance on seal selection and application.

BRE, IP16/81, 1981, 4pp £9.00

Accidents involving glass in domestic doors and windows: some implications for design

Describes some of the findings of a BRE study of accidents involving glass in doors and windows and suggests some implications for designers and building occupiers.

BRE, IP18/81, 1981, 4pp £9.00

Automatic doors and windows for use by elderly and disabled people

A specification guide

This guide covers the following items: automatic integrated controls for use with entrance doors and windows in homes; issues, such as integration into a home bus system; and related aspects of windows and doors, including performance, durability and maintenance. Procedures for the specification and installation for both doors and windows are described.

BRE, BR334, 1997, 40pp £22.50
ISBN: 978-1-86081-179-1

Weathering of white external PVC-U

PVC-U is one of the most widely used plastics materials for building components but compared with other materials used in the construction industry, it is relatively new. This Digest describes the weathering qualities of self coloured PVC-U used externally. White is by far the most common colour for most applications, having the advantage over dark colours of remaining much cooler in strong sunshine.

BRE, DG440, 1999, 8pp £15.00
ISBN: 978-1-86081-324-5

Double-glazing units

A BRE guide to improved durability

This guide describes the components and methods used to manufacture double-glazing units, the factors that affect their performance, and gives guidance on the preferred glazing systems. Guidance is also given on the measures that can be taken during procurement and installation of double-glazing units to maximise their life expectancy.

BRE, BR280, 1995, 30pp £25.00
ISBN: 978-1-86081-005-3

Selecting windows by performance

Poor or inadequate specification is a common cause of unsatisfactory performance of windows. Reliance on sales literature, or on claims to meet British Standards, can be inadequate without sufficient understanding of the performance required. This Digest identifies performance requirements and assessment tests for windows.

BRE, DG377, 1992, 8pp £15.00
ISBN: 978-0-85125-551-4

Double glazing for heat and sound insulation

Discusses double glazing design to meet the need for improved heat insulation and protection against external noise. Looks at practical considerations peculiar to the various systems now available.

BRE, DG379, 1993, 8pp £15.00
ISBN: 978-0-85125-552-1

PVC-U windows

This Digest draws on BRE research into the durability of PVC-U windows and their performance in service. It compares the key characteristics with those of alternative materials and will make specifiers aware of standards and other requirements that might influence their choice between competing makes of PVC-U windows.

BRE, DG404, 1995, 8pp £15.00
ISBN: 978-1-86081-004-6

Plastics external glazing

Discusses the types and applications of plastics glazing materials and the factors that influence their durability, especially the combination of ultraviolet light and thermal effects.

BRE, DG430, 1998, 6pp £9.00
ISBN: 978-1-86081-212-5

Durability of insulating glass units

This report gives the results of a study on the durability of insulating glass units under natural exposure. Measurement systems have been developed to monitor temperature, relative humidity and liquid moisture in glazing cavities and rebate areas around insulating glass units in window frames. Implications for durability are discussed. (Available on CD-ROM 11/98)

BRE, BR362, 1998, 12pp £25.00
ISBN: 978-1-86081-267-5

Repairing or replacing lintels

Housing rehabilitation often reveals deteriorating, inadequate, absent or poorly installed lintels. This Guide explains when repair is possible and when replacement is advisable. It also gives general advice on good practice during replacement operations.

BRE, GG1, 1992, 8pp £15.00
ISBN: 978-1-86081-849-3

Repairing timber windows

This guide, in 2 parts, describes how to investigate what is wrong with a defective window and what to do about water leakage.

BRE, GR10, 2 parts, 1997, 8pp £15.00
ISBN: 978-1-86081-148-7

Insulating glazing units

Insulating glass units (IGUs) – sealed double- or triple-glazing units – are commonly installed in timber, PVC-U, aluminium, steel and composite frames. They have better thermal insulation properties than single panes of glass and enable reductions in energy use and allow designers to meet the requirements of building regulations. This Digest covers good practice in glazing with IGUs, with particular emphasis on long-term durability. It covers the main standards for glazing, general principles of good glazing, site and factory glazing, and specific requirements of different types of frame. It also gives a maintenance checklist for ensuring continued sound performance of the system.

BRE, DG453, 2000, 12pp £15.00
ISBN: 978-1-86081-435-8

Hot air repair of PVC-U window and door frames

The use of hot air repair on PVC-U frames is relatively new, but appears to be growing rapidly. It requires a high level of training and skill to produce satisfactory repairs. If carried out well, it seems unlikely that repair will have long-term adverse consequences for the durability of the repaired window or door. This Good Repair Guide describes current practice, potential problems associated with a new technique and how repair work might develop in the future.

BRE, GR31, 2001, 4pp
ISBN: 978-1-86081-476-1 **£9.00**

Installing domestic automatic door controls

The installation of automatic door controls can assist elderly and disabled people with access into and out of their homes. This Good Building Guide describes available controls and how they work. It advises specifiers, manufacturers and installers on the best use of controls for disabled people and elderly users, and details technical issues concerning the installation of the various components of the system. Involvement of the user in the specification process is essential. Questions that are commonly asked and potential problem areas are also discussed.

BRE, GG48, 2001, 12pp
ISBN: 978-1-86081-507-2 **£15.00**

Level external thresholds: reducing moisture penetration and thermal bridging

Level thresholds, where the internal and external walking surfaces are level, or almost level, are increasingly being specified to give access to the elderly and disabled. Level thresholds present a potential weakness in the weatherproofing resistance of door openings which may let water in. There is also a risk of thermal bridging at the threshold. This Good Building Guide describes some of the technical risks associated with the design of level thresholds and some detailing solutions.

BRE, GG47, 2001, 8pp
ISBN: 978-1-86081-488-4 **£15.00**

Installing domestic automatic window controls

The installation of automatic window controls can assist elderly and disabled people to use windows where they would not be able to use manual hardware. This Good Building Guide describes available controls and how they work. It advises specifiers, manufacturers and installers on the best use of controls for disabled people and elderly users, and details technical issues relating to the installation to different types of frames. Involvement of the user in the specification process is essential. Questions that are commonly asked and potential problem areas are also discussed.

BRE, GG49, 2001, 12pp
ISBN: 978-1-86081-508-9 **£15.00**

Sloping glazing: understanding the risks

D Kelly, S Garvin and I Murray

Building regulations do not provide advice on overhead and sloping glazing. This book gives guidance on the risks of failure of sloping glazing and the assessment and management of those risks. It describes the main types of sloping glazing and the factors associated with failures. Risk assessment and management is fully covered, with an example risk assessment.

BRE, BR471, 2004, 28pp
ISBN: 978-1-86081-716-8 **£37.50**

Highly glazed buildings: assessing and managing the risks

J Ridal, J Reid and S Garvin

Highly glazed buildings are buildings that contain large amounts of glazing in the form of glass. The glazing can be at considerable height above ground level and can be vertical, horizontal, sloping or overhanging in aspect. Working with large amounts of glass, particularly at height, can present operatives with significant risk when, for example, installing, cleaning or replacing glass.

This book presents risk-based guidance for practitioners for the safe glazing of highly glazed buildings. It deals primarily with the safety of workers involved in glazing work, and is mainly for use by construction professionals who are not necessarily expert in glazing issues. Common hazards and risks, assessment of them, and suitable risk management actions are presented in tabular format for the four main stages in the life cycle of such buildings design, construction, maintenance and deconstruction. A procedure and an associated worksheet for risk assessment and risk management are given.

BRE, BR482, 2005, 28pp
ISBN: 978-1-86081-760-1 **£37.50**

Factory glazed windows

Historically there have been problems with controlling the quality of glazing on building sites leading to failures in insulating glass units. Glazing of units in factories offers the potential for higher quality work than for those glazed on site where poor weather and poor site conditions can produce damaged or defective units.

In the absence of existing guidelines, BRE has developed under a Partners in Innovation project funded by the DTI and the glazing and building industries good practice guidance to maximise the benefits of factory glazing. The guidance, prepared as this two-part Digest, is based on research and good practice. It is not prescriptive but sets out the general principles, supported by drawings, involved in factory glazing.

Part 1 of this Digest introduces the subject and describes the types of insulating glazing units and the preparation of a suitable factory workspace. Part 2 deals with transport, storage, installation, maintenance and performance of factory glazed windows.

BRE, DG497, 2 parts, 2005, 20pp
ISBN: 978-1-86081-927-8 **£22.50**

Doors, windows, glazing and cladding pack

BRE

DIGESTS

Double glazing for heat and sound insulation (DG379)
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Insulating glazing units (DG453)
Plastics external glazing (DG430)
PVC-U windows (DG404)
Reinforced plastics cladding panels (DG161)
Selecting windows by performance (DG377)
Wall cladding defects and their diagnosis (DG217)
Wall cladding: designing to minimise defects (DG223)
Weathering of white external PVC-U (DG440)

GOOD BUILDING GUIDES

Installing domestic automatic door controls (GG48)
Installing domestic automatic window controls (GG49)
Insulated external cladding systems (GG31)
Level external thresholds: reducing moisture penetration and thermal bridging (GG47)
Repairing or replacing lintels (GG1)

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Repairing timber windows (2-part set) (GR10)

INFORMATION PAPERS

Hot air repair of PVC-U profiles (IP12/01)
Impact standards for glass (IP1/05)
Metal cladding: assessing the thermal performance of built-up systems (IP10/02)
Whole life performance of domestic automatic window controls (IP3/02)

BRE, AP256, Ringbound set, 2007
ISBN: 978-1-86081-994-0 **£70.00**

FLOORS, FLOORING AND STAIRS

Safer floors

Guidance on specifying flooring for internal and external safety in domestic buildings

This Information Paper explains what test method should be used to assess a flooring product, what amount of slip resistance is considered appropriate and how slip resistance is affected by user behaviour and individual characteristics. It also highlights the special case of stairs and ramps.

BRE, IP10/07, 2007, 6pp
ISBN: 978-1-84806-014-2 £9.00

Proprietary nosings for non-domestic stairs

This Paper provides guidance to designers and building managers on assessing the types of proprietary nosing for non-domestic stairs. It considers such factors as fastening and colour contrast. Manufacturers can use this guidance to determine potential demand for different types of nosing and to develop products to meet the requirements suggested. Choices can be made on material, contamination, shape, apparent variability between steps, size of the going.

BRE, IP15/03, 2003, 8pp
ISBN: 978-1-86081-652-9 £9.00

Flooring, paving and setts – requirements for safety in use

This Paper summarises research into slip resistance of products in use, wear and abrasion of materials, and overall durability under vehicular and pedestrian traffic. The project concentrated on natural stone products but also included a comparison of similar products. The results were available to CEN/TC 178 Working Group 2 during the drafting of the European Standards for natural stone paving, setts and kerbs. This paper will be of interest to architects, specifiers, facilities managers, local authority highways engineers, contractors, and manufacturers and suppliers.

BRE, IP10/00, 2000, 8pp
ISBN: 978-1-86081-372-6 £9.00

Blocks with recycled aggregates: beam-and-block floors

Suspended floor systems constructed from inverted precast concrete T-beams with precast concrete block infill elements are a relatively new and expanding market. Infill blocks make only a minor contribution to the high performance achieved with such floors, and thus offer a low-risk route for the introduction of recycled aggregates. This paper details the results of a project in which blocks containing recycled aggregate were produced using conventional industrial plant and successfully tested in full-scale floor tests. It should be of interest to materials specifiers and the concrete/aggregate industry - particularly the precast and block industries and recyclers of construction and demolition materials.

BRE, IP14/98, 1998, 4pp
ISBN: 978-1-86081-244-6 £9.00

The U-value of solid ground floors with edge insulation

Explains the calculation of U-values for solid ground floors incorporating insulation of the edges and gives several worked examples.

BRE, IP7/93, 1993, 4pp £9.00

Design of warehouse floors

Describes a new and more appropriate classification for use in the specification of warehouse floor loading. It has been developed from work on ground-bearing concrete slabs, but it is equally applicable to the specification of suspended slabs, either at ground level or in multi-storey construction.

BRE, IP19/87, 1987, 4pp £9.00

BRE Screed tester: classifications of screeds, sampling and acceptance limits

Describes how the BRE Screed Tester can be used to assess the soundness of floor screeds. It classifies screeds into three categories according to their use and gives acceptance limits for each category.

BRE, IP11/84, 1984, 4pp £9.00

Safety aspects of handrail design

A review

This review, undertaken for the revision of the Building Regulations 1985, recommends design criteria for the ease of gripping and grasping stair handrails and for their height.

BRE, BR260, 1994, 24pp
ISBN: 978-0-85125-618-4 £32.50

Increasing the fire resistance of existing timber floors

Gives general guidance and simple examples on increasing fire resistance for periods of up to one hour by adding protection to the underside of ceilings, over the floor boarding and between the joists.

BRE, DG208, 1988, 8pp
ISBN: 978-0-85125-359-6 £15.00

Heat losses through ground floors

For solid or suspended ground floors, it is not possible to calculate U-values from first principles, but the value of a basic construction can be adjusted according to the floor finish and any insulation. This Digest discusses how this adjustment can be made.

BRE, DG145, 1984, 4pp £9.00

Floor loading in warehouses

A review

Identifies the types of storage and materials-handling systems currently in use in warehouses and gives examples of actual floor loads and pressures that may be imposed, with data from different storage systems, trucks and handling equipment.

BRE, BR109, 1987, 24pp
ISBN: 978-0-85125-247-6 £22.50

Alternating tread stairs

Details the results of a BRE survey into the safety and convenience of alternating tread stairs, which are commonly found with loft conversions of the late 1980s.

BRE, BR308, 1996, 68pp
ISBN: 978-1-86081-078-7 £42.50

Industrial platform floors: mezzanine and raised storage

This Digest has been prepared in response to difficulties experienced with the design and Building Regulation control of mezzanine raised storage platform floors. It aims to ease such difficulties by providing authoritative guidance on these specialised structures which are not specifically addressed in current Codes of practice. It gives guidance on imposed loading and chipboard decking, the two principal issues that cause the most difficulties.

BRE, DG437, 1999, 16pp
ISBN: 978-1-86081-281-1 £20.00

Joist hangers

This guide shows how to use joist hangers in new construction work. It stresses the importance of correct specification and installation to ensure good performance.

BRE, GG21, 1996, 8pp
ISBN: 978-1-86081-029-9 £15.00

Repairing and replacing ground floors

Covers faults that must be put right before refurbishment of floors can start. Gives advice on assessing the condition of two typical domestic ground floors (solid concrete and suspended timber) before starting refurbishment, and how to repair or replace them.

BRE, GR17, 1998, 4pp
ISBN: 978-1-86081-233-0 **£9.00**

BRE Building Elements Floors and flooring

Performance, diagnosis, maintenance, repair and the avoidance of defects

Describes the materials, production methods and criteria, used in floor construction which ensure good performance, and identifies things that go wrong so they can be avoided. It provides you with a checklist of points of concern, and where to obtain further information and advice. It includes over 200 photographs and 170 drawings of floors and floor construction detail plus case studies, feature panels and checklists. A surveyor's inspection list is included at the end of each chapter.

BRE, BR460, 2003, 312pp
ISBN: 978-1-86081-631-4 **£47.50**

Insulating ground floors

C Stirling

Highlights typical installation techniques, materials, insulation thicknesses and potential technical risks in achieving improved thermal standards. It covers concrete ground floors insulated above or below the structure, concrete ground floors insulated around the edge, and insulated suspended timber ground floors. Warnings about service entries through insulated floors are given, e.g. water and waste pipes below the floor construction can be damaged by frost, electric cables enclosed within insulation may overheat.

BRE, GG45, 2001, 8pp
ISBN: 978-1-86081-484-6 **£15.00**

Floors, flooring and stairs pack

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DIGESTS

Heat losses through ground floors (DG145)
Increasing the fire resistance of existing timber floors (DG208)
Industrial platform floors: mezzanine and raised storage (DG437)

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Insulating ground floors (GG45)
Joist hangers (GG21)

GOOD REPAIR GUIDES

Repairing and replacing ground floors (GR17)

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Proprietary nosings for non-domestic stairs (IP15/03)

BRE, AP260, Ringbound set, 2007
ISBN: 978-1-86081-998-8 **£45.00**

Domestic floors

Five part set that describes ground floor construction in new buildings and in rehabilitation work where floors are being replaced. Part 1 Construction, insulation and damp-proofing. Part 2 Concrete floors, screeds and finishes. Part 3 Timber floors and decks. Part 4 Magnesite, tiles, slabs and screeds. Part 5 Wood blocks and suspended timber.

BRE, GG28, 5 parts, 1997, 36pp
ISBN: 978-1-86081-827-1 **£25.00**

GEOTECHNICS, SOILS AND FOUNDATIONS

Pruning trees to reduce water use

Summaries of research; conclusions and recommendations

Certain tree species on shrinkable clay soils can increase the risk of subsidence by removing water from the ground. This leads to the clay in the ground shrinking which, in turn, destabilises house foundations - particularly shallow foundations.

This BRE information paper summarises the findings of research over five years by East Malling Research and the University of Cambridge to assess if soil drying by tree roots could be controlled by two branch pruning, crown thinning and crown reduction, and by root restriction

Comments and recommendations are made about the effectiveness of the three techniques, and the implications for managing trees in shrinkage-susceptible soils.

BRE, IP7/06, 2006, 8pp
ISBN: 978-1-86081-919-3 **£9.00**

BEST SELLER: Geotechnics for building professionals

J A Charles

Decisions about foundations are often made by people who have only limited understanding of the engineering of the ground. Written for non-experts, and their professional advisers this book gives an overview of ground behaviour and geotechnics, focusing on shallow foundations for low-rise buildings. It brings together into a single unified format and approach guidance published by BRE over a number of years and includes numerous illustrations, an extensive glossary of terms, over 300 references and a comprehensive index.

BRE, BR473, 2005, 336pp
ISBN: 978-1-86081-727-4 **£67.50**

Soils, ground investigation and foundations pack

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Underpinning (DG352)

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Principal drivers for reusing foundations (IP5/07)
Pruning trees to reduce water use (IP7/06)

A SIMPLE GUIDE TO IN-SITU GROUND TESTING (7-part set) (IS1-7)

BRE, AP264, Ringbound set, 2007
ISBN: 978-1-84806-002-9 **£130.00**

BEST SELLER: Basement construction and waterproofing

P Trotman

This Good Building Guide discusses one of the main challenges when designing a basement: preventing water or water vapour ingress. The focus is on dampness due to penetration of groundwater, sometimes complicated by rising damp. Part 1 outlines the principles of constructing a waterproof basement. Part 2 describes the main methods for perimeter construction with advice on safety, insulation and services.

BRE, GG72, 2 parts, 2007, 12pp
ISBN: 978-1-86081-983-4 £15.00

Contaminated land and brownfield sites**Hazards associated with redevelopment of contaminated land**

Describes two examples of reclamation of contaminated land, dealing with the explosion and toxic hazards associated with redevelopment on these sites.

BRE, IP2/87, 1987, 4pp
 £9.00

Preloading uncompacted fills

For civil and structural engineers considering building on uncompacted fills. Describes how the load-carrying properties of uncompacted fills can be improved by a temporary preloading with a surcharge of fill. It discusses the effectiveness of preloading in different situations and outlines the principles involved in designing an adequate surcharge.

BRE, IP16/86, 1986, 4pp
 £9.00

The effect of a rise of water table on the settlement of open-cast mining backfill

For those considering building on restored open-cast mining sites, this paper gives brief details of settlement monitored over a 10-year period while the water table rose 34 m through the backfill, and discusses the significance of the settlement measurements for building developments.

BRE, IP15/85, 1985, 4pp
 £9.00

Contaminated land

A review of research at BRE

This series of reviews covers the work carried out by BRE for the Contaminated Land and Liabilities Branch of the Department of the Environment, Transport and the Regions and describes the effects of contaminants on building materials and containment. (Available on CD-ROM 10/98)

BRE, BR346, 1998, 74pp
ISBN: 978-1-86081-230-9 £40.00

Modelling and measurement of soil gas flow

This report covers several modelling and experimental studies into the flow of gases in soil, as an investigation into protecting buildings against soil gases. There are three parts: flow due to natural driving forces, high pressure flows, and time dependent effects. For each, a combination of techniques has been applied and a number of experiments analysed. The modelling techniques vary from simple analytical models through more advanced analytical techniques to numerical solutions, many of which are new to the soil-gas field.

BRE, BR338, 1998, 274pp
ISBN: 978-1-86081-200-2 £52.50

Performance of building materials on contaminated land

This report presents a review of the mechanisms whereby commonly used construction materials may be attacked, corroded or otherwise degraded as a consequence of contact with aggressive chemicals and bacteria in soil.

BRE, BR255, 1994, 68pp
ISBN: 978-0-85125-624-5 £37.50

Brownfield development sites

Ground-related risks for buildings

J A Charles and K Watts

This report is concerned with ground-related hazards for building developments on brownfield sites. Principal hazards are ground movement, vulnerability of construction materials to aggressive ground conditions, gas migration, and subterranean fires and the report outlines a systematic way to manage the range of risks over the lifetime of the building development and case histories are discussed. It emphasises that an unwarranted over-sensitivity to risk will defeat the objective of locating building developments on brownfield sites.

BRE, BR447, 2002, 50pp
ISBN: 978-1-86081-571-3 £40.00

Contaminated land: ingress of organic vapours into buildings

Much guidance about managing the risks associated with contaminated land has been produced by DEFRA, the Environment Agency and other organisations. This Digest contains the main sources of information and gives examples of using risk assessment tools and measuring air pollutants that are applicable to evaluating and controlling risks due to the ingress of organic vapours from the ground into buildings. It describes the technical risks and financial risks that are important to any development or remediation project.

BRE, DG482, 2004, 8pp
ISBN: 978-1-86081-679-6 £15.00

Cover systems for land regeneration

Thickness of cover systems for contaminated land

This publication and the accompanying CD ROM help you to assess the need for cover systems to reduce exposure to contamination, and to design the thickness of such systems. The design method is intended for simple cover systems on brownfield sites where exposure to contamination must be reduced. The CD ROM includes a Powerpoint presentation, report (of an in-depth study of current design approaches) and a spreadsheet.

BRE, BR465, 2004, 120pp
ISBN: 978-1-86081-684-0 £66.13

Building on brownfield sites

Brownfield sites can contain a variety of hazards that can pose significant risks for developers, designers, house builders, insurers and house owners. Part 1 of this Good Building Guide describes the hazards commonly encountered on brownfield land. The significance of these hazards for housing developments and the ways in which they can be identified are explained. Part 2 describes how the risks can be managed and, where necessary, reduced. It also indicates the regulations that can impact on the development of brownfield sites.

BRE, GG59, 2 parts, 2003, 8pp
ISBN: 978-1-86081-833-2 £15.00

Regeneration of brownfield sites containing ferrous slags

S Lane, A Dunster and I Longworth

Developers are increasingly using slag-bearing sites as part of the drive to locate new housing development on brownfield land. This book provides comprehensive guidance on assessment of sites containing ferrous slags derived from refining of iron ores. It aims to promote safe and cost-effective development on sites which, hitherto, would have been rejected because of concern about possible expansive reactions, ground movement and damage to buildings and structures.

The first part gives guidance on assessing sites that may contain ferrous slags. It describes the origin, occurrence and characteristics of blastfurnace and steel slags that may be expansive, maps out procedures for investigating brownfield sites intended for development, and gives detailed guidance on assessment and management of ferrous slags with respect to built development.

The second part compares test methods for assessing the volume stability of steel slags. The literature review in the third part covers research and test methods, site assessment methodologies and case studies. The main risk factors associated with expansive slags as well as methodologies and principles to mitigate these risks are also discussed.

BRE, BR481, 2005, 82pp
ISBN: 978-1-86081-759-5 £90.00

Brownfield sites - integrated ground engineering strategy

H Skinner, J A Charles and P Tedd

This report provides authoritative guidance on the investigation, treatment and foundation design for building development on brownfield and landfill sites. This integrated ground engineering strategy takes a risk based approach. Key aspects of the strategy - hazard assessment and risk mitigation - are discussed in detail. The nature of brownfield hazards is explained, and critical outlines of the numerous ground treatment and remediation techniques are given, together with information on which decisions about treatment and remediation can be based.

BRE, BR485, 2005, 78pp
ISBN: 978-1-86081-891-2 **£60.00**

Construction of new buildings on gas-contaminated land

The principal components of landfill gas are methane and carbon dioxide, and so if it enters a building it can pose a risk to both health and safety. This report gives guidance on the construction of new buildings to prevent the ingress of these gases.

BRE, BR212, 1991, 12pp
ISBN: 978-0-85125-513-2 **£27.50**

Ground investigation and treatment

Pfa grouts for stabilising mine workings

Since the 1970s, many disused mine workings have been successfully stabilised by filling with grouts based on pulverized-fuel ash (pfa) and Portland cement. However, concerns have been expressed over the potential for contamination of controlled groundwaters by bleed water and leachate released from pfa grout, disruption and dust arising from the work, the effect on land and property prices, and the risk of classification of the land above the workings as contaminated.

This Information Paper summarises new guidance on the selection of environmentally compatible and cost-effective materials and techniques, with authoritative guidance on good practice that is published in a detailed BRE report (BR488). It is based on information in the literature, laboratory studies at BRE, data from the use of pfa grouts and expertise from an industry steering group.

BRE, IP10/06, 2006, 4pp
ISBN: 978-1-86081-948-3 **£9.00**

Building on fill: collapse compression on inundation

Compression collapse, which results from initial submersion of poorly compacted fills, is often the most serious hazard for buildings on fill. This paper presents a methodology for identifying and measuring collapse potential in fills.

BRE, IP5/97, 1997, 4pp
ISBN: 978-1-86081-134-0 **£9.00**

The use of 'vibro' ground improvement techniques in the United Kingdom

Information about the use of vibro techniques in foundations for low-rise buildings. It is based on the findings of a survey on the use of the methods in the UK carried out by Scott Wilson Kirkpatrick and Partners and the Geotechnical Consulting Group.

BRE, IP5/89, 1989, 4pp **£9.00**

Techniques for monitoring ground movement above abandoned limestone mines

Describes precision water-levels and extensometers designed and used by BRE to research long term horizontal and vertical ground movements above an abandoned limestone mine in an urban area of the West Midlands. Details are also given of the borehole electro-level.

BRE, IP1/88, 1988, 4pp **£9.00**

Recommendations for the procurement of ground investigation

Identifies the underlying reasons for the shortcomings which exist in the ground investigation industry in the UK and proposes means of improvement.

BRE/CIRIA, BR94, 1986, 44pp **£22.50**

An engineering guide to seismic risk to dams in the United Kingdom

J A Charles, C P Abbiss, E M Gosschalk and J L Hinks

This guide assesses the seriousness of seismic risk and proposes criteria for earthquake safety evaluation of existing UK dams. It relates specifically to the safety of UK dams and reservoirs under seismic loading although it should also be useful in the design of new dams. The guide is relevant to all forms of dam construction.

BRE, BR210, 1991, 72pp
ISBN: 978-0-85125-510-1 **£80.00**

Investigating embankment dams

A guide to the identification and repair of defects

J A Charles, P Tedd, A K Hughes and H T Lovenbury

The guide gives comprehensive information on the geotechnical methods which can be employed to identify and investigate defects in embankment dams. Some of the more common repair methods are described. The guide is intended to assist all those responsible for the safety of reservoirs which are impounded by embankment dams. It is a companion volume to BR 171.

BRE, BR303, 1996, 90pp
ISBN: 978-1-86081-069-5 **£30.00**

Simple measuring and monitoring of movement in low-rise buildings

Part 2. Settlement, heave and out-of-plumb

Discusses methods of measuring and recording movement and cracking in low-rise buildings. Part 2 of a two-part Digest.

BRE, DG344, 1989, 6pp
ISBN: 978-1-86081-043-5 **£9.00**

The Value of Geotechnics in Construction

Involvement of geotechnical specialist throughout a project enables ground related hazards to be identified and dealt with cost-effectively. This paper gives examples where a geotechnical specialist was introduced to a project and demonstrates that the later the point at which the first involvement occurred, the greater the potential monetary loss and therefore the lower the likely end value of the development.

EP49, 1998
ISBN: 978-1-86081-251-4 **£42.50**

Site investigation for low-rise building: desk studies

An initial desk study forms an important part of the site investigation process to assess the suitability of a site for development. This Digest describes how to make use of various sources, and gives a number of examples of typical desk studies.

BRE, DG318, 1987, 12pp
ISBN: 978-0-85125-240-7 **£15.00**

Site investigation for low-rise building: procurement

If reliable results are to be obtained, site investigation must be arranged only after careful preparation. This Digest considers the steps that should be taken and provides guidance on contractual methods.

BRE, DG322, 1987, 8pp
ISBN: 978-0-85125-254-4 **£15.00**

Site investigation for low-rise building: the walk-over survey

The walk-over survey is an important part of site investigation. Used with desk studies (see Digest 318), it provides valuable information which cannot be gathered any other way.

BRE, DG348, 1989, 8pp
ISBN: 978-0-85125-424-1 **£15.00**

Site investigation for low-rise buildings: direct investigations

This Digest describes the field techniques most commonly used during site investigations for low-rise buildings. As part of the process of investigating ground conditions at a site, for example in order to ensure the adequate performance of foundations, it will often be necessary to carry out this kind of work. It should be preceded by a desk study (Digest 318), and a walk-over survey (Digest 322).

BRE, DG411, 1996, 12pp
ISBN: 978-1-86081-061-9 **£15.00**

Specifying vibro stone columns

Provides a technically prescriptive specification for vibro stone columns, including elements of design. It will save considerable time at tender stage, avoid misunderstandings between those specifying the works and the specialist contractors, particularly in the use of standard terminology, and provide common benchmarks for all parties to a vibro stone column contract. In Notes for Guidance and information, it presents a rationale for the clauses of the specification and provides supporting technical information.

BRE, BR391, 2000, 46pp
ISBN: 978-1-86081-380-1 **£40.00**

Application of subsurface radar as an investigative technique

This report provides guidance on applications and uses of subsurface radar surveying, and on matters which need consideration when specifying a radar survey or programme of investigation. A comparison with conventional atmospheric radar is made, noting the difficulties and influences associated with subsurface applications, before setting out a simplified version of the theoretical principles and the influence of material properties.

BRE, BR340, 1998, 110pp
ISBN: 978-1-86081-210-1 **£42.50**

An engineering guide to the safety of embankment dams in the United Kingdom

J A Charles

This guide deals primarily with matters which relate to the safety of embankment dams in the United Kingdom. It includes a brief history of the development of embankment dam engineering in Britain and the geotechnical background to dam safety. It also provides information on surveillance and on the identification of defects, deterioration and inadequacies. Investigations, instrumentation, remedial works and emergency actions are described.

BRE, BR363, 1999, 114pp
ISBN: 978-1-86081-272-9 **£40.00**

Building on fill: geotechnical aspects

J A Charles and K S Watts

Provides a detailed account of BRE research findings and their significance for appropriate and successful building developments on fill in the redevelopment of derelict land and brownfield sites. It describes the history of types of fill, their engineering behaviour, construction on fills (including engineered fills), and the field performance of fills as illustrated by case histories.

BRE, BR424, 2001, 208pp
ISBN: 978-1-86081-509-6 **£82.50**

Optimising ground investigation

Ground represents the greatest hazard to any construction project. It has been widely recognised by the UK geotechnical community that the proportion of project funding spent on, and time allowed for, investigating ground hazards is generally inadequate; the quality of some ground investigation is consequently poor. This Digest informs building and construction professionals who commission ground investigations, especially clients and their advisers who do not themselves have geotechnical qualifications and experience. It aims to raise awareness of the importance of ground investigation for routine projects and provides a summary of best practice.

BRE, DG472, 2002, 8pp
ISBN: 978-1-86081-588-1 **£15.00**

Specifying dynamic compaction

The repeated dropping of a heavy weight onto the ground surface is one of the simplest and most basic methods of ground improvement. This publication looks specifically at 'falling weight treatment' and 'rapid impact compaction' and provides a technical specification for the process. It supports this with extensive guidance notes and numerous illustrations covering all aspects of the process from objectives and site investigation, through design and execution to testing.

BRE, BR458, 2003, 60pp
ISBN: 978-1-86081-629-1 **£40.00**

EuroSoilStab Design guide: soft soil stabilisation

This Design Guide deals with all the aspects of the application of column and mass stabilisation: soil investigations in situ and in the laboratory; design of the mixture of binders; design of the stabilisation; construction of the stabilisation; inspection of the stabilised soil; inspection of the behaviour of the stabilisation. It provides a description of the best practice, mainly based on the experiences at seven test sites of the European project EuroSoilStab.

EP60, 2002, 94pp
ISBN: 978-1-86081-599-7 **£47.50**

A simple guide to in-situ ground testing

The advantages of in-situ testing over traditional sampling and laboratory testing are speed, quantity and quality. This series of seven concise leaflets acts as a guide in decision-making when specifying in-situ tests in order to obtain the right information. The set includes an introductory guide and parts on geophysical testing, cone penetration testing, flat dilatometer testing, dynamic probing, pressuremeter testing and large-diameter plate loading tests.

BRE, AP159, Collated set, 2003, 32pp
ISBN: 978-1-86081-778-6 **£37.50**

Stabilising mine workings with pfa grouts

Environmental code of practice

BRE Construction Division

This environmental code of practice on the use of pfa grouts for filling disused underground mine workings provides guidance on the selection of environmentally compatible and cost-effective materials and techniques, with authoritative guidance on good practice.

BRE, BR488, 2006, 44pp
ISBN: 978-1-86081-909-4 **£50.00**

Simple measuring and monitoring of movement in low-rise buildings

Part 1. Cracks

Discusses methods of measuring and recording movement and cracking in low-rise buildings. Part 1 of a two-part Digest.

BRE, DG343, 1989, 10pp
ISBN: 978-0-85125-380-0 **£15.00**

Soils and foundations

Principal drivers for reusing foundations

This Information Paper outlines the principal drivers for reusing foundations and discusses why developers, building owners and construction professionals should consider it. Reusing foundations is being developed in response to:

- ~increasing pressure on available land for re-development in inner cities, and
- ~finding more cost-effective and sustainable methods of construction.

Changes to legislation, growth in technical understanding, recognition of the needs of the environment and sustainability are all working together to drive us to reuse foundations. The text is a short extract from 'Reuse of foundations for urban sites: a best practice handbook' (EP75).

BRE, IP5/07, 2007, 6pp
ISBN: 978-1-86081-971-1 **£9.00**

Development of sites containing expansive ferrous slags

This paper gives guidance on the assessment and development of sites that may contain ferrous slag. It is primarily intended for engineering and geo-environmental consultants and contractors dealing with potentially expansive legacy blastfurnace and steel slags in the ground. However, it will also enable site owners, construction clients, developers, regulators, insurers and other construction professionals to appreciate the issues involved.

BRE, IP8/05, 2005, 12pp
ISBN: 978-1-86081-758-8 **£9.00**

A method of determining the state of desiccation in clay soils

The filter paper method of soil suction determination to establish the state of desiccation in clay soil profiles is increasingly used, but is not yet included in the British Standard for soil testing. This paper provides guidance for carrying out the test on disturbed and undisturbed soil samples.

BRE, IP4/93, 1993, 4pp £9.00

Anglo-Jordanian research into the properties of clays

BRE and the Jordanian Building Materials Research Centre at the Royal Scientific Society are collaborating in a study of the properties of Jordanian clays. This paper sets out the background to the co-operation, and gives details of the research which is to be carried out.

BRE, IP13/80, 1980, 4pp £9.00

Analysis of sulfate-bearing soils

Deals with a selection of reliable and fast analytical methods to determine constituents of interest in soil or groundwater.

BRE, IP6/79, 1979, 4pp £9.00

A review of routine foundation design practice

Describes a survey of routine housing, commercial and public buildings up to four storeys in height, and light industrial buildings. The report indicates aspects of existing good practice which should be more widely adopted and problems for which improved design procedures are needed.

BRE, BR104, 1987, 16pp £22.50
ISBN: 978-0-85125-243-8

BEST SELLER: Soakaway design

Describes design and construction procedures, explains how to calculate rainfall design values and soil infiltration rates, and gives some design examples of soakaways. This widely used Digest is an invaluable guide to design of soakaways.

BRE, DG365, 1991, 8pp £15.00
ISBN: 978-1-86081-604-8

Foundation movement and remedial underpinning in low-rise buildings

Based on the findings of a comprehensive survey of underpinning practice, the report gives guidance on: how to determine that a foundation problem exists and the need for underpinning; how to recognise the circumstances in which underpinning is appropriate; how to conduct a site investigation; the scope and depth of underpinning; and how to choose which type of underpinning to adopt.

BRE, BR184, 1991, 44pp £35.00
ISBN: 978-0-85125-459-3

Low-rise buildings on shrinkable clay soils: Part 1

Describes the behaviour of clay soils and shows the general location in the UK of the more common shrinkable clays.

BRE, DG240, 1993, 4pp £9.00
ISBN: 978-0-85125-331-2

Low-rise buildings on shrinkable clay soils: Part 2

Describes designs which should provide stable foundations in the most adverse circumstances.

BRE, DG241, 1990, 4pp £9.00
ISBN: 978-0-85125-377-0

Low-rise building foundations: the influence of trees in clay soils

Soil shrinkage caused by the removal of water by trees and other vegetation can result in foundation subsidence. Soil swelling caused by the recovery of moisture following tree removal can result in foundation heave. This Digest gives simple guidance on minimising these effects in clay soils and points to some dangers in current foundation practice. It should be read in conjunction with Digests 240, 241, 251 and 412.

BRE, DG298, 1999, 8pp £15.00
ISBN: 978-1-86081-278-1

Underpinning

About £80 million is spent annually in Britain on repairs to foundations following subsidence, heave and landslip. This Digest presents the background to the causes of foundation movement, and explains when and why underpinning may be necessary.

BRE, DG352, 1993, 8pp £15.00
ISBN: 978-0-85125-446-3

Desiccation in clay soils

Desiccation in clay soils can result in shrinkage of the soil and subsidence of the ground; this may lead to damage to buildings. As the soil re-hydrates, it can swell, resulting in ground heave; this may also cause damage to buildings. This Digest describes the most commonly used techniques for detecting desiccation and gives guidance on how to use the results of some of these techniques to estimate heave potential.

BRE, DG412, 1996, 12pp £15.00
ISBN: 978-1-86081-072-5

Cracks caused by foundation movement

Nearly all buildings have cracks in them. There are many causes of cracking, but most of them are not associated with foundation movement: cracks are much more likely to be the result of changes induced by moisture or temperature. This Guide illustrates how to differentiate between cracks caused by foundation movement and cracks caused by other factors.

BRE, GR1, 1996, 4pp £9.00
ISBN: 978-1-86081-097-8

Damage to buildings caused by trees

This Guide describes how to prove if trees are the source of cracking, and how to determine the right course of action to prevent further damage.

BRE, GR2, 1996, 4pp £9.00
ISBN: 978-1-86081-098-5

Assessment of damage in low-rise buildings

Discusses the assessment and clarification of visible damage resulting from structural distortion.

BRE, DG251, 1995, 8pp £15.00
ISBN: 978-1-86081-045-9

Eurocode 7 – a commentary

This commentary helps the reader to understand Eurocode 7 by clarifying the text, reviewing new concepts, comparing it with existing British practice; and providing worked examples. The commentary is in five parts: fundamentals, important features of EC7-1, clause-by-clause commentary, the way ahead, and worked examples. These combine to explain the intentions of Eurocode 7, especially where this differs from previous design approaches.

BRE, BR344, 1998, 180pp £37.50
ISBN: 978-1-86081-226-2

Site investigation for low-rise building: trial pits

Shallow trial pits can provide an economic and versatile way of examining and assessing the in-situ soil conditions. This Digest gives the advantages and disadvantages of trial pits compared with boreholes.

BRE, DG381, 1993, 12pp £15.00
ISBN: 978-0-85125-570-5

Site investigation for low-rise building: soil description

Explains how to make an accurate description of soil, the most important part of any site investigation of the ground where a building is to be constructed.

BRE, DG383, 1993, 12pp £15.00
ISBN: 978-0-85125-296-4

Slurry trench cut-off walls to contain contamination

This Digest discusses materials and specification of cement bentonite mixes and geomembranes in contaminated land.

BRE, DG395, 1994, 8pp £15.00
ISBN: 978-0-85125-639-9

Low-rise buildings on fill

The scarcity and cost of suitable land are leading increasingly to the development of sites with deep deposits of fill and occasionally serious failures have occurred. This should not obscure the fact that many buildings have been successfully built on fill, but emphasise the importance of understanding the behaviour of fills, identifying potential hazards and adopting measures that will ensure successful development of these sites.

BRE, DG427, 3 parts, 1998, 28pp
ISBN: 978-1-86081-816-5 £22.50

Subsidence damage to domestic buildings

Lessons learned and questions remaining

A review of the information available on subsidence, highlighting advice when dealing with subsidence, and providing best practice in design of new buildings. The publication provides a comprehensive examination of subsidence damage to domestic buildings. It includes a detailed evaluation of the technical issues of soils, trees, climate change, foundations and buildings, guidance on dealing with damage and subsidence, socio-economic factors and insurance cover, future developments, tree risk rankings and data from BRE's subsidence database, guidelines and requirements of NHBC and BSI. The information given will ensure movements associated with shrinkage and swelling are reduced to tolerable levels.

FBE, FB1, 2000, 32pp
ISBN: 978-1-86081-433-4 £40.00

BRE Building Elements

BEST SELLER: Foundations, basements and external works

Performance, diagnosis, maintenance, repair and the avoidance of defects

Even the simple construction used in domestic work has potential for improvement. This book is about the parts of buildings in direct contact with the ground: foundations and basements, and external works outside the building footprint but inside the site boundary. Included is information on wind and rainfall, types of ground, characteristics of foundations, structural and waterproofing aspects of basements, wastewater and surface water drains, supply of utilities, footpaths, access for vehicles, freestanding walls and security and other kinds of fencing, and hard and soft landscaping. Includes case studies.

BRE, BR440, 2002, 264pp
ISBN: 978-1-86081-540-9 £47.50

Low-rise building foundations on soft ground

This Digest aims to be an authoritative source of general information about how best to provide foundations for low-rise buildings on soft ground. It describes how to identify and investigate soft ground, outlines the difficulties likely to be encountered and provides guidance on the foundation options available. It emphasises that specialist advice from competent professionals experienced in the engineering of soft ground is essential to the delivery of successful development of soft ground sites.

BRE, DG471, 2002, 12pp
ISBN: 978-1-86081-587-4 £15.00

Foundations for low-rise building extensions

There is a lack of guidance on foundations for low-rise building extensions, particularly for housing. Local practice, often established through rules-of-thumb, can vary, while formal procedures usually follow guidance for entire, new buildings. Owners and builders may be required to adopt extension foundation depths that differ markedly from those of the existing building, which can lead to confusion, dispute and even damage at the junction between old and new structures. This Good Building Guide suggests procedures to avoid these difficulties.

BRE, GG53, 2002, 8pp
ISBN: 978-1-86081-589-8 £15.00

Tilt of low-rise buildings

With particular reference to progressive foundation movement

This Digest provides guidance on assessing the significance of tilt of low-rise buildings resulting from foundation movement. It will help building professionals, property valuers and insurance advisors to assess the significance of tilt and the need for expert advice. The issues of acceptability and tolerability of tilt are particularly acute in low-rise housing. The shortage of good building land and the consequent need to site housing developments on marginal sites gives added importance to the subject. This Digest is complementary to Digest 251 which deals with structural distortion and cracking caused by foundation movement.

BRE, DG475, 2003, 8pp
ISBN: 978-1-86081-613-0 £15.00

Timber piles and foundations

T N Reynolds

Timber is a hugely capable civil engineering material, with the advantage of being sustainable. Trees, in particular conifers, make natural piles. Timber foundations may be particularly suitable for countryside structures such as bridges, forest chalets and activity centres, and for post and beam timber buildings in waterfront or flood-prone locations. Home grown treated softwood and hardwood timber can offer an alternative to imported tropical hardwoods. One suggested method of reducing global warming has been to bury timber to create carbon dumps: using timber for piled foundations would effectively achieve this.

BRE, DG479, 2004, 12pp
ISBN: 978-1-86081-661-1 £15.00

BEST SELLER: Working platforms for tracked plant

Good practice guide to the design, installation, maintenance and repair of ground-supported working platforms

This guide was instigated by the Federation of Piling Specialists to promote safety in the design, specification, installation, operation, maintenance and repair of working platforms. A secondary objective is that safety should be achieved without unnecessary or excessive expenditure. The guide highlights important issues in site assessment, design, installation and maintenance of working platforms. Design calculations are given, together with worked examples for different subgrade properties.

BRE, BR470, 2004, 52pp
ISBN: 978-1-86081-700-7 £37.50

Reuse of foundations for urban sites

Proceedings of the International Conference

A P Butcher, J J M Powell and H D Skinner (Editors)

Redevelopment and regeneration of urban areas have left a legacy of old foundations, congested underground space and archaeological artefacts. This legacy compromises new developments and the project 'Reuse of Foundations for Urban Sites' (RuFUS), partly funded by the EU, has developed and proving new processes to provide environmentally sustainable foundations for future developments. This volume presents papers by the RuFUS project partners and authors from Europe and further afield. It provides valuable technical information and case studies on successful reuse of foundations, and extends the guidance presented in the RuFUS best practice handbook. The papers are presented under five themes:

- Decision making
- Foundation assessment methods
- Foundation performance
- Who pays?
- Getting it right.

EP73, 2006, 416pp
ISBN: 978-1-86081-939-1 £95.00

Reuse of foundations for urban sites

A best practice handbook

A P Butcher, J J M Powell and H D Skinner (Editors)

This Handbook has been developed as part of the Reuse of Foundations for Urban Sites (RuFUS) research project part-funded by the European Commission. The project draws together experience of reusing foundations across Europe and analyses existing knowledge and the latest research.

The Handbook provides: a sound understanding of the background to foundation reuse and the key issues. It gives advice on how to address risk through sound engineering principles and presents technical guidance on the processes for deciding on the correct foundation options. It also provides advice on investigation, design and construction using reused foundations.

EP75, 2006, 144pp

ISBN: 978-1-86081-938-4

£75.00

Reuse of foundations for urban sites: Handbook and Proceedings

A P Butcher, J J M Powell and H D Skinner (Editors)

EP76, Collated set, 2006, 560pp

ISBN: 978-1-86081-944-5

£122.50

BEST SELLER: Subsidence damage to domestic buildings

A guide to good technical practice

R Driscoll and H Skinner

Subsidence is a persistent problem in some parts of the UK: around 35,000 domestic insurance claims are made each year, costing up to £550 million, which are often complex and protracted. This book provides authoritative guidance to best practice in the technical and engineering aspects of subsidence damage to domestic buildings, and covers investigation, diagnosis, repair, prevention and mitigation of building cracking and deformation. It reviews current information and provides a baseline of technical guidance for investigators, clearly and logically structured. The authors have drawn on BRE experience of researching subsidence problems, and on consultancy for difficult cases. Key BRE publications on soils, site investigation and foundation are included in pdf format in a CD-ROM accompanying the book.

BRE Trust, FB13, 2007, 68pp

ISBN: 978-1-86081-977-3

£27.50

Simple foundations for low-rise housing

This Good Building Guide set brings together essential information on the selection of foundations for low-rise housing in the UK. It deals with the key features of a site investigation, the information needed to decide whether an engineered design is called for or whether a rule-of-thumb design is appropriate, the application of the rule-of-thumb approach, and the key features of good site work for foundations.

Part 1. Site investigation.

Part 2. 'Rule of thumb' design.

Part 3. Groundworks: getting it right

BRE, GG39, 3 parts, 2000, 20pp

ISBN: 978-1-86081-829-5

£22.50

MASONRY, WALLS AND CHIMNEYS

Aircrete tongue and grooved block masonry

For the construction of housing and small commercial buildings, solid aircrete blockwork with an outer finish that protects against penetration of rain, wind, pests and grime offers an attractive alternative to the complexities of cavity walls. The productivity advantages of aircrete blockwork used with thin bed mortar technology and mortar-less interlocking vertical (perpend) joints, when combined with the simplicity of solid wall construction, offers a rapid, economical building system which is less demanding in terms of masons' skills but which can still meet all the requirements of the Building Regulations. This Information Paper sets out the background research on the key aspects of performance and gives an introductory guide on constructional best practice using this wall system.

BRE, IP7/05, 2005, 8pp

ISBN: 978-1-86081-757-1

£9.00

Dynamic stiffness of wall ties used in masonry cavity walls: measurement procedure

The sound insulation of masonry cavity walls is partly determined by the number and dynamic stiffness of the wall ties used. Wall ties have a drip to prevent water passing from the outer to the inner leaf which means that their dynamic stiffness cannot be calculated from their dimensions and properties. The stiffness also depends on the width of the cavity. The dynamic stiffness of wall ties therefore needs to be measured experimentally: this paper describes such a measurement procedure.

BRE, IP3/01, 2001, 8pp

ISBN: 978-1-86081-461-7

£9.00

Ties for masonry walls: a decade of development

The development and evolution of wall ties were reviewed in BRE Information Papers 16/88 and 17/88. This Paper covers the further development over the last decade and anticipates the European standard, EN 845-1.

BRE, IP11/00, 2000, 8pp

ISBN: 978-1-86081-383-2

£9.00

Untied cavity party walls: structural performance when using AAC blockwork

Unwanted noise is the most frequent cause of complaint by occupiers of dwellings with party walls. Therefore the concept of a cavity party (separating) wall, built with loadbearing masonry but without wall ties, has generated wide interest. This paper describes a series of element tests, followed by a full-scale model test, that show that an untied cavity party wall can be a stable structure and achieve satisfactory sound attenuation. It will interest manufacturers and suppliers of AAC blocks, building designers and specifiers.

BRE, IP1/99, 1999, 8pp

ISBN: 978-1-86081-282-8

£9.00

Design of masonry walls subjected to concentrated vertical loads

Current codes of practice for the design of such walls are inaccurate. This paper deals with the main parameters that affect local bearing stresses and gives design guidance.

BRE, IP10/92, 1992, 4pp

£9.00

Corrosion of steel wall ties: history of occurrence, background and treatment

This paper describes the history and epidemiology of wall tie corrosion and some methods for remedial action. Reinstatement of walls is often feasible and at much less cost compared with rebuilding.

BRE, IP12/90, 1990, 4pp

£9.00

Corrosion of steel wall ties: recognition and inspection

This paper describes how to recognise and assess wall tie corrosion in the field. It also includes inspection methods.

BRE, IP13/90, 1990, 4pp

£9.00

Ties for cavity walls: new developments

The durability of galvanised mild-steel ties made before 1981 has been shown to be insufficient. This is a review of the history of the development of wall ties, and of recent improvements in materials specifications and performance; also of newer forms of tie which are described and illustrated.

BRE, IP16/88, 1988, 4pp

£9.00

Ties for masonry cladding

Fixing systems appropriate to some of the common cladding situations are reviewed, together with the more recent improvements in both materials specifications and performance. Describes and illustrates forms of tie which are suitable for fixing new masonry to timber, concrete, steel and lightweight concrete slabs or blockwork. Remedial ties are also described.

BRE, IP17/88, 1988, 4pp £9.00

Rain penetration of cavity walls: report of a survey of properties in England and Wales

During the winter of 1983/84, the number of reports of rain penetration of insulated cavity walls seemed unusually high. A survey carried out by BRE, collaborating with BBA, BEC and NHBC, confirmed an increase, concentrated in places where exceptional weather had been recorded. In nearly every case there was also a construction or design fault.

BRE, IP2/88, 1988, 4pp £9.00

Summer condensation on vapour checks: tests with battened, internally-insulated walls

Some of the factors controlling condensation on the back of vapour checks during a summer were compared in an experimental building. The number of days that condensation was present depended on orientation, materials and conditions. Remedies were tested with varying degrees of success.

BRE, IP12/88, 1988, 4pp £9.00

The spacing of wall ties in cavity walls

A review of the results of loading tests on masonry walls with cavities exceeding 75 mm.

BRE, IP6/86, 1986, 4pp £9.00

Surveying the moisture contents of cavity-filled timber-framed dwellings

Describes a method of surveying the moisture contents of timber in those timber-framed dwellings which have had the cavity between their cladding and the sheathing thermally insulated after occupation. It gives guidance on moisture levels likely to be acceptable for the timber frame and suggests remedial action should high moisture levels be found.

BRE, IP1/85, 1985, 4pp £9.00

Performance specification for wall ties

The overall performance requirements for ties for masonry cavity walls and masonry cladding are discussed in the context of the current and future design environment.

BRE, IP4/84, 1984, 4pp
ISBN: 978-0-85125-063-2 £9.00

Urea-formaldehyde foam cavity wall insulation: reducing formaldehyde vapour in dwellings

Suggests what the householder, installer or builder can do to reduce the concentration of vapour.

BRE, IP7/84, 1984, 4pp £9.00

Assessing the performance of timber frame wall panels subject to racking loads

It is necessary to assess the performance of wall panels by testing, and this paper proposes a method of test suitable for this purpose.

BRE, IP12/84, 1984, 4pp £9.00

Field measurements of the effect of plastered lightweight masonry inner leaves on the sound insulation of plastered brick and dense blockwork party walls

Results for plastered brick and dense blockwork party walls associated with plastered lightweight masonry inner leaves of external walls are here compared with earlier results from similar party walls associated with heavier masonry or lightweight panelling external wall leaves to find whether sound insulation is reduced.

BRE, IP24/82, 1982, 4pp £9.00

The performance of cavity wall ties

Based on the laboratory measurements of the thickness of zinc on some 150 wall ties removed from 80 buildings owned by the Property Services Agency and local authorities, typical lives are deduced for galvanised wall ties conforming to the minimum standards of BS 1243:1978. It is concluded that more durable ties are required for new construction but that the majority of existing buildings are sufficiently robust for wide-spread problems to be unlikely.

BRE, IP4/81, 1981, 4pp £9.00

Vapour diffusion through timber-framed walls

This paper is concerned with preventing moisture accumulation from water vapour diffusion inside the building.

BRE, IP1/81, 1981, 4pp £9.00

Assessment of hard body impact resistance of external walls

Summarises the research which has led to the development of an assessment method for estimating the resistance of wall claddings to impacts from hard objects, and the background to proposals for appropriate levels of impact resistance for particular cladding uses.

BRE, IP19/81, 1981, 4pp £9.00

Replacement of cavity wall ties using resin-grouted stainless steel rods

In the maintenance of buildings there is sometimes a need for a method for tying the two leaves of an existing cavity wall without resorting to demolition and reconstruction of the non-loadbearing leaf. This paper describes the method using resin-grouted stainless steel rods.

BRE, IP29/79, 1979, 4pp £9.00

Repairing brick and block masonry

This Digest lists causes of damage, through accident or neglect, to small, generally domestic, masonry buildings and summarises methods of repair. It indicates certain avoidable risks and suggests special precautions to be taken in the course of repair work to prevent recurrence.

BRE, DG359, 1991, 8pp
ISBN: 978-0-85125-485-2 £15.00

Measuring the compressive strength of masonry materials: the screw pull-out test

The compressive strength of masonry materials can be assessed by a test developed by BRE. It can be used on mortar and some masonry units with strengths up to 7 N/mm². This Digest explains the screw pull-out test, its technical background, calibration and the interpretation of results.

BRE, DG421, 1997, 4pp
ISBN: 978-1-86081-139-5 £9.00

Aircrete: thin joint mortar systems

Thin mortar joint systems are being introduced to the UK for commercial or industrial buildings. Using aircrete units with a rapid setting mortar, the thin joint system allows rapid masonry construction without adversely affecting quality. Some aspects of thin joint construction differ from traditional masonry construction and they must be understood in order to gain the maximum benefits from the system. This Digest explains the technical background, properties and benefits of thin joint mortar systems.

BRE, DG432, 1998, 8pp
ISBN: 978-1-86081-239-2 £15.00

Surveying brick or blockwork freestanding walls

Shows what to look for when assessing masonry boundary walls that may need to be repaired or rebuilt.

BRE, GG13, 1992, 6pp
ISBN: 978-1-86081-858-5 £9.00

BEST SELLER: Building simple plan brick or blockwork freestanding walls

A rule-of-thumb guide for contractors and site supervisors showing how to build sound freestanding boundary walls.

BRE, GG14, 1994, 8pp
ISBN: 978-1-86081-859-2 **£15.00**

Providing temporary support during work on openings in external walls

Shows how to provide temporary support when replacing lintels or changing the size of window or door openings. Gives guidance on choice of materials and typical methods for supporting walls, floors and roofs.

BRE, GG15, 1992, 8pp
ISBN: 978-1-86081-860-8 **£15.00**

Freestanding brick walls – repairs to copings and cappings

Gives recommendations for repair of deteriorated copings or cappings on existing walls, and for replacement of copings or cappings where a wall is being lowered in height to reduce risk of collapse.

BRE, GG17, 1993, 4pp
ISBN: 978-1-86081-862-2 **£9.00**

Building reinforced, diaphragm and wide plan freestanding walls

This guide gives guidance for stable construction of freestanding walls built with a range of common brick or blockwork wall types.

BRE, GG19, 1994, 10pp
ISBN: 978-1-86081-864-6 **£15.00**

Removing internal loadbearing walls in older dwellings

In older properties an open-plan ground floor is often created by removing part of an internal loadbearing wall. This guide is for those responsible for specifying, carrying out and inspecting such alterations.

BRE, GG20, 1999, 8pp
ISBN: 978-1-86081-264-4 **£15.00**

BEST SELLER: Building brickwork or blockwork retaining walls

This guide is for builders, designers and planners. It deals with types of retaining walls, soil classification, walls in sloping ground, materials, foundations, construction and, most importantly, safety. NHBC accepts design solutions based on this Good Building Guide.

BRE, GG27, 1996, 14pp
ISBN: 978-1-86081-105-0 **£15.00**

Repointing external brickwork walls

This Good Repair Guide provides advice for builders and householders on choosing the right mortar mix and how to repoint.

BRE, GR24, 1999, 4pp
ISBN: 978-1-86081-300-9 **£9.00**

Supporting temporary openings

Forming a new opening in a loadbearing wall or enlarging an existing opening are both common operations for builders involved in alteration work. But it can be difficult to decide how much temporary support is needed while the work is done, and to make sure it is properly installed and safe. This Good Repair Guide gives advice on how to provide safe support when creating or enlarging openings or replacing lintels in traditional buildings.

BRE, GR25, 1999, 4pp
ISBN: 978-1-86081-307-8 **£9.00**

Building damp-free cavity walls

Cavity walls should be built so that the inner leaf stays dry. Many building details are designed with this express purpose and are long-established. However, dampness is still a common problem in modern buildings, due to faulty design or construction of damp-proofing measures or to wrong choice of material. This Guide shows how to make sure new cavity walls do not suffer from dampness problems.

BRE, GG33, 1999, 6pp
ISBN: 978-1-86081-326-9 **£9.00**

Surveying masonry chimneys for repair or rebuilding

During the life of a building, chimneys may need repair, be required to act as flues for different fuels or appliances, or become redundant. This Guide shows what to look for when assessing chimneys for repair, re-use or decommissioning.

BRE, GG2, 1990, 6pp
ISBN: 978-1-86081-850-9 **£9.00**

Repairing chimneys and parapets

Chimneys and parapets are more exposed to the elements than any other part of a building. If they are allowed to get into a bad state of repair, rain can penetrate to the inside of the building. Falls of masonry from unstable chimneys and parapets pose real danger to people below. It is vital that repairs are carried out to a high standard and that bricks and mortar, and concrete and metal components, are carefully selected to ensure they are durable in severe exposure. This Guide deals with how to make damaged chimneys and parapets safe and weathertight.

BRE, GR15, 1998, 4pp
ISBN: 978-1-86081-204-0 **£9.00**

BRE Building Elements Walls, windows and doors

Performance, diagnosis, maintenance, repair and the avoidance of defects

Provides practical advice on all the main vertical elements of buildings, both external (including walls, windows and doors) and internal (including separating walls, partitions and internal doors). It deals with the achieved performance and deficiencies of these elements over the whole age range of the national building stock. The book contains over 400 illustrations, and provides sources of further information and advice.

BRE, BR352, 1998, 308pp
ISBN: 978-1-86081-235-4 **£47.50**

Installing wall ties in existing construction

Describes the range of techniques available for reinstatement of cavity walls by inserting new wall ties.

BRE, DG329, 2000, 16pp
ISBN: 978-0-85125-282-7 **£20.00**

Testing bond strength of masonry

Covers the technical background, calibration and interpretation of results for bond wrenches and features the use of the BRENCHE – a powerful in-situ tool used for investigating suspect masonry, for quality control of new work and for laboratory investigation of bond.

BRE, DG360, 1991, 8pp
ISBN: 978-0-85125-495-1 **£15.00**

Replacing wall ties

This Digest discusses site workmanship and quality assurance for the installation of replacement wall ties in masonry walls.

BRE, DG401, 1995, 12pp
ISBN: 978-0-85125-656-6 **£15.00**

Masonry and concrete structures: measuring in-situ stress and elasticity using flat jacks

This Digest describes how compressive stress in members and local stress-strain behaviour can be measured with a flat jack (a flat, flexible envelope filled with hydraulic fluid which can be pressurised with a pump and works on the lever principle).

BRE, DG409, 1995, 8pp
ISBN: 978-1-86081-033-6 **£15.00**

Temporary support for openings in external walls: assessing load

Many buildings will require minor structural alteration or repair around openings; others will need new or enlarged openings. This Guide gives a simple procedure for assessing loads above lintels in traditionally built brick or brick and block housing.

BRE, GG10, 1992, 6pp
ISBN: 978-1-86081-855-4 **£9.00**

Repairing damage to brick and block walls

Brick and block masonry suffers damage from a variety of causes, not all of which require immediate or extensive attention. This Guide helps anyone carrying out these repairs to choose the appropriate method for any given situation. It emphasises the importance of assessing the structural stability of damaged walls.

BRE, GR3, 1996, 4pp
ISBN: 978-1-86081-110-4 **£9.00**

Replacing masonry wall ties

Distress of cavity walls is sometimes attributable to corrosion or absence of metal ties. Generally the wall bulges, cracks or leaks, but if subjected to high wind loads it might even collapse. This Guide shows how to assess masonry wall ties and, when appropriate, how to replace them.

BRE, GR4, 1996, 4pp
ISBN: 978-1-86081-111-1 **£9.00**

Installing wall ties

Lack of skill or care in installing wall ties can lead to distortion, cracking, or – in extreme cases – collapse. The outer leaf is also the rain shield for the building. Badly installed ties can lead to rain penetration and dampness in the inner leaf. This Good Building Guide gives practical advice on installing wall ties in new buildings.

BRE, GG41, 2000, 6pp
ISBN: 978-1-86081-427-3 **£9.00**

Repairing brick and block freestanding walls

If freestanding walls are not well built, they can fail early in their life. And if local conditions change a well established, soundly built wall can be damaged or even collapse. Before starting on any repair, whether a minor patching up or a major rebuilding, it is important to find out what caused the problem. This Guide aims to help in assessing damage in freestanding masonry walls, establishing the cause, and carrying out effective repairs.

BRE, GR28, 2000, 6pp
ISBN: 978-1-86081-393-1 **£9.00**

Cleaning external walls of buildings

Cleaning building façades can enhance appearance, but may also make the building more unsightly and damage the walling materials. Trials can help determine appropriate methods, risks involved and if cleaning is warranted.

Part 1 of this Good Repair Guide outlines actions to take before cleaning and describes the methods available.

Part 2 gives advice on the methods and precautions for different types of soiling on different wall surfaces to help surveyors and contractors.

BRE, GR27, 2 parts, 2000, 12pp
ISBN: 978-1-86081-395-5 **£20.00**

Corrosion of metal components in walls

This Digest reviews the history and incidence of problems with metal components in walls, particularly wall ties. It considers problems of corrosion, inadequate provision or poor specification and what action can be taken, particularly where structural stability is threatened. Reinstatement is often feasible and may cost a fraction of the whole rebuilding cost, so methods are suggested. With IP13/90, Digests 329 and 401, and Good Building Guide 29, this Digest offers a package of information on problems and remedial installation of wall ties, straps and fixings into existing walls.

BRE, DG461, 2001, 8pp
ISBN: 978-1-86081-523-2 **£15.00**

Insulating solid masonry walls

Solid masonry is used in about 15% of existing houses, many of which could be thermally upgraded. Increased insulation demanded by building regulations may present technical challenges to cavity and framed construction and it may be appropriate to specify solid masonry construction for new build. This Good Building Guide highlights risks associated with solid masonry walling and provides solutions for improving its thermal performance.

BRE, GG50, 2002, 8pp
ISBN: 978-1-86081-553-9 **£15.00**

Reinforced autoclaved aerated concrete panels

Review of behaviour, and developments in assessment and design

Reinforced autoclaved aerated concrete (RAAC) panels are widely used in mainland Europe but serviceability problems have occurred in the UK with some panels designed and built before 1980. This paper describes: concerns about the performance of RAAC roof panels designed before 1980, laboratory testing of RAAC roof panels after 20 years' service, and newly fabricated panels, mechanisms influencing in-service behaviour, design guidance in prEN 12602, and testing RAAC panels fabricated to the new guidance.

BRE, BR445, 2002, 22pp
ISBN: 978-1-86081-565-2 **£30.00**

Thin layer mortar masonry

Thin layer mortar technology, which is rapidly gaining in popularity among UK builders, overcomes many of the actual and perceived disadvantages of conventional masonry techniques. Thin layer mortar is easy to mix on site. The laying technique is simple and fast using large accurately sized block units and less mortar. The result is increased productivity and savings in labour and materials. Thin layer mortar technology complying with building regulations and codes of practice, aims to retain masonry as a preferred option for house construction because of its proven durability, inherent fire resistance, good noise exclusion and low maintenance.

BRE, GG58, 2003, 8pp
ISBN: 978-1-86081-632-1 **£15.00**

AAC 'aircrete' blocks and masonry

This Digest covers the main technical issues and answers the frequently asked questions on specification, application and performance of AAC masonry in the light of current regulations and guidance. It evaluates the green credentials on the basis of data on energy and resource usage published by the manufacturing industry. This Digest is in two parts; figure, table and reference numbering continues into Part 2 which contains the full list of references, documents mentioned in the text, and further reading.

BRE, DG468, 2 parts, 1998, 20pp
ISBN: 978-1-86081-875-2 **£22.50**

Insulating masonry cavity walls

C Stirling

With increasing pressure to provide ever thicker levels of insulation there is concern that thermally upgrading conventional cavity walls, consisting of two leaves of masonry, may prove impracticable. Part 1 of this Good Building Guide highlights techniques and materials for insulating cavity walls. Part 2 provides guidance on how to reduce the associated technical risks. The guidance is for cavity walls having two masonry leaves; it is not suitable for timber-framed construction.

BRE, GG44, 2 parts, 2000, 12pp
ISBN: 978-1-86081-830-1 **£20.00**

Domestic chimneys for solid fuel – flue design and installation

This Good Building Guide gives advice on design and construction of chimneys and flues to vent combustion gases safely to the outside air and induce a good air flow to suit the appliance and its heat output.

BRE, GG46, 2001, 4pp
ISBN: 978-1-86081-477-8 **£9.00**

Retro-installation of bed joint reinforcement in masonry

Installing bed joint reinforcement into existing walls, 'retro-reinforcement', enables repair of cracks, sagging lintels and flat arches, developing arches or cantilevers within a wall to span over subsidence, increasing the flexural strength and shear resistance of walls to combat wind and seismic loading, and reconnecting cracked or parted buttresses. This guide tabulates the cross-sectional area and tensile strength of typical bars, and grout properties. Performance for steel and epoxy-glass fibre reinforcements are given. Where subsidence of foundations causes cracking of masonry, remedial reinforcement, combined with new piles, can be cheaper and less invasive than massive underpinning works. Illustrations show typical problems and solutions.

BRE, GG62, 2004, 8pp
ISBN: 978-1-86081-724-3 **£15.00**

BEST SELLER: Rammed earth: design and construction guidelines

P Walker, R Keable, J Marton and V Maniatidis

Rammed earth walling is a beautiful, durable building material with a long and successful tradition in the UK and around the world. For modern construction it offers a high-quality and sustainable building method suitable for a range of external and internal applications. Often using local materials, rammed earth buildings have characteristic textures and colours, with structural and thermal properties suited to a range of situations. Until now there has been no authoritative guidance on the use of rammed earth in the UK. This book presents state-of-the-art practical guidance on material selection, construction, structural design, architectural detailing, maintenance and repair of rammed earth. It contains numerous photos of rammed earth buildings in the UK, Europe, the USA, Africa and Australia, and includes construction details. The aim of the book is to inform, develop and encourage the use of rammed earth wall construction for housing and other low- and medium-rise buildings. The guidance has been derived from extensive testing and research at the University of Bath, funded by the DTI Partners in Innovation programme.

EP62, 2005, 160pp
ISBN: 978-1-86081-734-2 **£37.50**

Earth, clay and chalk walls

Inspection and repair methods

P Trotman

Around the UK, a variety of earth-walling construction methods and practices have been developed over many centuries depending on the characteristics of the subsoils and on local traditions. Since the 1980s there has been a resurgence of interest in the techniques used mainly to ensure appropriate repairs for maintenance and extension of existing buildings. There is also a growing interest in earth-walling construction methods and practices for new build as a means of reducing the environmental impact of building and of employing more sustainable and natural building methods.

This Good Repair Guide focuses on inspection of existing earth, clay and chalk walls and the use of traditional repair methods to rectify defects.

BRE, GR35, 2006, 8pp
ISBN: 978-1-86081-934-6 **£15.00**

Masonry, walls and chimneys pack

BRE

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AAC 'aircrete' blocks and masonry (2-part set) (DG468)
Aircrete: thin joint mortar systems (DG432)
Cleaning exterior masonry (2-part set) (DG449)
Corrosion of metal components in walls (DG461)
Installing wall ties in existing construction (DG329)
Masonry and concrete structures: measuring in-situ stress and elasticity using flat jacks (DG409)
Measuring the compressive strength of masonry materials: the screw pull-out test (DG421)
Principles of masonry conservation management (DG502)
Repairing brick and block masonry (DG359)
Replacing wall ties (DG401)
Testing bond strength of masonry (DG360)

GOOD BUILDING GUIDES

Building brickwork or blockwork retaining walls (GG27)
Building damp-free cavity walls (GG33)
Building reinforced, diaphragm and wide plan freestanding walls (GG19)
Building simple plan brick or blockwork freestanding walls (GG14)
Domestic chimneys for solid fuel - flue design and installation (GG46)
Freestanding brick walls - repairs to copings and cappings (GG17)
Installing wall ties (GG41)
Insulating masonry cavity walls (2-part set) (GG44)
Insulating solid masonry walls (GG50)
Providing temporary support during work on openings in external walls (GG15)
Removing internal loadbearing walls in older dwellings (GG20)
Retro-installation of bed joint reinforcement in masonry (GG62)
Surveying brick or blockwork freestanding walls (GG13)
Surveying masonry chimneys for repair or rebuilding (GG2)
Temporary support for openings in external walls: assessing load (GG10)
Thin layer mortar masonry (GG58)

GOOD REPAIR GUIDES

Cleaning external walls of buildings (2-part set) (GR27)
Earth, clay and chalk walls: Inspection and repair methods (GR35)
Repairing brick and block freestanding walls (GR28)
Repairing chimneys and parapets (GR15)
Repairing damage to brick and block walls (GR3)

Replacing masonry wall ties (GR4)
Repointing external brickwork walls (GR24)
Supporting temporary openings (GR25)

INFORMATION PAPERS

Aircrete tongue and grooved block masonry (IP7/05)
Dynamic stiffness of wall ties used in masonry cavity walls (IP3/01)
Ties for masonry walls: a decade of development (IP11/00)
Untied cavity party walls: structural performance with AAC blockwork (IP1/99)

BRE, AP261, Ringbound set, 2007
ISBN: 978-1-86081-999-5 **£130.00**

Earth masonry

Design and construction guidelines

T Morton

Earth masonry is the one of the oldest and most widespread building materials. Though technologically simple, it can produce a durable architecture of considerable artistic sophistication, and buildings that are appropriate to their climate and suited to a wide range of uses.

EP80, 2008, 160pp
ISBN: 978-1-86081-978-0 **£35.00**

Hemp lime construction

A guide to building with hemp lime composites

R Bevan and T Woolley

Hemp lime is a composite construction material that can be used for walls, insulation of roofs and floors and as part of timber-framed buildings. It provides very good thermal and acoustic performance, and offers a genuinely zero-carbon contribution to sustainable construction. Hemp masonry is breathable and is able to absorb and emit moisture, leading to much healthier buildings. Comprehensive guidance on using this novel material for housing and low-rise buildings is given for the first time in this book, which is full of practical information on materials, design and construction. It is fully illustrated and includes case studies and design details, and explains how the use of hemp-based material can capture and store carbon dioxide in the fabric of buildings. The guide is the output from a Defra-funded study commissioned by the National Non-Food Crops Centre.

EP85, 2008, 120pp
ISBN: 978-1-84806-033-3 **£30.00**

Cleaning exterior masonry

This digest is relevant to all types of buildings, including private, public and historic buildings. Part 1 outlines the approach that should be taken to managing cleaning projects; types of cleaning; choosing cleaning methods; specification and tendering criteria; research and trial cleaning; and analyses the cleaning of a building as a process. Part 2 categorises a range of widely used cleaning methods, highlights key issues, and describes the problems and risks associated with each method.

BRE, DG449, 2 parts, 2000, 20pp
ISBN: 978-1-86081-822-6 **£22.50**

ROOFS AND ROOFING

Designing roofs with safety in mind

This Paper reports the findings of a committee of roofing experts who examined HSE data on accidents with a view to establishing the design decision which led to the underlying cause of the accident. It is aimed primarily at architects and designers of roofs but is also relevant to material suppliers and installers and others working on roof construction.

BRE, IP7/04, 2004, 4pp
ISBN: 978-1-86081-701-4 £9.00

Reinforced autoclaved aerated concrete planks designed before 1980

Describes the difficulties experienced in service with RAAC roof planks designed before 1980. It gives guidance on their identification and initial assessment in buildings. It suggests that roofs incorporating pre-1980 RAAC planks are inspected, and their condition assessed.

BRE, IP10/96, 1996, 4pp
ISBN: 978-1-86081-118-0 £9.00

Bituminous roofing membranes: Performance in use

This paper discusses a laboratory test measuring the cold bending temperature of a wide range of bituminous roofing sheets, and the implications for current site practice.

BRE, IP7/95, 1995, 4pp
 £9.00

Mastic asphalt for flat roofs: testing for quality assurance

Severe winter conditions have seen the failure of standard types of mastic asphalt laid over thermal insulation. BRE tests show that the performance of mastic asphalt can be significantly improved by the addition of appropriate polymers. One of these tests may also have potential as a quality control test for mastic asphalts used in flat roofing.

BRE, IP8/91, 1991, 4pp
 £9.00

Thermal performance of lightweight inverted warm-deck flat roofs

BRE research shows that an inverted warm-deck roof combined with a lightweight deck can, during rainfall, lead to reduced thermal performance and the risk of condensation in the roof. The paper explains that a simple design modification could reduce this risk.

BRE, IP2/89, 1989, 4pp
 £9.00

Ventilating cold deck flat roofs

Suggests that there is need for increasing ventilation where natural draught ventilation is low or where roofs are complex. Offers guidance for designers and maintenance managers

BRE, IP13/87, 1987, 4pp
 £9.00

The movement of foam plastics insulants in warm deck flat roofs

In recent years a high incidence of premature failure has occurred with warm deck flat roofs. This paper describes research which has been carried out by BRE to investigate this problem and gives design recommendations based on the findings.

BRE, IP6/84, 1984, 4pp
 £9.00

Trussed rafter roofs

This paper summarises of the results of surveys of the manufacture, site use, and performance in service of trussed rafters, and the significance of copper-chrome-arsenic treatment on the incidence of corrosion of galvanised metal plate fasteners used in trussed rafters. It also gives conclusions and recommendations based on these results.

BRE, IP14/83, 1983, 4pp
 £9.00

Load sharing between rafters in traditional timber roof structure

Reports on the development of a theoretical model which may be used to estimate the amount of load sharing provided by tiling battens spanning between rafters in a traditional timber roof structure.

BRE, IP5/82, 1982, 4pp
 £9.00

Trussed rafter roofs - load distributions and lateral stability

Summarises the load sharing capabilities of the components of a laboratory test roof constructed with fink trussed rafters. The lateral stability of the roof with different diagonal bracing systems in the plane of the rafters was assessed.

BRE, IP14/82, 1982, 4pp
 £9.00

Inspection and maintenance of flat and low-pitched timber roofs

Discusses the need for regular inspection of flat and low-pitched roofs which incorporate built-up beams or other composite timber structures.

BRE, IP15/82, 1982, 4pp
 £9.00

Considerations in the design of timber flat roofs

Draws attention to some of the problems which can arise with timber-based roofs and gives guidance on how these problems might be prevented in future.

BRE, IP19/82, 1982, 4pp
 £9.00

Maintenance costs of flat roofs

Although flat roofs have a reputation for being expensive to maintain, there has been a shortage of quantitative information on the subject; research to date has concentrated on technical investigation of failures. This paper summarises two maintenance studies that use a statistical approach.

BRE, IP11/81, 1981, 4pp
 £9.00

Timber stress grades for trussed rafters

Discusses timber stress grades and concludes that to obtain the same permissible spans as for the composite grade, timber of ss grade should be used and the resulting yields of this grade from commercial parcels should not be significantly lower than those of composite grade.

BRE, IP15/80, 1980, 4pp
 £9.00

Moisture in a timber-based flat roof of cold deck construction

Deals with moisture which penetrates the roof from inside the building in the form of vapour.

BRE, IP35/79, 1979, 4pp
 £9.00

Survey of performance of organic-coated roof sheeting

Results of a survey of building and chartered surveyors specialising in commercial and industrial buildings and of industrial building owners to assess the performance of profiled metal roofing sheet in the UK. Organic-coated zinc galvanised sheet was the most common roofing material identified and PVC the most common organic coating.

BRE, BR259, 1993, 20pp
ISBN: 978-0-85125-617-7 £32.50

American plywood in roof construction

Plywood has characteristics that make it ideal in today's construction market where performance, process and price are main drivers. This guide will help users of American plywood to derive the maximum benefits from plywood in roof constructions in terms of performance, durability and cost-effectiveness. It will enable users to make the right decisions when specifying, selecting, designing and fabricating roof constructions using plywood. It has been written by BRE in partnership with APA (the Engineered Wood Association).

BRE, BR369, 1999, 30pp
ISBN: 978-1-86081-291-0 £30.00

Stability under wind load of loose-laid external roof insulation boards

Gives guidance on the uplift pressures to which loose-laid roof insulation boards can be subjected, and how they can be restrained using ballast or mechanical fixing.

BRE, DG295, 1985, 4pp
ISBN: 978-0-85125-091-5 £9.00

Roof loads due to local drifting of snow

Following a review of some areas of difficulty, BS 6399-3 was amended in 1997. The main changes related to determining load shape coefficients for local drifting of snow, and using the snow load statistical factor to produce estimates of loads with probabilities of exceedance different from 0.02. This Digest presents background information and design requirements for local snow drift loads on roofs in line with the amended British Standard. It is aimed at architects, structural engineers, contractors, and manufacturers and suppliers of roofing systems.

BRE, DG439, 1999, 12pp
ISBN: 978-1-86081-299-6 £15.00

Flat roof design: thermal insulation

The need to conserve energy in buildings has led to improved standards of insulation, including those of flat roofs in domestic, public and industrial buildings. This Digest describes the properties required of thermal insulation in flat and low-pitched roofs, reviews the wide range of products available and suggests criteria for selection.

BRE, DG324, 1987, 12pp
ISBN: 978-0-85125-277-3 £15.00

Swimming pool roofs: minimising the risk of condensation using warm-deck roofing

Successful roof design demands much more rigorous consideration of condensation risks than is needed for roofs of other buildings. This Digest outlines the steps in designing a warm-deck roof in which the condensation risk is minimised. It can also be used to solve problems in roofs of existing pools.

BRE, DG336, 1989, 8pp
ISBN: 978-0-85125-366-4 £15.00

Ventilating thatched roofs

Thatch is permeable to air and moisture; when constructed traditionally it is a weather resistant, breathable and highly durable roofing material. However, the introduction of impermeable plastics, the requirements of building regulations for additional insulation and reduced air leakage, can increase the risk of condensation within the thatch, so affecting its durability. This Guide explains how to reduce that risk by introducing cavities and ventilation below the thatch. It applies to new roofs and where the thatch of an existing roof is to be replaced. Local authorities may require a consent application for the removal of thatch or if the insertion of new materials would change the behaviour of the roof.

BRE, GG32, 1999, 4pp
ISBN: 978-1-86081-297-2 £9.00

Handbook of imposed roof loads

BS 6399: Part 3 includes more comprehensive information on imposed roof loads than previously given in BS 6399: Part 1:1984 or in CP 3: Chapter V: Part 1: 1967. This handbook assists with its interpretation and application.

BRE, BR247, 1993, 104pp
ISBN: 978-0-85125-571-2 £52.50

BRE Building Elements Roofs and roofing

Performance, diagnosis, maintenance, repair and the avoidance of defects

A key reference source on all aspects of roofing. Assists in the identification of defects and their causes, establishes how to correct them and how to avoid them in the first place by careful design and maintenance.

It explains the basic functions of all roofs, then discusses short span domestic pitched and flat roofs, medium span commercial, public and industrial roofs, and long span roofs. It has over 200 photographs and 100 drawings of roofs and construction details.

Currently supplied as a black and white digital reprint.
 A new edition will be published in June of 2007.

BRE, BR302, 2000, 252pp
ISBN: 978-1-86081-068-8 £47.50

Structural appraisal of buildings with long-span roofs

Explains why periodical structural appraisal of buildings with long-span roofs is especially important. It also indicates the commonly occurring defects and gives guidance on appraisal of structure and components.

BRE, DG282, 1984, 4pp
 £9.00

Flat roof design: the technical options

Summarises the requirements which must be considered when designing a flat roof and outlines the technical options available to designers, describing the advantages and disadvantages of each, and the costs and other considerations.

BRE, DG312, 1986, 8pp
ISBN: 978-0-85125-216-2 £15.00

Re-covering old timber roofs

How to assess the condition of old timbers in roofs that might be subjected to higher loads from new tiles or slates.

BRE, DG351, 1990, 4pp
ISBN: 978-0-85125-455-5 £9.00

Flat roof design: bituminous roofing membranes

This Digest will help designers, specifiers and flat roofing contractors to specify durable bituminous sheets. This is one of a series of Digests giving guidance on design and specification of flat roofs. Other Digests in the series are: 312 The technical options; 324 Thermal insulation; 372 Waterproof membranes.

BRE, DG419, 1996, 8pp
ISBN: 978-1-86081-112-8 £15.00

Erecting, fixing and strapping trussed rafter roofs

Guide for site supervisors and building inspectors, showing normal arrangements for fixing and strapping domestic roofs up to 12 m span, to provide a sound platform for roof coverings and contribute to the stability of the roof and gable ends. To be used with GG 8.

BRE, GG16, 1993, 6pp
ISBN: 978-1-86081-861-5 £9.00

Bracing trussed rafter roofs

Shows how timber bracing may be installed in typical trussed rafter roofs of up to 12 m span, advises on materials and where and how to fix the bracing normally needed for dual-pitched and mono-pitched roofs.

BRE, GG8, 1991, 6pp
ISBN: 978-1-86081-853-0 £9.00

Re-covering pitched roofs

Highlights key points to watch out for when renewing a roof covering, which would not normally arise in new work.

BRE, GR14, 1998, 4pp
ISBN: 978-1-86081-203-3 £9.00

Insulating roofs at rafter level: sarking insulation

This Guide highlights sarking insulation, a system of roof insulation where the insulation material is laid between and over inclined rafters. It can satisfy the thermal requirements of building regulations and allow complex roofs to be more effectively insulated with a reduced risk of thermal bridging and condensation problems as the roofing timbers are kept at or near internal environmental conditions. This Guide provides advice on specifying sarking insulation and on avoiding the associated technical risks.

BRE, GG37, 2000, 8pp
ISBN: 978-1-86081-354-2 **£15.00**

Building a new felted flat roof

With advances in materials and design, weathertightness and energy performance of modern flat roofs has improved. This Good Building Guide focuses on one of the commonest examples of a new flat roofed building – a house extension. Here a flat roof may be the only practical option, and also the cheapest. This Guide advises on how to make a good job of a new felted roof extension.

BRE, GG36, 2000, 6pp
ISBN: 978-1-86081-335-1 **£9.00**

Flat roofs: assessing and making roof repairs

Most flat roof coverings need repair or replacement during the life of the building. This can be anything from a small patch repair to renewal of the roof covering or even rebuilding the whole roof structure. Part 1 of this Guide gives advice on how to carry out a detailed assessment of a roof in need of repair or refurbishment. Part 2 gives guidance on how to plan and carry out remedial work.

BRE, GR16, 2 parts, 1998, 12pp
ISBN: 978-1-86081-220-0 **£20.00**

Insulated profiled metal roofs

This Good Building Guide highlights typical profiled metal roof constructions, some of the technical risks associated with increased levels of insulation (such as potential risk of condensation) and the design aspects which should be considered.

BRE, GG43, 2000, 6pp
ISBN: 978-1-86081-440-2 **£9.00**

Ventilated and unventilated cold pitched roofs

In a 'cold' pitched roof, the insulation is fitted at ceiling level, but there is a risk of condensation on the underside of the roof. Since the 1960s, the accepted solution has been to ventilate the loft space by openings to the outside at eaves and ridge. More recently, vapour permeable underlays are sometimes used as an alternative. With the introduction of the unventilated cold pitched roof, the general principles and risks need to be clarified and approved construction techniques identified. By giving guidance on the technical risks associated with ventilated and unventilated forms of cold pitched roofs, this Good Building Guide responds to some of the confusion and conflicting views.

BRE, GG51, 2002, 6pp
ISBN: 978-1-86081-554-6 **£9.00**

Site-cut pitched timber roofs

B Keyworth

Pitched roofs can be constructed in several ways: in situ with each piece cut and fitted individually, prefabricated or site-made trusses to support in situ fitted purlins and rafters, or with prefabricated trussed rafters forming the complete roof structure. Prefabricated roofs have become the commonest form of construction but there are situations where a purpose designed and site-built roof may be preferred. Part 1 explains the principles of this type of construction and describes patterns of roof structure and design considerations. Part 2 describes a method of fabricating and constructing a typical domestic site-built roof.

BRE, GG52, 2 parts, 2002, 12pp
ISBN: 978-1-86081-873-8 **£15.00**

Slate and tile roofs: avoiding damage from aircraft wake vortices

The pressures generated by aircraft trailing wake vortices can greatly exceed the normal design load for roofs. Damage is generally confined to small-format roofing elements, such as tiles and slates, on buildings near the ends of runways in urban areas. This Digest helps building owners, occupiers, roofing specifiers, contractors, installers, and local and airport authorities, to identify and avoid damage to tiled and slated roofs from aircraft trailing vortices by suggesting minimum safe fixing standards.

BRE, DG467, 2002, 12pp
ISBN: 978-1-86081-560-7 **£15.00**

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 have been most frequently observed in BRE site investigations of roofing schemes, which could lead to deficiencies in the performance of the completed roof. The objective is to provide practitioners with a summary of the main good practice criteria.

Part 1 covers general principles applicable to all forms of tiling and slating, together with criteria where requirements for ancillary materials and practices are common to both tiles and slates, such as weather resistance and underlay specifications and some aspects of work on site.

Parts 2 and 3 describe battening, nailing and product and material quality requirements for tiles and slates.

BRE, GG64, 3 parts, 2005, 22pp
ISBN: 978-1-86081-835-6 **£22.50**

Safety considerations in designing roofs

This Digest reports the findings of the Designing Roofs with Safety in Mind Partners in Innovation project sponsored by the Department of Trade and Industry. It is intended to give guidance to enable effective implementation of the Construction Design and Management (CDM) regulations and result in the construction of safer roofs.

BRE, DG493, 2005, 6pp
ISBN: 978-1-86081-753-3 **£9.00**

Designing roofs for climate change: Modifications to good practice guidance

The climate change models produced by the UK Climate Impacts Programme (UKCIP) in 2002 gave an insight into predicted weather changes, with higher summer temperatures and milder winters, but more rainfall. Roofs being designed now will have to cope with these changes and designers need to take this into account in their designs.

This Digest gives recommendations on proposed modifications to guidance on good practice in roof design and construction for many types of roof in the light of predicted climate changes. It is based on the views of roofing industry experts as part of a Partners in Innovation project led by BRE.

BRE, DG499, 2006, 8pp
ISBN: 978-1-86081-916-2 **£15.00**

BEST SELLER: Green roofs and façades

G Grant

Green roofs and façades on buildings offer a wide range of benefits, including attenuation of rainwater run-off, improved thermal stability and energy conservation and open space. It is fully illustrated with numerous examples of successful applications from around the world.

EP74, 2006, 84pp
ISBN: 978-1-86081-940-7 £22.50

BEST SELLER: Loft conversion

Part 1 and 2

Two part Good Building Guide. Applies to loft conversions in houses not more than two storeys high, with no more than two habitable rooms and a maximum floor area of 50 square metres, and only to dwellings in single occupancy.

BRE, GG69, 2 parts, 2006, 14pp
ISBN: 978-1-86081-947-6 £20.00

Roofs and roofing pack

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Designing roofs for climate change: modifications to good practice guidance (DG499)

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Safety considerations in designing roofs (DG493)

Slate and tile roofs: avoiding damage from aircraft wake vortices (DG467)

Stability under wind load of loose-laid external roof insulation boards (DG295)

Structural appraisal of buildings with long-span roofs (DG282)

Swimming pool roofs: minimising the risk of condensation using warm-deck roofing (DG336)

GOOD BUILDING GUIDES

Bracing trussed rafter roofs (GG8)

Building a new felted flat roof (GG36)

Erecting, fixing and strapping trussed rafter roofs (GG16)

Insulated profiled metal roofs (GG43)

Insulating roofs at rafter level: sarking insulation (GG37)

Loft conversion (2-part set) (GG69)

Site-cut pitched timber roofs (2-part set) (GG52)

Tiling and slating pitched roofs (3-part set) (GG64)

Ventilated and unventilated cold pitched roofs (GG51)

Ventilating thatched roofs (GG32)

GOOD REPAIR GUIDES

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Re-covering pitched roofs (GR14)

INFORMATION PAPERS

Designing roofs with safety in mind (IP7/04)

BRE, AP263, Ringbound set, 2007
ISBN: 978-1-84806-001-2 £85.00

STRUCTURAL DESIGN AND PERFORMANCE**NEW: Structural composite connections for sequential seismic and fire performance**

This paper provides information on the design and detailing of two types of composite beam-to-column connection specifically designed to achieve seismic resistance and fire resistance through a multi-objective, performance-based design approach. The adequacy of the connections has been demonstrated by experimental testing and numerical studies. The connections have been developed as part of a collaborative European project to develop fundamental data, design procedures and promote ductile and fire resistant composite beam-to-column connections.

BRE, IP2/09, 2009, 8pp
ISBN: 978-1-84806-087-6 £9.50

Loads generated by jumping crowds: experimental assessment

This paper describes an experimental investigation of the dynamic loads produced by groups of up to 64 people jumping in time to music. It focuses on the changes in the characteristics of the load with increasing numbers of people. The responses were analysed to determine peak accelerations and displacements. The load model was then used to calculate the floor response for comparison with the measurements. The measurements demonstrate that both safety and serviceability must be considered in the design of floors to withstand this type of loading.

BRE, IP4/02, 2002, 12pp
ISBN: 978-1-86081-541-6 £9.00

Temporary demountable grandstands: dynamic response

This paper gives details of full-scale tests on 50 temporary demountable stands. The dynamic behaviour of the empty stands (natural frequencies, damping values and mode shapes) are presented. The results from 23 stands monitored during live events are also presented. This paper will be of interest to engineers and local authorities responsible for designing or licensing stands.

BRE, IP3/00, 2000, 8pp
ISBN: 978-1-86081-363-4 £9.00

Retractable grandstands: dynamic response

This paper gives results from full-scale tests on six retractable stands. The dynamic behaviour of the empty stands (natural frequencies, damping values and mode shapes) are presented. The results from three stands monitored during rock concerts are also presented. This paper will be of interest to engineers and local authorities responsible for designing or licensing stands.

BRE, IP4/00, 2000, 8pp
ISBN: 978-1-86081-364-1 £9.00

Permanent cantilever grandstands: dynamic response

This paper gives results obtained from full-scale tests on permanent cantilever grandstands. The dynamic behaviour of the empty stands (natural frequencies, damping values and mode shapes) are presented. The results from ten stands that were monitored during live events are also presented. This paper will be of interest to engineers and local authorities responsible for designing licensing stands.

BRE, IP5/00, 2000, 8pp
ISBN: 978-1-86081-365-8 £9.00

Guidance for engineers conducting static load tests on building structures

The loading regime adopted for a load test must reflect the load environment of the structure being tested, and in particular whether this environment is predominately static or dynamic. This paper gives guidance on whether the response of a structure can be regarded as static, and it offers recommendations for static load tests, including interpretation and safety considerations. It will help engineers to formulate suitable test programmes.

BRE, IP2/95, 1995, 4pp £9.00

The structural adequacy and durability of large panel system dwellings: summary of the report

Summarises the principal findings, conclusions and recommendations of the BRE Report on the structural adequacy and durability of LPS dwellings.

BRE, IP8/87, 1987, 4pp £9.00

Weatherproof joints in large panel systems: 3. Investigation and diagnosis of failure

Third in a series of three publications to assist engineers in local authorities and elsewhere in appraisal, maintenance and repair of large panel system dwellings. Should be read in conjunction with IP 8/86 and IP 9/86.

BRE, IP10/86, 1986, 4pp £9.00

Weatherproof joints in large panel systems: flat roofs, balconies and deck accessways

Examines the typical faults occurring in horizontal weatherproofing membranes in large panel system dwellings and the most appropriate remedial measures.

BRE, IP15/86, 1986, 4pp £9.00

Weatherproof joints in large panel systems: 2. Remedial measures

Second in a series of three publications to assist engineers in local authorities and elsewhere in appraisal, maintenance and repair of large panel system dwellings. Should be read in conjunction with IP 8/86 and IP 10/86.

BRE, IP9/86, 1986, 4pp £9.00

Weatherproof joints in large panel systems: 1. Identification and typical defects

First of a series of three publications to assist engineers in local authorities and elsewhere in appraisal, maintenance and repair of large panel system dwellings. Should be read in conjunction with IP 9/86 and IP 10/86.

BRE, IP8/86, 1986, 4pp £9.00

Design stresses for timber; background to BS 5268:Part 2

The 1984 revision of the structural code for timber incorporates revised grade stresses and a new system for classifying the strength of timber. This paper outlines the reasons for these changes and explains the new method of deriving grade stresses.

BRE, IP18/85, 1985, 4pp £9.00

The incidence of accidental loadings in buildings, 1971-1981

Data on the occurrence in Great Britain of various extreme incidents, not specified in loading codes, were collected for the 10 years 1971-1981. The principal features of the data are outlined, focusing on the more recent years, overall trends and some topical points.

BRE, IP8/83, 1983, 4pp £9.00

The use of light-gauge cold-formed steelwork in construction

Developments in research and design

A review of research, design and application of light-gauge cold-formed steel sections and profiled sheeting in the construction industry.

BRE, BR142, 1989, 120pp £35.00
ISBN: 978-0-85125-382-4

BEST SELLER: Cracking in buildings

Most cracks happen because of small movements within and between the material and elements used in the construction of buildings, usually at points of weakness such as at openings in walls for windows and doors. Cracking in buildings explains the science of cracking in an uncomplicated way, giving those from the building professions who wish to make precise calculations the means and examples to do so.

BRE, BR292, 1995, 106pp £35.00
ISBN: 978-1-86081-039-8

A deterministic calibration of draft BS 5950 'The structural use of steelwork in buildings'

The method used in this calibration was based on a comparison of the capacities of structural elements derived according to BS 449 'Specification for the use of structural steel in building' with those according to draft BS 5950.

BRE, BR101, 1987, 30pp £22.50
ISBN: 978-0-85125-217-9

Static load testing: concrete floor and roof structures within buildings

This Digest gives guidance for engineers on how to conduct and interpret the results from load tests on concrete floor and roof structures within buildings. It is based on experience gained testing different types of concrete floor construction both in the laboratory and in the field. The Digest brings together and summarises the results of work which have already been published.

BRE, DG402, 1995, 8pp £15.00
ISBN: 978-0-85125-658-0

Bibliography on cold-formed, thin-walled steel structures, 1978-86

Research into the structural behaviour of thin-walled, cold-formed steel structures has expanded considerably in recent years, but information in some databases is not very extensive. This report contains 637 references, the results of a search of the on-line database Compendex, together with many references from other sources.

BRE, BR112, 1987, 70pp £35.00
ISBN: 978-0-85125-241-4

Worked examples for the design of steel structures

This report provides engineers with a set of examples that meet the requirements of British Standard DD ENV 1993-1-1: 1992, Eurocode 3: Design of steel structures Part 1.1 General rules and rules for buildings.

BRE, BR242, 1994, 168pp £47.50
ISBN: 978-0-85125-563-7

Structural vibration and damage

Reviews information on the vibration of structures due to transport services and industrial processes and its effect on the occupants; also information on damage to the buildings. The natural periods of buildings and structural elements, and the dampness of structures and their constituent materials, are considered.

BRE, BR69, 1985, 64pp £35.00
ISBN: 978-0-11670-528-0

Structural appraisal of existing buildings for change of use

Deals with structural appraisal of traditional buildings, constructed using rule-of-thumb and experience for the layout and sizing of structural members, and those whose structure has been designed, calculated and specified according to engineering principles.

BRE, DG366, 1991, 8pp £15.00
ISBN: 978-0-85125-508-8

Relocatable buildings: structural design, construction and maintenance

Presents some of the factors to be considered in the design of relocatable buildings and offers guidance on suitable details and procedures.

BRE, DG374, 1992, 8pp £15.00
ISBN: 978-0-85125-545-3

The response of structures to dynamic crowd loads

BS 6399-1, Loading for buildings, Code of practice for dead and imposed loads, includes guidance on dynamic loads generated by synchronized crowd movement. This Digest provides information that explains and supports the recommendations in the Standard, and provides a method for calculating structural response to rhythmic crowd loads. It also includes improved information on the loads generated by crowds.

BRE, DG426, 2004, 12pp £15.00
ISBN: 978-1-86081-715-1

Why do buildings crack?

Examines the causes of cracking in buildings. Describes with illustrations the results of a wide range of problems. Broadens understanding of the factors responsible, increases the likelihood of correct diagnosis and repair and provides a key to more specialised BRE publications.

BRE, DG361, 1991, 12pp £15.00
ISBN: 978-0-85125-496-8

Damage to structures from ground-borne vibration

Ground-borne vibrations from civil engineering, blasting or traffic often cause noticeable vibrations in buildings. Householders are occasionally worried that vibrations might damage their property and this can be a significant cause of distress. Guidance levels for damage from ground-borne vibration were introduced in BS 7385 and this Digest gives information on the UK position concerning damage to buildings.

BRE, DG403, 1995, 8pp
ISBN: 978-1-86081-002-2 £15.00

Structural design for hazardous loads: the role of physical testing

Proceedings of a conference in April 1991 organised by the Model Analysis as a Design Tool Study Group of the Institution of Structural Engineers.

Spon, EP10, 1992
ISBN: 978-0-41917-250-5 £75.00

Structural assessment: the use of full and large scale testing

Proceedings of a conference in April 1987 organised by the Model Analysis as a Design Tool Study Group of the Institution of Structural Engineers.

Butterworths, EP11, 1987
ISBN: 978-0-40800-356-8 £25.00

Structural design in architecture

This Digest is a statement of one approach to the problem of structural design within the context of architectural design as a whole.

BRE, DG12, 1960, 8pp
ISBN: 978-0-85125-093-9 £15.00

Approaches to the design of reinforced concrete flat slabs

Choice of design method for reinforced concrete flat slabs should be based on what is appropriate for the structure, the designer's experience, and what will benefit the client most. This report gives pointers to how existing design guidance and methods could be developed and made more user-friendly, particularly with the introduction of Eurocode 2. It also points out issues for the permanent works designer to consider as a result of the desire to strike slabs earlier and speed up construction.

BRE, BR422, 2001, 48pp
ISBN: 978-1-86081-498-3 £42.50

Steel structures supporting composite floor slabs: design for fire

Test results and observations from real fires in buildings have continually shown that steel framed structures comprising composite floor slabs and downstand steel beams perform far better than current fire design methods suggest. This Digest shows how the true structural behaviour of these types of buildings can be calculated in fire, allowing a reduction in the amount of passive fire protection currently used.

BRE, DG462, 2001, 12pp
ISBN: 978-1-86081-527-0 £15.00

U-values for light steel-frame construction

This Digest gives a method for assessing U-values of light steel-frame constructions, developed by BRE and SCI. The method has been validated using BS EN ISO 10211-1 and enables U-values to be calculated by a simplified method similar to that in BS EN ISO 6946. It can easily be incorporated into software tools used by designers, builders and enforcers of the Building Regulations. This Digest supports the 2002 editions of Approved Documents L1 and L2. It is addressed to designers and others concerned with energy efficiency in buildings.

BRE, DG465, 2002, 12pp
ISBN: 978-1-86081-550-8 £15.00

BEST SELLER: Multi-storey timber frame buildings

A design guide

R Grantham and V Enjily

This book will be of interest to all building professionals responsible for the design and construction of multi-storey timber frame buildings. Building control, local authorities and insurance companies will also benefit from the normative guidance provided for timber frame buildings. Since this publication documents the results and lessons learnt from research on the world's first six-storey timber building using the platform frame technique of construction, it will also be relevant for regulators and code writers.

BRE, BR454, 2002, 56pp
ISBN: 978-1-86081-605-5 £40.00

Reinforced concrete framed structures: comparative design study to EC2 and BS8110

This study compares parallel designs of a typical reinforced concrete framed structure designed to EC2 and BS 8110, to assess their differences in terms of economy of construction and design process. It includes outline designs and calculations, reinforcement drawings and schedules, for both designs. Supplied as PDF.

BRE, BR455, 2003, 130pp
ISBN: 978-1-86081-611-6 £69.00

Best practice in concrete frame construction

Practical application at St George Wharf

This report details the demonstration at St George Wharf of the practical benefits of adopting many of the innovative features and techniques used in the design and construction of the European Concrete Building Project's in-situ concrete frame building at Cardington.

BRE, BR462, 2003, 16pp
ISBN: 978-1-86081-663-5 £30.00

Fire safety of concrete structures

Background to BS 8110 fire design

T Lennon

Brings together information from testing and research over a number of years. Investigations have found that the experimental results used to develop the tabulated approach in BS 8110 fully supported the provisions of the code in relation to assumed periods of fire resistance. Furthermore in many cases these provisions were found to be conservative. Evidence from performance in real fires over a number of years demonstrates that the tabular approach to determining fire resistance of concrete elements has been effective.

BRE, BR468, 2004, 44pp
ISBN: 978-1-86081-693-2 £42.50

Backprop forces and deflections in flat slabs

Construction at St George Wharf

This work investigated the conclusions from the European Concrete Building Project at Cardington that slab deflections can be increased significantly by cracking induced by construction loading. Measurements showed that peak load occurs when the slab above is cast and that the upper floor in a supporting assembly carries more load from casting the slab above than usually assumed. This was investigated at St George Wharf by measuring backprop forces during construction.

BRE, BR463, 2004, 36pp
ISBN: 978-1-86081-664-2 £32.50

Best practice in concrete frame construction: case studies

The third in a series that has studied the application of the Cardington project on actual construction projects. Studies the application of initiatives trialled on two medium-sized commercial reinforced concrete structures. It covers reinforcement rationalisation for flat slabs, proprietary punching shear reinforcement, electronic rebar information, early age striking and reduced backpropping, early age strength assessment using LOK tests, deflection prediction and measurement, special concretes (high strength, self compacting, ultra high strength), the use of the National Structural Concrete Specification, and productivity measurements.

BRE, BR479, 2005, 16pp
ISBN: 978-1-86081-749-6 £27.50

NEW: Concrete structure management

Owners' guide to good practice

S Matthews and J Jacobs (BBRI)

This Digest provides guidance to owners of concrete structures on how they can maximise the benefits to be gained from their structures, whilst minimising through-life cost and sustainability impacts. It gives owners an insight into their responsibilities, what they should do and seek to achieve in the context of concrete structure management. It describes stages in the life of an asset, potential deterioration mechanisms to be avoided and actions to be taken.

BRE, DG510, 2009, 16pp
ISBN: 978-1-84806-089-0 **£22.00**

Connecting walls and floors

Building Regulations require floors and roofs to be tied or well strapped to the walls to maximise the stability and robustness of structures. While this occurs naturally in frame structures, it must be considered at the design stage for masonry structures. New structures can be built with this in mind, but many older buildings do not meet it. Part 1 of this Guide examines a number of retro-fit fixing systems that can bring structures up to modern safety standards, alleviate bulging in walls and other related stability problems. This second part considers design and performance issues of wall and floor ties.

BRE, GG29, 2 parts, 1997, 12pp
ISBN: 978-1-86081-828-8 **£20.00**

DESIGN AND MANAGEMENT**BUILDING DESIGN****An introduction to building with Structural Insulated Panels (SIPs)**

Structural Insulated Panels (SIPs) are a modern method of construction and are becoming increasingly popular as they are light, strong and versatile, thermally efficient and have low air leakage, able to be erected by a fast and predictable construction process. In most applications, SIPs are used as primary loadbearing components. This Information Paper gives information and advice on the design, construction and performance of the generic form of SIPs used primarily for domestic and light industrial construction. It also addresses conformity assessment, purchasing, insurance and other issues.

BRE, IP13/04, 2004, 8pp
ISBN: 978-1-86081-731-1 **£9.00**

Helping visually impaired people in their homes: assistive technology

The average age of the UK population is increasing and there is a natural desire among older people to remain in their own homes for as long as is practical. It is important to allow people whose sight deteriorates to carry on living in a familiar environment if it is safe for them to do so, and if that is what they want. There are many aspects of daily independent living that blind and partially sighted people find more difficult to cope with, particularly if appliances and tools that they are using have not been well designed. By giving them the tools to carry on living at home they can have more independence and control over their lives.

BRE, IP8/03, 2003, 8pp
ISBN: 978-1-86081-633-8 **£9.00**

Cockroach infestation of dwellings in the UK

Cockroaches carry bacteria and cause allergies, and are therefore a distinct health hazard. They cannot easily be excluded from dwellings, but attention to design and detailing can minimise the risk of spread and permit more effective treatment. This IP gives guidance on remedial measures.

BRE, IP1/95, 1995, 4pp
£9.00

Falls from domestic balconies

This paper and its companion IP 17/93 summarise statistical studies of the occurrences of falls from windows and balconies using data from the Home Accident Surveillance System and coroners' inquest notes. They describe the principal findings and likely implications for designers and occupiers of dwellings.

BRE, IP18/93, 1993, 4pp
£9.00

Building management systems: user experiences

A review of building management systems (BMS) users' experience covering, particularly, the benefits of BMS, the improvements in systems' performance between 1984 and 1987, problem areas, and the choice of BMS to match the operating environment and users' skills.

BRE, IP10/89, 1989, 4pp
£9.00

Meeting designers' needs for trade information

Intended for manufacturers of building materials and products, and trade associations. Describes how designers work and how they use information.

BRE, IP14/85, 1985, 4pp
£9.00

Using experience and publications in building design

Based on a study of live architectural practices, this paper describes how designers work, how they use experience and publications, and how they learn through practice. A checklist for individual designers recommends how to make better use of experience and publications.

BRE, IP13/85, 1985, 4pp
£9.00

Design decision-making in architectural practice

Describes how a study of designers in architectural offices showed that, despite the various information sources available to them, they relied most frequently on their own experience when making design decisions.

BRE, IP11/82, 1982, 4pp
£9.00

Factors affecting service life predictions of buildings

A discussion paper

This report covers: alternative approaches to predicting service lives for components; features of a factorial approach to service life prediction; analysis of critical factors affecting service life; experience of factoring systems and recommendations on number of factors; worked examples for pressed steel lintels, softwood windows, and fibre-based cement slates; summary of findings, and conclusions.

BRE, BR320, 1996, 46pp
ISBN: 978-1-86081-122-7 **£25.00**

New environments for working

Considers how office buildings and their environmental systems will perform when their pattern of use changes from the typical 9-5. The study defines modern working patterns, devising four metaphors (hive, den, cell and club) to describe organisational patterns of work and their spatial consequences. This book describes how these concepts can be applied, and their consequences for office design and operation from the perspective of users, and those responsible for procuring office space. Also considers trends in how these working patterns are applied and the impact on product development.

BRE, BR341, 1998, 172pp
ISBN: 978-0-41920-990-4 £47.50

Building without cold spots

All new buildings have to meet minimum standards of energy efficiency. Achieving them makes extra demands on site practice and workmanship as well as on designers. Crucial to success is correct design and installation of thermal insulation. If there are gaps or weaknesses in the insulation, there will be cold spots in the building envelope, and these can lead to trouble. This Guide gives advice from BRE on how to build without gaps in insulation and how to avoid the problems caused by thermal bridges.

BRE, GG35, 1999, 6pp
ISBN: 978-1-86081-332-0 £9.00

Control of lichens, moulds and similar growths

Explains how to treat affected interior (mould) and exterior (algae, lichens and mosses) surfaces.

BRE, DG370, 1992, 4pp
ISBN: 978-0-85125-526-2 £9.00

Reducing the risk of pest infestations in buildings

Describes the pests that can be found in and around buildings and the problems they cause. It explains the principles for reducing pest infestation by exclusion and reduction of harbourage and food supply.

BRE, DG415, 1996, 12pp
ISBN: 978-1-86081-086-2 £15.00

Bird, bee and plant damage to buildings

This Digest provides guidance on the prevention of damage to external surfaces by birds, masonry bees, climbing plants and creepers, and biological growths. It describes how these animals and plants can cause deterioration in surfaces and mortar joints, and suggests both preventative measures, and methods of treating affected surfaces.

BRE, DG418, 1996, 8pp
ISBN: 978-1-86081-099-2 £15.00

Managing and exploiting your knowledge assets

This report reviews knowledge-based and decision support techniques in the construction industry with a view to highlighting how decision makers in construction organisations can exploit knowledge as an asset. It provides information on example applications that demonstrate their use in industrial sectors closely related to construction. Research and development projects that demonstrate the applicability of these techniques to the construction industry itself are also presented.

BRE, BR382, 2000, 40pp
ISBN: 978-1-86081-346-7 £35.00

Building with Europe

This booklet provides guidance for firms submitting applications for EC funding. It describes the size, scope and objectives of the Fourth Framework Programme (FP4), explains how the construction industry can benefit from participation in the programme, shows how to maximise chances of success in seeking funding from the programme, and lists additional sources of useful information.

EP30, 1995, 20pp
ISBN: 978-1-86081-049-7 £25.00

A risk assessment procedure for health and safety in buildings

This report describes the development of a procedure for the comparative evaluation of the health and safety risks associated with various aspects of buildings.

BRE, BR402, 2000, 96pp
ISBN: 978-1-86081-420-4 £40.00

Measuring up

A practical guide to benchmarking in construction

Benchmarking has become the key business tool to effect change. It encompasses three key elements: a study of key internal processes, comparison with others and continuous improvement. This guide concentrates on the benchmarking methodology, and is indispensable for construction industry clients, contractors, suppliers and consultants.

BRE, BR336, 1997, 66pp
ISBN: 978-1-86081-181-4 £52.50

Architectural competitions: a handbook for promoters

Architectural competitions have had a bad press almost since they were first conceived. This book aims to clarify the process. It describes what competitions involve, why they should be undertaken, what type of competition to devise and for what specific purpose. The publication will be of interest both to architects and promoters.

EM36, 1996
ISBN: 978-1-86081-107-4 £25.00

Timber frame dwellings. Conservation of fuel and power: AD L1A guidelines

S M Doran

This Digest explains how the requirements of the building regulations for conservation of fuel and power may be satisfied for a new dwelling built with timber frame construction. It provides guidance on the relevant regulations, showing various approaches to compliance, together with four worked examples involving timber frame build solutions. Seventeen examples of timber frame wall, roof and floor constructions show how suitable U-values may be achieved for a variety of timber frame constructions. It is written for the timber frame industry, and for designers, architects and builders who may be considering using timber frame, and for enforcers of the regulations who are assessing applications. This revised edition will enable designers to align their designs with the new Regulations simply and effectively.

BRE, SD2, 2006, 24pp
ISBN: 978-1-86081-923-0 £30.00

Building performance feedback: getting started

This Digest encourages the adoption of post occupancy evaluation (POE) as part of a process of continuous improvement in building performance. It introduces a strategic method of POE tailored to the early stages of a building's occupancy (ie the first 12 months) and discusses the use of the method and explains the principles of POE. The method uses a checklist during a discussion between the client and project team in a workshop session. The early stage POE method itself is presented in tabular form; a spreadsheet version can be downloaded from www.projects.bre.co.uk/earlypoe.

BRE, DG478, 2003, 12pp
ISBN: 978-1-86081-627-7 £15.00

Schools Design Forum Workshop

Report and Summary

BRE, AP244, Collated set, 2006, 44pp
ISBN: 978-1-86081-949-0 £30.00**Schools Design Forum Workshop
13 September 2006**

A summary of the outputs from the workshop

The Schools Design Forum (SDF) is a new initiative by the BRE Trust and the Sustainable Development Commission to progress the aims of the government's Building Schools for the Future programme. The Forum brings together leading practitioners who are committed to bringing about a change in the way sustainability is understood, delivered and shared in schools.

This report highlights the output from an SDF workshop held on 13 September 2006 at BRE, carefully structured to tackle the questions:

- Where are we now?
- Where would we like to be
- How do we get there?

Key findings from discussions involving 60 experts provide thought-provoking insights into how the built environment can play its part in making the learning environment more sustainable.

The full verbatim responses are available in a companion publication BR491

BRE, BR492, 2006, 16pp
ISBN: 978-1-86081-943-8 £15.00**Schools Design Forum Workshop
13 September 2006**

A report outlining the outputs from the workshop

The Schools Design Forum (SDF) is a new initiative by the BRE Trust and the Sustainable Development Commission to progress the aims of the government's Building Schools for the Future programme. This report captures the output from an SDF workshop held on 13 September 2006 at BRE.

BRE, BR491, 2006, 28pp
ISBN: 978-1-86081-942-1 £25.00**Building design pack**

BRE

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ISBN: 978-1-86081-990-2 £95.00**Earthships**

Building a zero carbon future for homes

M Hewitt and K Telfer

What exactly is an earthship? This book tells you everything you need to know to answer that question, and more. Architecture is undergoing rapid change as the issues of climate change and cutting carbon emissions in buildings become more and more widely understood.

EP78, 2007, 146pp
ISBN: 978-1-86081-972-8 £25.00**Timber-frame dwellings**

Section 6 of the Domestic Technical Handbook (Scotland): Energy

S Doran

This Digest explains how the requirements of The Building (Scotland) Regulations covering energy can be satisfied using timber-frame construction. It describes those requirements, showing various approaches to compliance, with five worked examples of different dwelling types and 17 wall, roof and floor constructions.

BRE, SD6, 2008, 28pp
ISBN: 978-1-84806-030-2 £30.00**Access to buildings**

S Garvin

An accessible environment is one that a disabled person can enter and make use of independently or with help from a partner or assistant. This Digest sets out basic requirements for accessible buildings which in making buildings more functional will be to the benefit of all users.

BRE, DG505, 2008, 12pp
ISBN: 978-1-84806-031-9 £15.00**Building and urban space
accessibility**

POLIS: Decision support tools and policy initiatives in support of universal design of buildings

This report introduces the POLIS methodology and Decision Support System for Universal Building Design. It sets it within the context of access audit and action planning. POLIS is an assessment tool that has been developed through research, and the report is intended to highlight its potential.

EP83, 2008, 76pp
ISBN: 978-1-84806-026-5 £35.00**BEST SELLER: Designing quality
buildings: a BRE guide**

This BRE guide to the design of domestic and low-rise buildings gives building professionals the starting points for selection and specification of structural elements, materials and finishes. Fully in line with UK regulations and standards, the guide is based on sustainable design requirements.

BRE, BR487, 2007, 358pp
ISBN: 978-1-86081-899-8 £67.50**Insulation of timber-frame
construction**

U-values and regulations for the UK, Republic of Ireland and Isle of Man

S Doran

This Special Digest describes timber-frame wall construction solutions that are capable of achieving very high insulation levels using existing technologies; in some cases, wall U-values as low as 0.13 W/m²K are achieved. Timber-frame insulation solutions lend themselves to going significantly beyond the thermal performance requirements of current building regulations, with the potential to address the future aim of zero-carbon housing. This Digest is written for all those involved in specifying or assessing designs, including timber-frame manufacturers, designers, architects and housebuilders.

BRE, SD7, 2008, 20pp
ISBN: 9781848060609 £22.50**NEW: Bats and refurbishment**

J Collins

This guide focuses on bats because they are so commonly encountered in existing buildings. The drive for sustainability and building refurbishment has increased the likelihood that bats could be disturbed, injured or killed, or that bat roosts could be destroyed. The construction industry must therefore be proactive in minimising impacts on these animals and providing enhancements where possible.

Identifies the key steps to be followed if the presence of bats is detected or suspected in a building
Illustrates the simple practical steps that can be taken to accommodate bats

BRE, GR36, 2009, 6pp
ISBN: 978-1-84806-093-7 £10.00

CODES, STANDARDS AND REGULATIONS

Structural Eurocodes: their adoption in the UK

This Paper identifies issues that should be considered by national authorities, professional institutions and universities, to ensure smooth transition and implementation of the structural Eurocodes. These issues are: the objectives and status of Eurocodes, the Eurocode programme, differences from national codes, use, implementation, costs and benefits of harmonisation and opportunities to the professions.

BRE, IP3/99, 1999, 6pp
ISBN: 978-1-86081-320-7 **£9.00**

Eurocode 1

Part 1 - The structural loading basis of design, dead, imposed, fire, snow and wind loads.

Part 2 - The code for structural loading

This two-part Information Paper describes the evolution of Eurocode 1, summarises its contents, and gives some background information of its derivation. It describes the assumptions and requirements of Eurocode on basis of design, to explain the context in which Eurocode 1 is intended to be used. It gives references, where possible, to enable practising engineers to obtain further insight into the basis and use of the Code's requirements. This first part covers basis of design, dead, imposed, fire, snow and wind loads. Part 2 covers thermal actions, actions during execution, accidental actions, traffic loads on bridges, actions in silos and tanks, and actions due to cranes and machinery.

BRE, IP13/98, 2 parts, 1998, 4pp
ISBN: 978-1-86081-240-8 **£9.00**

The conformance of some common building products with British Standards

Wall ties, precast concrete blocks, timber scaffold blocks, admixtures for concrete and water-thinned primers for wood were examined for conformance with British Standards. Very few of the products conformed completely with all requirements of the standards.

BRE, IP13/83, 1983, 4pp
£9.00

Local plans: increasing their usefulness for development control

Reports a study of the extent to which the first local plans are fulfilling their function of providing a detailed basis for development control, and discusses ways in which local authority planners can increase the effectiveness of local plans in supplying guidance for development control decisions.

BRE, IP1/82, 1982, 4pp
£9.00

Hygiene, health and the environment

Construction Products Directive of the European Communities. Draft Interpretive Document

One of a series of reports following seminars involving the presentation and discussion of five of the six drafts of the Interpretative Documents. These IDs will provide the links between the Essential Requirements of the Directive and the mandates for producing European Standards, Technical Approvals and other technical specifications.

BRE, BR180, 1990, 66pp
ISBN: 978-0-85125-452-4 **£22.50**

Mechanical resistance and stability

Construction Products Directive of the European Communities. Draft Interpretive Document

One of a series of reports following seminars involving the presentation and discussion of five of the six drafts of the Interpretative Documents. These IDs will provide the links between the Essential Requirements of the Directive and the mandates for producing European Standards, Technical Approvals and other technical specifications.

BRE, BR181, 1990, 42pp
ISBN: 978-0-85125-453-1 **£22.50**

Building Regulations and health

This report concerns the influence on health of building fabric and services controlled or controllable by Building Regulations. Discussions with conclusions are given for the following health issues: ambient temperature (hypothermia), noise, dampness, sanitation, food storage, lighting, space requirements, domestic waste and indoor air quality.

BRE, BR97, 1987, 78pp
ISBN: 978-0-85125-236-0 **£22.50**

Building Regulation Health and Safety

Provides a basis for targeting development of the Building Regulations, the Housing Fitness Standard (HFS), and its successor, the Housing Health and Safety Rating System (HHSRS). The emphasis is on regulation in general, rather than specific legislation or guidance. The report has two key elements: summarising the evidence for the impact of buildings on human health and safety, including fire safety; and assessing the relative importance of the various hazards in buildings, by applying the same risk assessment method to all.

BRE, BR417, 2001, 150pp
ISBN: 978-1-86081-475-4 **£47.50**

HOUSING DESIGN AND REHABILITATION

New build and refurbishment in the Sustainable Communities Plan

This Information Paper outlines the conclusions of research by the College of Estate Management, sponsored by BRE Trust, into the relative advantages of the two approaches to housing renewal – demolition and renewal, or refurbishment – “knock it down or do it up”. A full report of the research is available as BRE Trust report FB16.

BRE, IP2/08, 2008, 8pp
ISBN: 978-1-84806-032-6 **£9.00**

Prefabricated relocatable extensions

Evaluating their use for people with disabilities

This Information Paper summarises the results of a study undertaken by BRE on behalf of the Northern Ireland Housing Executive to review the development of adapted public sector housing and modular extensions for disabled and elderly tenants in Salford. The study examined Salford City Council's experience of using prefabricated relocatable modular adaptations and concluded that their use has a number of advantages compared with conventional construction in terms of cost, speed of construction and less disruption to occupants.

BRE, IP7/07, 2007, 8pp
ISBN: 978-1-86081-976-6 **£9.00**

Refurbishing Victorian housing

Guidance and assessment method for sustainable refurbishment

This paper is based on a recent BRE Trust Report Sustainable refurbishment of Victorian housing (FB14), which deals with the topic in much greater detail and includes several case studies.

This paper outlines a method of assessing the refurbishment of traditionally built houses dating from the period 1840–1919 similar to that used in BREEAM (BRE Environmental Assessment Method) EcoHomes. It looks at competing requirements for modern energy and acoustic standards, whole building performance and the effects of durability, reliability and maintainability of the building fabric. It will be of interest to construction professionals responsible for refurbishment of Victorian housing.

It summarises the economic, environmental and social costs and benefits of retaining this part of the building stock and sets out a methodology that can be used in the assessment process.

BRE, IP9/06, 2006, 6pp
ISBN: 978-1-86081-941-4 **£9.00**

Prefabricated housing in the UK

This Paper results from an industry-led project sponsored by DETR on innovation and best practice in flexible and modular residential construction. It is in three parts: Parts 1 and 2 describe case studies (Murray Grove, Hackney, and CASPAR II, Leeds) and Part 3 summarises the project. The objective was to study modular construction in the context of flexible, adaptable and sustainable solutions to the changing demands of social housing and unpredictable future demographic demands.

BRE, IP16/01, 3 parts, 2001, 18pp
ISBN: 978-1-86081-877-6 **£15.00**

Quality in new-build housing

Reports on research into the quality of new traditional housing, including special studies of particularly energy-efficient schemes.

BRE, IP3/93, 1993, 4pp
£9.00

Improving space in homes

Summarises results from a recent BRE survey of how satisfied people are with the amount of space in their homes. A model of space satisfaction has been developed. Methods of providing more space in homes are suggested.

BRE, IP9/92, 1992, 4pp
£9.00

Energy-efficient rehabilitation of pre-1919 housing

Summarises the principal opportunities for improving energy efficiency in older inner-city housing and describes the benefits of such improvements.

BRE, IP13/91, 1991, 4pp
£9.00

Defects in local authority housing: results of building problems survey

The results of a survey of all local authorities in England and Wales in January 1989 which identified current building problems experienced in their housing stocks, both rehabilitated and non-rehabilitated. Comparison is made with a similar survey conducted in 1983.

BRE, IP15/90, 1990, 4pp
£9.00

House inspection for dampness: a first step to remedial treatment for wood rot

Gives advice on house inspection to identify building faults or lack of maintenance and on location of timbers which may be at risk from wood rot. Although focussing on problems associated with older, traditionally built houses, the broad approach to inspection applies to most types of construction.

BRE, IP19/88, 1988, 4pp
£9.00

Maintaining and improving steel houses

Highlights some of the key points in specifying and carrying out maintenance repair and improvement works. Brief advice on good practice is given.

BRE, IP15/87, 1987, 4pp
£9.00

Inspecting steel-framed houses

Summarises BRE Report BR 113 'Steel-framed and steel-clad houses: Inspection and assessment'.

BRE, IP14/87, 1987, 4pp
£9.00

Interpreting feedback information - some examples from housing maintenance

Possible ways in which computerised maintenance histories could be used as an aid to improve both building design from the maintenance standpoint and operational procedures are illustrated by examples.

BRE, IP6/83, 1983, 4pp
£9.00

Traditional housing: a BRE study of quality

Summarises the lengthy BRE study on traditional housing, explaining the reasons for the study, its aims and its end-products.

BRE, IP18/82, 1982, 4pp
£9.00

Conversions of older property to house single young people

Describes some of the experience gained from a development project in which older properties were acquired and converted to house single young people.

BRE, IP13/81, 1981, 4pp
£9.00

Obsolete housing: a study of long-term vacant-dwellings in the private sector

Gives the results of investigations of unoccupied dwellings in three local authority areas, from which predictions have been made of the likely character of the stock at risk of becoming obsolete.

BRE, IP17/80, 1980, 4pp
£9.00

Lifts in local authority high-rise flats: proposals towards reducing tenant grievance

Lifts serving the half million local authority high-rise flats in this country are the subject of much adverse publicity, and also complaint by tenants, especially the elderly or disabled who are totally lift-dependent. This paper reports on BRE research into lift traffic and tenant opinion.

BRE, IP26/80, 1980, 4pp
£9.00

Third world urban housing

A guide for everyone concerned with housing problems in developing countries, from devising a housing strategy to planning and implementing projects on the ground.

BRE, BR19, 1978
ISBN: 978-1-86081-843-1 **£27.50**

BRE housing design handbook: energy and internal layout

This handbook encapsulates much of BRE's expertise relating to the design of housing, and is addressed to all owners, designers and maintainers of housing stock. It provides a reference manual of basic information on housing, whether new or refurbished.

BRE, BR253, 1993, 300pp
ISBN: 978-1-86081-163-0 **£42.50**

Common defects in low-rise traditional housing

Many defects in public sector housing have resulted from non-compliance with authoritative advice. This Digest reviews the sources of advice relevant to the most frequently occurring defects.

BRE, DG268, 1988, 8pp
ISBN: 978-0-85125-337-4 **£15.00**

Rehabilitation – a review of quality in traditional housing

A study of the quality of rehabilitated housing on 82 sites in England and Wales. The research covered a wide range of construction types and ages of dwellings which were mainly owned by local authorities and housing associations.

BRE, BR166, 1990, 28pp
ISBN: 978-0-85125-431-9 **£22.50**

Outline guide to assessment of traditional housing for rehabilitation

Rehabilitation work presents particular problems and a need for specialist skills. Problems are often underestimated and final costs often exceed original estimates; building deficiencies may not be identified or corrected during the work. This guide gives advice on property assessment prior to rehabilitation.

BRE, GG6, 1990, 4pp
ISBN: 978-1-86081-851-6 **£9.00**

Habitability guidelines for existing housing

Lists the key considerations related to the habitability of housing and in each case suggests desirable characteristics or performance for the rehabilitated building. The guide will be of use during planning or inspection of rehabilitation work, either as a site checklist or as a desk-top prompt.

BRE, GG9, 1991, 6pp
ISBN: 978-1-86081-854-7 **£9.00**

The use of modular building techniques for social housing in the UK

A market research report

Despite the success of prefabrication in commercial and industrial sectors, this technique has had only limited use in UK housing developments. This report aims to identify the reasons for this by investigating trends, attitudes and perceptions amongst construction professionals. It also aims to clarify whether or not increased flexibility could be achieved through the use of modular construction techniques.

BRE, BR393, 2000, 32pp
ISBN: 978-1-86081-384-9 **£35.00**

Defect action sheets

Complete set of all BRE Defect Action Sheets 1 to 144 (except for a few that were superseded by later issues). Defect Action Sheets were published between 1982 and 1990 to provide concise practical advice on housing and the defects commonly encountered at design stage and on site. Facsimile copies have been republished as a complete set but advice in them may no longer represent current best practice.

BRE, BR419, Bound set, 2001, 290pp
ISBN: 978-1-86081-479-2 **£40.00**

An audit of UK social housing innovation

This report presents the results of a review of 12 UK social housing projects that incorporated an element of innovation, and provide feedback on lessons learnt to inform housing associations contemplating such projects. The information gathered has been compiled into a series of case studies.

FBE, FB7, 2004, 54pp
ISBN: 978-1-86081-676-5 **£45.00**

BEST SELLER: Modern methods of house construction

a surveyor's guide

K Ross

The term 'modern methods of construction' covers a broad range of construction types, from complete housing systems built in factories through to new site-based technologies. This guide gives surveyors an insight into how to differentiate between houses built using modern methods of construction and those built using more 'traditional' site-based methods. It provides: - An overview of the principal forms of housing constructed by modern methods to demonstrate the fundamental differences between these methods of construction and those expected to be used on a block and brick cavity based building, - Specific examples of the visual clues that can help the surveyor to recognise what form of construction has been used - A checklist to use on site.

BRE Trust, FB11, 2005, 68pp
ISBN: 978-1-86081-755-7 **£22.50**

BEST SELLER: Wheelchair housing design guide

S Thorpe. Habinteg Housing Association

The Wheelchair housing design guide explains how to design and detail a home that is fully manageable by wheelchair users and that maximises their independence. It is activity-based and discusses design considerations, requirements and recommendations for each of fifteen activities carried out within and around the home, rather than presenting plans or preferred solutions. Checklists are provided.

This second edition takes account of the experience of individual wheelchair users and of practitioners who have used the original guide, and reflects the new level of statutory advancements and societal perceptions of wheelchair standard design in the built environment. It provides design details and good practice examples which take account of current guidance and regulations; reflects and promotes the values and principles of existing strategies for social inclusion; and promotes the long-term cost benefits and other benefits of designing to wheelchair accessibility standards.

Habinteg, EP70, 2006, 132pp
ISBN: 978-1-86081-897-4 **£40.00**

BEST SELLER: BRE Good Building Guides and Good Repair Guides on CD-ROM

Good Building Guides 1 to 67 and Good Repair Guides 1 to 34 of these highly illustrated series is presented in PDF format on this single CD.

Drawing on BRE site experience and research, each series provides clear technical advice, practical solutions and covers a range of subjects including; dampness and condensation, plumbing, windows and doors, tiling, energy efficiency, sound insulation, ventilation, frost damage, painting, plaster, floors, roofs, chimneys, wood rot and insect attack, flood damage, rain penetration, foundation movement, tree damage and more.

BRE, AP242, CD ROM, 2006, 1100pp
ISBN: 978-1-86081-925-4 **£115.00**

BEST SELLER: Sustainable refurbishment of Victorian housing

guidance, assessment method and case studies

T Yates

This report presents a method of assessing the refurbishment of traditionally built houses dating from the period 1840-1919 similar to that used in BREEAM EcoHomes. It looks specifically at competing requirements for modern energy and acoustic standards, whole building performance and the effects of durability, reliability and maintainability of the building fabric. It also examines the economic, environmental and social costs and benefits of retaining this part of the building stock and develops a methodology that can be used in the assessment process. It includes case studies that illustrate the practical application of this approach to individual houses and to larger areas of housing.

BRE Trust, FB14, 2006, 40pp
ISBN: 978-1-86081-936-0 **£30.00**

Housing for people with sight loss

A Thomas Pocklington Trust design guide

This guide provides good practice guidance for architects, designers and housing practitioners in the development of inclusive domestic environments that meet the requirements of people with sight loss. The emphasis is on maximising functional vision and minimising barriers and risk by achieving specific design and specification requirements. It is based on research commissioned by Thomas Pocklington Trust into the needs, experiences, and choices for people with sight loss within their home environment.

EP84, 2008, 120pp
ISBN: 978-1-84806-029-6 **£40.00**

Knock it down or do it up?

Sustainable housebuilding: New build and refurbishment in the Sustainable Communities Plan

F Plimmer, G Pottinger, S Harris, M Waters and Y Pockock

Demolishing existing housing stock in favour of building new homes results in loss of heritage and wastes carbon emissions embedded in otherwise sound structures, as well as breaking up existing communities. These criticisms have been levelled at the housing market renewal Pathfinder areas established within the UK government's Sustainable Communities Plan. Deciding how best to regenerate run-down urban areas and create sustainable communities therefore demands comparisons between the relative advantages of the two approaches to housing renewal: "knock it down or do it up". This report by the College of Estate Management, sponsored by BRE Trust, investigated the responses to this question by private and social housing developers and their professional advisers. Although the research points to the benefits of refurbishment in terms of achieving sustainability objectives, it also shows that the uptake of sustainable construction practices is still being held back by higher costs compared to traditional housing, risk aversion, less favourable financial incentives and lack of consumer demand.

BRE Trust, FB16, 2008, 72pp
ISBN: 9781848060203 **£50.00**

NEW: Building the New Jerusalem

Architecture, housing and politics 1900–1930

M Swenarton

This is the first book to explore this new architecture of housing as an international phenomenon.

Unwin's garden suburb model was adopted by the British government for its experiments in social housing during and after the First World War. It was also highly influential on the mainland of Europe, where it formed the reference point for modernist architects. Theories of modern production meshed with transcendentalist ideas about new ways of living to bring about a revolution in the theory and practice of housing world wide.

The accompanying CD includes key documents from the period.

Author, EP82, 2008, 248pp
ISBN: 978-1-84806-024-1 **£47.50**

Assessing traditional housing for rehabilitation

Rehabilitation differs from new build work in a number of ways. This report offers guidance in a structured form for building professionals assessing property for rehabilitation.

BRE, BR167, 1990, 232pp
ISBN: 978-0-85125-432-6 **£47.50**

NON-TRADITIONAL HOUSING**NEW: Lessons learned from the Barratt Green House**

Delivering a zero carbon home using innovative concrete systems

This Information Paper is intended for housing professionals interested in the challenge of delivering housing to zero carbon standards. The Barratt Green House, winner of the 2007 Home for the Future competition, and built on the BRE Innovation Park, uses innovative concrete products to achieve this aspiration with the design and construction involving the application of concrete products in the building fabric. This publication discusses how zero CO₂ emissions were achieved through the adoption of low carbon and renewable energy technologies. Finally, the Paper also brings together key conclusions and the wider lessons learned.

BRE, IP3/09, 2009, 12pp
ISBN: 978-1-84806-090-6 **£13.00**

Applying the Code for Sustainable Homes on the BRE Innovation Park

Lessons learnt

This four-part Information Paper looks at the lessons learnt from the BRE Innovation Park concerning compliance with the Code for Sustainable Homes. The four parts deal with: building fabric; energy sources, overheating and ventilation; water use, harvesting, recycling and drainage; architecture, construction and material sourcing.

BRE, IP9/08, 4 parts, 2008, 36pp
ISBN: 978-1-84806-056-2 **£25.00**

Modern methods of construction (MMC) in housing

These four Information Papers provide an authoritative guide to the key aspects of MMC for housing. The first part focuses on the drivers (such as savings in time and materials) and barriers (such as concern about higher costs) to the use of MMC. Part 2 shows how registered social landlords need to plan for the use of MMC in order to take advantage of the potential savings in time and materials, and the potential for higher quality that they offer. It highlights essential points to be considered at all stages from brief, concept design, planning and through to construction. The role of design in the process of producing high quality, low cost MMC homes is featured in the third part, which discusses the generic constraints of MMC on design, together with the constraints imposed by specific MMC systems and by the site. Part 4 discusses the successful development and manufacturing of MMC products

BRE, IP3/07, 4 parts, 2007, 26pp
ISBN: 978-1-86081-965-0 **£25.00**

BEST SELLER: Non-traditional housing

Collection of BRE publications

82 previously published BRE reports and leaflets are brought together as pdf image files on this CD. The housing types included are: reinforced concrete [cast-in-situ concrete, prefabricated reinforced concrete (PRC) and large panel system (LPS)], steel-framed and steel-clad, and timber-framed. The publications cover constructional details of systems for the guidance of owners, lenders, surveyors and engineers evaluating systems; assessments of the structural condition of existing dwellings; and guidance on surveying, maintenance, rehabilitation and repair.

BRE, AP149, CD ROM, 2002
ISBN: 978-1-86081-582-9 **£195.50**

BEST SELLER: Non-traditional houses

Identifying non-traditional houses in the UK 1918-75

H W Harrison, S Mullin, B Reeves and A Stevens

A wealth of information and advice from the leading experts is brought together in this comprehensive and highly illustrated reference on non-traditional houses. Presented with exceptional clarity, the book provides the building surveyor, engineer and architect with a unique practical resource. It details 450 house types classified by form of construction: metal framed, precast concrete, in-situ concrete and timber framed. Extensive background information and an invaluable search tool are included.

BRE, BR469, Hardback, 2004, 992pp
ISBN: 978-1-86081-697-0 **£275.00**

SmartLIFE – lessons learned

P Cartwright, E Moulinier, T Saran, O Novakovic and K Fletcher

The SmartLIFE project commissioned, designed and built 106 new homes on three sites in Cambridgeshire using innovative construction systems (panelised steel frame, panelised timber frame and insulating concrete formwork) alongside traditional brick and block construction. This report outlines the project and the extensive programme of measurement and monitoring undertaken by BRE on site over a two-year period. It presents key findings from the project and draws essential lessons about modern methods of construction in relation to costs, speed of build, affordability and quality, and sustainability. The report also includes a CD Rom with a detailed technical report on the project.

BRE, BR500, 2008, 28pp
ISBN: 978-1-84806-070-8 **£25.00**

In situ concrete housing

Early in-situ concrete housing systems

Constructional details

Seven reports, each describing the constructional details of a cast-in-situ concrete housing system: Forrester-Marsh houses; Cast rendered No-fines houses; Incast houses; Universal houses; Fidler houses; No-fines houses; BRS Type 4 houses.

BRE, AP48, 1989
ISBN: 978-1-86081-763-2 **£25.00**

Precast concrete housing

The structural condition of prefabricated reinforced concrete houses designed before 1960

BRE has undertaken structural evaluations of the present condition of several common types of prefabricated reinforced concrete (PRC) house designed before 1960. This paper summarises the findings on the types inspected and suggests some implications for these types of house.

BRE, IP10/84, 1984, 4pp
£9.00

The structural condition of Ayrshire County Council (Lindsay) and Whitson-Fairhurst houses

This report describes, in Part 1, the defects and deterioration which have been found and the inspections and examinations which may be necessary to determine the structural condition and likely future performance of an individual dwelling. Some possibilities for repair or remedial work are outlined. Part 1 is based on the investigations described in Part 2 which were concerned primarily with the condition of reinforced concrete components. When owners or their representatives are making a full inspection and assessment of Ayrshire County Council (Lindsay) and Whitson-Fairhurst houses it will be necessary to look wider than the scope and conclusions of this report.

BRE, BR50, 1984, 32pp
ISBN: 978-0-85125-074-8 **£30.00**

Timber framed housing

Timber frame housing systems 1920 to 1975

Inspection and assessment

S A Covington, I S McIntyre and A J Stevens

This report gives guidance on the inspection and assessment of timber frame dwellings built between 1920 and 1975. It describes the construction characteristics of dwellings built in this period and provides a step-by-step guide to carrying out a site inspection. This report should be read in conjunction with two companion reports (BR283 and BR284) which give detailed coverage of individual systems and possible variants.

BRE, BR282, 1995, 68pp
ISBN: 978-1-86081-008-4 **£30.00**

Timber frame housing systems built in the UK between 1920 and 1965

S A Covington, I S McIntyre and A J Stevens

This report records the form of construction of timber frame dwellings built between 1920 and 1965. It identifies locations in the UK where deterioration has occurred, and highlights the areas in dwellings to which surveyors should pay particular attention when carrying out an inspection. The report is based on the results of BRE investigations of over 50 dwellings, covering 14 different systems.

BRE, BR283, 1995, 68pp
ISBN: 978-1-86081-009-1 **£22.50**

Timber frame housing systems built in the UK between 1966 and 1975

I S McIntyre and A J Stevens

This report records the form of construction of timber frame dwellings built between 1966 and 1975. It identifies locations in the UK where deterioration has occurred, and highlights the areas in dwellings to which surveyors should pay particular attention when carrying out an inspection. The report is based on the results of BRE investigations of over 70 dwellings, covering 34 different systems.

BRE, BR284, 1995, 48pp
ISBN: 978-1-86081-010-7 **£27.50**

Timber framed housing

A technical appraisal

I L Freeman, R N Butlin and J H Hunt

Reports BRE studies on the performance of timber framed houses. No risks of major defects were found but recommendations were made on wall ties, sheathing materials, breather papers, cavity barriers (against fire), vapour barriers, training for site staff and research requirements.

BRE, BR41, 1983, 56pp
ISBN: 978-1-86081-845-5 **£22.50**

Moisture conditions in walls of timber-framed houses

The effects of holes in vapour barriers

S A Covington and I S McIntyre

Presents the findings of an investigation into the effects of holes behind intact plaster board lining.

BRE, BR90, 1986, 14pp
ISBN: 978-0-85125-221-6 **£25.00**

Supplementary guidance for assessment of timber-framed houses

Part 1. Examination

Supplements initial inspection procedure by suggesting what further information should be gathered by surveyors when deficiencies related to structural stability, durability or fire protection are suspected. (Guidance on the interpretation of information collected is given in GBG 12.)

BRE, GG11, 1993, 6pp
ISBN: 978-1-86081-856-1 **£9.00**

Supplementary guidance for assessment of timber-framed houses

Part 2. Interpretation

Offers up-to-date guidance on how to assess the significance of key observations and measurements gathered during the detailed examinations recommended in GBG 11 and how to identify any need for remedial work.

BRE, GG12, 1993, 6pp
ISBN: 978-1-86081-857-8 **£9.00**

Timber frame housing

Set of three reports

BRE, AP98, 3 parts, 1995
ISBN: 978-1-86081-767-0 **£55.00**

PROCUREMENT, COMMISSIONING AND MAINTENANCE

A guide to certification and approval for engineers and designers

This Information Paper explains the types of certification scheme and sets out the characteristics of good certification and its use. It distinguishes certification from testing and CE marking and looks at the related subjects of 'passing off' and 'competent persons'.

BRE, IP5/08, 2008, 8pp
ISBN: 978-1-84806-023-4 £9.00

Balanced Value for sustainable procurement

Balanced Value is a tool for construction professionals who want to incorporate functional performance and "triple bottom-line" sustainability (social, environmental and economic) into their decision-making processes. The tool is web-based and should be used in conjunction with guidance, both of which are available at www.balancedvalue.com. This information paper describes the tool and explains it in the context of case studies and how it can be applied at three levels: entry, intermediate and expert.

BRE, IP6/06, 2006, 8pp
ISBN: 978-1-86081-914-8 £9.00

Achieving cost effective responsive maintenance

This Information Paper highlights some of the key findings of a study led by BRE, which brought together a group of project partners experienced in partnering relationships with their contractors. It examines some of the issues and processes involved in the partnering process. The full results of this study are published in Repair it with effective partnering: Guide to contractual relationships for cost effective responsive maintenance (see page 4 for details).

BRE, IP14/05, 2005, 4pp
ISBN: 978-1-86081-888-2 £9.00

Whole building commissioning

Approved Document L2 of the Building Regulations, for the Conservation of Fuel and Power in buildings other than dwellings, asks for building services systems including heating, lighting, mechanical ventilation and air conditioning, to be commissioned. The process involves drawing up a commissioning plan, carrying out commissioning so that the installed systems perform to the designer's specification, and the production of a certificate confirming that the commissioning has been carried out. The four parts are 1 A guide for clients, 2 A guide for designers, 3 A guide for specifiers, 4 A guide for facilities managers.

BRE, IP8/04, 4 parts, 2004, 16pp
ISBN: 978-1-86081-836-3 £15.00

Performance specifications for whole buildings

Looks at problems of defining and specifying building performance. It describes research into technical, procedural and administrative aspects, and reports work undertaken for other bodies.

BRE, BR32, 1983, 70pp
ISBN: 978-0-85125-054-0 £22.50

Better briefing means better buildings

Provides a framework, in the form of a checklist, to aid briefing. Suggests ways in which the early stages of building projects might be set up and carried out to ensure the project's satisfactory outcome for the client.

BRE, BR95, 1987, 38pp
ISBN: 978-0-85125-213-1 £22.50

The performance and costs-in-use of buildings

A new approach

Describes the development of a new approach to the procurement, operation and management of buildings: the 'Performance and Cost Managed Building' (PCMB) approach, in which building performance and the associated costs-in-use are addressed consistently throughout building life. This report describes how PCMB is a significant step towards the provision of better buildings.

BRE, BR277, 1995, 24pp
ISBN: 978-1-86081-001-5 £25.00

Lists of excluded materials: a change in practice

Explains the background to the use of lists of excluded materials in contract documents and gives examples of the negative effects such lists may have on clients. It then provides an alternative, positive approach to specification.

BRE, DG425, 1997, 4pp
ISBN: 978-1-86081-170-8 £9.00

Cleaning buildings: legislation and good practice

Cleaning buildings is an industrial process which should be handled by specialists. Often, though, general building operatives (and even householders) have attempted cleaning without understanding the health, safety and environmental implications. This Digest provides building owners, contractors, operatives, building designers and local authorities with advice on three important issues relevant to building cleaning (especially relating to health and safety): legislation, procedures and good practice, and discharging waste to the environment.

BRE, DG448, 2000, 8pp
ISBN: 978-1-86081-406-8 £15.00

Better building – integrating the supply chain

A guide for clients and their consultants

There is growing awareness in the construction industry that the development of integrated supply chains and construction processes is potentially the means by which the industry will prosper in the 21st century. One of the principle mechanisms identified to achieve this goal is the early involvement of the supply chain in the construction process. This Digest describes the benefits to be obtained by implementing early involvement, gives guidance on how best to facilitate it and explains the methodology and tools required.

BRE, DG450, 2000, 12pp
ISBN: 978-1-86081-423-5 £15.00

Value from construction

A comprehensive bibliography

An essential guide to value management literature for the value management facilitator and researcher.

BRE, BR333, 1997, 38pp
ISBN: 978-1-86081-176-0 £22.50

Study on whole life costing

Summarises the results of a study on the use of whole life costing by the construction industry. Over 900 representatives from a cross-section of industry stakeholders were surveyed. The objectives were to investigate: the state of the art; work carried out to date; information available; techniques used and participation; scope for use; barriers to adoption and opportunities for promotion; and focused areas of priority activities needed for a structured research and innovation programme.

BRE, BR367, 1999, 36pp
ISBN: 978-1-86081-280-4 £27.50

Applying facilities expertise in building design

Explains how facilities expertise can be more fully integrated into the design process. It is aimed both at facilities managers, to encourage them to take a more active part in projects, and at Building designers who need to be aware of key operational issues when setting design principles. Highlights potential solutions to many of the problems encountered and is based on issues that BIFM members identified as of particular concern.

BRE, BR425, 2001, 52pp
ISBN: 978-1-86081-501-0 £40.00

Getting it right

A clients' guide to functionality

Shows clients of the construction industry and their suppliers the importance of functionality in construction to achieving business and personal aspirations. Functionality can be seen as the flow of added value to a process - smooth flow means continually added value, interrupted flow means the introduction of waste. It is about enabling things to happen, adding value to businesses and meeting personal aspirations, and it can become an intrinsic part of both the decision to build and the briefing process.

BRE, BR452, 2003, 42pp
ISBN: 978-1-86081-606-2 £40.00

Handover of Office Building Operations protocol (HOB0)

There is presently no formal protocol for the preparation and handover of a building and its documentation. As a result, many buildings are not being properly handed over on practical completion. When this happens, it is likely that the building will be used inappropriately and inefficiently, leading to the dissatisfaction of its users and wasted energy resources. This Digest describes BRE's proposed new handover protocol - Handover of Office Buildings Operations (HOB0). It encourages handover to be seen as a process of many activities with emphasis on information exchange, training, demonstration and fine-tuning.

BRE, DG474, 2002, 12pp
ISBN: 978-1-86081-602-4 £15.00

Lessons from UK PFI and Real Estate Partnerships

Drivers, barriers and critical success factors

Large-scale outsourcing of public infrastructure through the Private Finance Initiative (PFI) represents the most radical change in UK public procurement policy in the last ten years and has been extended into corporate real estate outsourcing through Real Estate Partnerships (REPs). Research by The College of Estate Management (funded by the Foundation for the Built Environment) shows that the successes and difficulties associated with PFI and REPs provide opportunities to learn from experience and translate best practice into future projects.

FBE, FB6, 2003, 108pp
ISBN: 978-1-86081-662-8 £50.00

Achieving whole life value in infrastructure and buildings

K Bourke, V Ramdas, S Singh, A Green, A Crudington and D Mootanah

Developed by experts to give stakeholders the means of unlocking Whole Life Value in infrastructure and building projects. This guide considers key questions and provides a clear understanding of the concepts and principles underlying the use and application of Whole Life Value in planning, commissioning and maintaining assets such as schools, offices, highways and repair and maintenance schemes. A set of case studies illustrates practical applications.

BRE, BR476, 2005, 60pp
ISBN: 978-1-86081-737-3 £47.50

Repair it with effective partnering

J Prior and F Nowak

Guide to contractual relationships for cost effective responsive maintenance

Maintenance and refurbishment account for just over half the UK construction spend of £25 billion (excluding infrastructure), and much of this is spent on responsive maintenance and minor works. Only 32% is spent on making the repair. Partnering can help property owners simplify their administrative processes and achieve cost effective responsive maintenance by reducing response times.

Repair it with effective partnering brings together knowledge shared by a group of project partners with experience of partnering relationships with their contractors. The guide examines the issues and identifies the key processes involved. It provides practical advice on how to manage these processes effectively and sets out the benefits of partnering.

This guide is aimed at property owners with responsibility for maintaining property, in particular those who want to take advantage of the benefits of partnering. It considers value for money in public procurement, sets out European and UK procurement rules which form the context of the contractual arrangements and considers the application of existing forms of partnering contracts.

A set of case studies illustrates successful client and contractor relationships and examines how probity, quality control and cost control are managed.

BRE, BR484, 2005, 60pp
ISBN: 978-1-86081-887-5 £47.50

Procurement, maintenance, site organisation and waste management pack

BRE

DIGESTS

Better building - integrating the supply chain: guide for clients and consultants (DG450)

Cleaning buildings: legislation and good practice (DG448)

Construction logistics: an introduction (DG459)
Handover of Office Building Operations protocol (HOB0) (DG474)

Lists of excluded materials: a change in practice (DG425)

Waste minimisation on a construction site (DG447)

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Offsite construction: an introduction (GG56)

The Quality Mark Scheme (GG55)

Working with local businesses and residents (GG71)

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Balanced Value for sustainable procurement (IP6/06)

Composting in the construction industry (IP3/05)

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Recycling fibre reinforced polymers in the construction industry (IP4/04)

Using small volume wastes in construction (IP9/05)

Whole building commissioning (4-part set) (IP8/04)

BRE, AP262, Ringbound set, 2007
ISBN: 978-1-84806-000-5 £70.00

The Office Toolkit

The guide for facilities and office managers for reducing costs and environmental impact

Examines and evaluates the aspects of an 'office-based' business that have an environmental impact, not just the direct impacts of energy, water, paper usage and waste management, but also commuting, business travel and working from home. In all it provides a complete environmental assessment for your business or office. Spreadsheets (on a 3.5 inch disk) require Microsoft Excel or Lotus 1-2-3 software.

BRE, BR285, Ringbound set, 1995, 144pp
ISBN: 978-1-86081-014-5 £109.25

Value management

Value management is a creative, problem-solving process that uses a methodical approach to include the necessary parties and, working together, achieve the best solutions for value from construction. The four parts of this publication cover: Value from construction - getting started with value management, The value workshop - concise guidance on the value management workshop, Value for social housing - concise guidance for RSLs, their consultants and contractors and The FAST approach - function analysis and diagramming techniques.

BRE, AP135, 2000, 60pp
ISBN: 978-1-86081-770-0 £32.50

SITE ORGANISATION AND MANAGEMENT

Construction site packaging wastes

A market position report

Most products used on construction sites are delivered wrapped in, placed on or held together by packaging of some kind; but little is known about the amount, type, safety and hygiene qualities of packaging material disposed of from sites. Previous BRE studies have shown that packaging materials can constitute as much as 50% of the volume of waste leaving a site. Traditionally the cost for disposal of this material has been borne by the main contractor. This paper represents the initial results of the first study in the UK to show what packaging materials are available for recovery, reuse and recycling.

BRE, IP8/02, 2002, 8pp
ISBN: 978-1-86081-567-6 **£9.00**

Expert systems and the construction industry

BRE research into the application of expert systems to construction-related problems has shown that this technology can offer considerable benefits to the industry. The paper explains expert systems and their benefits, and identifies potential applications.

BRE, IP4/89, 1989, 4pp
£9.00

Timber scaffold boards - reducing the incidence of site injury

Explains the main causes of scaffold board failure and emphasises the attention and care that must be taken in purchase, handling and maintenance of boards.

BRE, IP20/88, 1988, 4pp
£9.00

Production drawings - arrangement and content

A report of further findings which emerged from research for the Code of Practice for production drawings published in December 1987. The authors of this paper concluded that a flexible approach is needed for the arrangement of drawings. Three methods are suggested.

BRE, IP3/88, 1988, 4pp
£9.00

Quality control on building sites

Observations of building site staff on 27 sites which reveals how problems arose and if/how they were effectively solved.

BRE, IP28/81, 1981, 4pp
£9.00

A survey of scaffold boards in use

This publication aims to fill in the gaps in the knowledge about scaffold board conditions in service such as moisture content, support spans and loading.

BRE, IP9/80, 1980, 4pp
£9.00

R&D for the construction site process

Reproduces the papers, responses and conclusions of the second symposium of the European Network of Building Research Institutes (ENBRI) held in Luxembourg in 1993. Concentrating on the construction site process, the symposium identified goals for construction and associated research.

BRE, BR257, 1993, 176pp
ISBN: 978-0-85125-613-9 **£32.50**

Early striking of formwork on forces in backdrops

This report describes the research carried out on the concrete flat slab structure at Cardington to investigate early striking of formwork and backpropping (Task 4).

BRE, BR394, 2000, 108pp
ISBN: 978-1-86081-386-3 **£37.50**

Re-engineering the concrete frame business process

Construction phase report: Task 1

This report describes one of the construction-phase research investigations based on the in-situ concrete frame building at Cardington. The objective of the project was to re-engineer the business process of such buildings in order to reduce costs, increase speed and improve quality. The need, established through industry based studies, was addressed by a thorough re-appraisal of the supply chains and construction processes.

BRE, BR388, 2000, 92pp
ISBN: 978-1-86081-374-0 **£32.50**

Improving rebar information and supply (IRIS)

The IRIS project is part of a wider project looking at re-engineering the processes of in-situ concrete frame construction. Although the project is part of the wider project it is not directly dependent on the construction for the in-situ concrete building at Cardington. Information about the in-situ building and the European Concrete Building Project, of which the in-situ building is the first stage, is available at www.bre.co.uk.

BRE, BR401, 2000, 86pp
ISBN: 978-1-86081-411-2 **£37.50**

Construction logistics: an introduction

Good site logistics practice is more than just ensuring that delivery vehicles turn up on time; it is about ensuring that design, procurement and construction practices are optimised to facilitate the efficient delivery, movement and installation of materials and components. In other words, it is about eliminating waste in all its forms. This Digest, based on research by BRE in association with The Logistics Business Ltd, introduces the concept of construction logistics and explains the benefits to be gained by adopting good logistics practice.

BRE, DG459, 2001, 12pp
ISBN: 978-1-86081-513-3 **£15.00**

Construction site security and safety. The forgotten costs!

The UK construction industry suffers from almost indeterminate losses of materials and plant through theft, vandalism and careless housekeeping. A large proportion of these losses are due to either inefficient or non-existent site security. This report considers where these losses occur and how to prevent them through effective planning and management. The report focuses on the largest material losses, plant theft, and the biggest risk, fire. Site safety, fire prevention and security should be considered together rather than in isolation as is current practice.

BRE, FB4, 2002, 34pp
ISBN: 978-1-86081-597-3 **£37.50**

The Quality Mark Scheme

The Quality Mark scheme has been introduced to give reputable tradesmen the opportunity to demonstrate their professionalism and distinguish themselves from the cowboys. It has been developed by representatives from the construction industry, consumer bodies, and local and central government to make it workable yet rigorous for contractors, and accessible and effective for consumers. Quality Mark is an independent scheme offering consumers peace of mind by giving them a reliable tool to select reputable tradesmen. It is backed by an independent complaints mechanism and a comprehensive warranty.

BRE, GG55, 2003, 6pp
ISBN: 978-1-86081-616-1 **£9.00**

Offsite construction: an introduction

Building all, or some components, of buildings off site in a factory has been a feature of construction over many generations, and in some cases has been adopted extensively. In the post-war period, prefabricated construction unfortunately acquired negative connotations. However, with developments in lightweight, high strength materials and modern production techniques, prefabrication has much to offer today's construction industry. This Good Building Guide introduces the techniques and methods of off-site construction and suggests how these might be adopted within the modern construction process.

BRE, GG56, 2003, 8pp
ISBN: 978-1-86081-624-6 **£15.00**

Control of dust from construction and demolition activities

Deals with the problem of control of nuisance dust emissions from construction and civil engineering activities and demonstrates how these emissions can be substantially reduced. Fine particles can be carried from sites even in light winds and may have an adverse effect on the local environment and on the health of local residents, as well as those working on site. Dust control measures are outlined for specific processes, and advice is also given on pre-project planning, implementation and site management, together with checklists for all sizes and types of construction activity.

BRE, BR456, 2003, 54pp
ISBN: 978-1-86081-612-3 £37.50

Working with the community

A good practice guide for the construction industry

M Hadi, S Rao, H Sargant and K Rathouse

Improved relationships with the local community can bring substantial business benefits in the short and long term. This Guide identifies the impacts of construction projects on local people and businesses, and gives advice on how to mitigate some of the negative impacts. It will be a useful aid for anyone who is committed to improving the construction industry's relationship with the public, particularly construction companies, developers, local authorities and clients. It includes a CD ROM with useful sample documents.

BRE, BR472, 2004, 48pp
ISBN: 978-1-86081-726-7 £35.00

Working with local businesses and residents

M Hadi

A large construction project can have a variety of unwelcome impacts on the lives of local residents and businesses. However, these impacts can be mitigated by planning, communication and consideration from construction companies. The business benefits to the client from working with local businesses and residents are substantial. This Good Building Guide sets out a communications strategy to keep the local community informed about a construction project, outlines how to deal with complaints and lists a range of good practice measures that can be implemented to reduce the major impacts (eg noise- and dust-reducing measures and traffic management schemes).

BRE, GG71, 2007, 8pp
ISBN: 978-1-86081-950-6 £15.00

Construction site communication

Every year defects in the UK construction industry cost at least £1 billion to repair or rebuild. Some of the defects are the result of poor communication, for example, a poorly detailed drawing, operatives being given incorrect instructions or technical information not being available. This Good Building Guide gives advice on how communication can be improved to and around a construction site, resulting in cost savings and a reduction in defects.

BRE, GG54, 2 parts, 2003, 12pp
ISBN: 978-1-86081-831-8 £15.00

SUSTAINABILITY AND GREEN ISSUES

NEW: Delivering sustainable development in the built environment

This Information Paper introduces the structure and process of the sustainable development framework that BRE Global has developed. The framework provides a practical approach to implementing national, regional and local planning policy requirements, and economic, environmental and social sustainability objectives for development projects in the built environment. It will enable developers, planning consultants and local planning authorities to demonstrate and verify the extent to which these requirements and objectives are met within masterplans put forward for planning approval. The role of regional sustainability checklists, GreenPrint and other compliant assessment methodologies within the framework is explained.

BRE, IP4/09, 2009, 8pp
ISBN: 978-1-84806-097-5 £9.50

The price of sustainable schools

How much does it cost to achieve BREEAM Schools ratings?

This Information Paper identifies the additional capital costs associated with a range of sustainable and low- or zero-carbon solutions for a primary and secondary school. The full findings of the study are published in the BRE Trust report 'Putting a price on sustainable schools' (FB 15).

BRE, IP1/08, 2007, 6pp
ISBN: 978-1-84806-018-0 £9.00

Delivering sustainability objectives through planning

This information paper looks at how BREEAM (the BRE Environmental Assessment Method) and the Code for Sustainable Homes are being used by local authorities to deliver their sustainable development objectives through the planning system.

BRE, IP3/08, 2008, 4pp
ISBN: 978-1-84806-036-4 £9.00

Environmental weightings

Their use in the environmental assessment of construction products

This Information Paper summarises a BRE study conducted in 2006 to update weightings for a range of environmental issues first established in 1999. An international panel of 10 experts was set up to judge the importance of 13 parameters and their individual responses have been aggregated to create a single set of weightings. The Information Paper also explains how the weightings are applied to BRE's tools for assessing the environmental impact of construction products. This Information Paper provides:

- * a description of the methodology,
- * the weighting results,
- * an explanation of how these weightings are used.

BRE, IP4/07, 2007, 8pp
ISBN: 978-1-86081-967-4 £9.00

Composting in construction

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. It describes the results of trials using different timber products from CDW and the recommendations that have been drawn from them. It addresses various economic, performance and environmental benefits along with the costs and regulatory considerations. This paper also examines some of the issues relating to the use of compost in construction to promote markets for composted materials.

BRE, IP3/05, 2005, 12pp
ISBN: 978-1-86081-741-0 £9.00

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. This Information Paper presents some of the key findings from this costing analysis; namely, the capital costs associated with reaching increased levels of environmental performance, as defined by the BREEAM and EcoHomes schemes, for different building types and in different locations. It demonstrates that significant improvements in building sustainability performance can be achieved at very little additional cost. In addition, more sustainable buildings can offer major in-use cost savings. The full results of this study undertaken by BRE and Cyril Sweett for the BRE Trust are published in a new report, 'Putting a price on sustainability'

BRE, IP4/05, 2005, 4pp
ISBN: 978-1-86081-742-7 £9.00

Environmental sustainability in bridge management

Most transport systems have a programme for highway administration, which will include a planned and co-ordinated approach to bridge management. Environmental performance is increasingly being seen as a principle against which bridge management should be measured, but a comprehensive understanding of the environmental impacts of bridge management activity does not yet exist. Environmental tools and information must be developed and integrated into current bridge management practice. Surrey County Council has recognised this need by creating an assessment method for the environmental comparison of bridge management strategies and forming a partnership with BRE's Centre for Sustainable Construction. This paper is an output from that collaboration.

BRE, IP14/04, 2004, 12pp
ISBN: 978-1-86081-732-8 £9.00

Whole Life Value: sustainable design in the built environment

This paper outlines the concept of Whole Life Value (WLV) and describes the WLV Framework – a web-based tool that provides an integrated framework for the variety of design tools that deal with the issue of sustainability in the built environment. The framework enables designers and their clients to take account of the most significant aspects of sustainability and to predict the whole life value of their projects.

BRE, IP10/04, 2004, 4pp
ISBN: 978-1-86081-720-5 £9.00

Sustainable buildings: benefits for occupiers, designers, investors, developers and constructors

These four Papers result from a study of the business benefits of sustainable construction practices in the construction and property sectors. They focus on occupiers, the design team, investors and developers, and constructors, respectively. Sustainable business practices require that we protect the environment and address the needs of staff, clients and our communities. But they also help to reduce costs and improve profitability. The 'triple bottom line' challenges us to extend the way we account for business success from the financial balance sheet to include consideration of the environmental and social benefits of our operations.

BRE, IP13/03, 4 parts, 2003, 44pp
ISBN: 978-1-86081-837-0 £25.00

Refurbishment or redevelopment of office buildings?

Sustainability comparisons and case histories

Guidance is available on increasing the sustainability of individual refurbishment and redevelopment projects, but there is little information for comparing refurbishment and redevelopment options. Part 1 summarises the findings of a DTI-funded project to investigate sustainability of the two options. A simple online tool, Office Scorer, allows users to compare scenarios for a particular site. Part 2 contains case studies using Office Scorer. Quantitative results are given in ecopoints and costs per m² or per person.

BRE, IP9/02, 2 parts, 2002, 20pp
ISBN: 978-1-86081-838-7 £15.00

Sustainability lessons from private finance and similar private initiatives

How has sustainability been incorporated into Private Finance Initiative and Public Private Partnerships projects for hospitals, schools, infrastructure and public buildings? The Paper comments on lessons learnt, pitfalls and provides a summary checklist of the opportunities and pitfalls of integrating sustainability into the PFI/PPP process. It will inform those involved in such schemes of how to take advantage of lessons learnt from previous projects.

BRE, IP13/02, 2002, 10pp
ISBN: 978-1-86081-585-0 £9.00

Environmental benchmarking for property portfolio managers

This paper describes the development of a straightforward approach to environmental benchmarking of whole stocks of non-domestic buildings. It provides an easy method for property managers to produce an environmental profile of their stock. This profile can be used: as a key part of environmental management and reporting practices, to aid investment decisions on renovation, disposal or purchasing, to manage risk by highlighting poorly performing buildings and as an integral part of the cost accounting for the portfolio.

BRE, IP1/01, 2001, 8pp
ISBN: 978-1-86081-457-0 £9.00

Local authorities' performance on sustainable construction

The Local Authority Sustainable Construction Network (LASCN) aims to improve and advance sustainable construction policies and working practices in local authorities across the UK. It is funded by the Department of the Environment, Transport and the Regions under a broader research project: Sustainable Construction – Developing an Industry Agenda. All levels of authority above parish councils are targeted: district, borough, metropolitan, unitary and county.

BRE, IP7/01, 2001, 8pp
ISBN: 978-1-86081-473-0 £9.00

Sustainability indicators for utilities

These indicators have been developed with support from DTI's Construction Industry Directorate and through consultation with industry. They incorporate economic, social and environmental issues to support the achievement of more sustainable activities at the local level of utilities' work. Using the indicators, utility companies and their contractors can measure and monitor performance and set targets for improvement. The benefits of such action include increased efficiency and reduced risk.

BRE, IP21/01, 2001, 8pp
ISBN: 978-1-86081-525-6 £9.00

Green buildings revisited

This two-part Information Paper summarises the findings from a series of studies of environmentally acclaimed buildings. Ten buildings were featured, representing winning and highly commend schemes from the 'Green Building of the Year Award' organised by the Heating and Ventilating Contractors Association in association with Independent Newspapers from 1992 until 1997.

BRE, IP13/00, 2 parts, 2000, 8pp
ISBN: 978-1-86081-391-7 £12.50

Ecolabelling of building materials and building products

Building specifiers are demanding more information on the environmental impacts of building materials and products, encouraged in part by a European Community regulation on ecolabelling. This paper describes the development of criteria for the award of a label, including consideration of the whole life-cycle of products.

BRE, IP11/93, 1993, 4pp
 £9.00

The environmental impact of buildings

Describes the current major environmental issues arising from buildings.

BRE, IP18/91, 1991, 4pp
 £9.00

Environmental design manual

Summer conditions in naturally-ventilated offices

This manual presents a graphical method of assessing the effect of window size and type, kind of construction and ventilation rate on summertime comfort conditions and daylighting in top-lit offices with one external wall. The method is for use early in the design procedure.

BRE, BR86, 1988, 78pp
ISBN: 978-0-85125-209-4 £22.50

Transport and buildings: the environmental impact

This publication provides guidance on the location, design and operation of buildings with a view to reducing air pollution, pressure on resources and traffic congestion. A set of 18 case studies describes initiatives which have successfully addressed the transport problem and reduced transport-related business and environmental impacts. Initiatives such as teleworking, hot-desking, alternative working practices, computer planning, car sharing are featured.

BRE, BR377, 1999, 58pp
ISBN: 978-1-86081-322-1 **£37.50**

Impact of climate change on building

Aims to develop acceptance of the reality of climate change and its effects on future building and so stimulate debate on how the effects of these impacts can be minimised. This report will inform government, regulators, local authorities, housing associations, clients, financial institutions, building professionals and all who have a stake in UK construction of the extent to which climate change may affect the building stock.

BRE, BR349, 1998, 50pp
ISBN: 978-1-86081-237-8 **£30.00**

BRE methodology for environmental profiles of construction materials, components and buildings

Reliable and independent environmental information about building materials and components is in high demand. Environmental profiles provide a useful way of providing this. To assist the architect, client and building specifier, the information must be produced according to an agreed methodology. This report provides a standardised way of identifying and assessing the environmental effects of building materials over their entire life cycle, through their extraction, processing, construction, use and maintenance and their eventual demolition and disposal.

BRE, BR370, 1999, 70pp
ISBN: 978-1-86081-294-1 **£42.50**

Environmental site layout planning

Solar access, microclimate and passive cooling in urban areas

Provides comprehensive design guidance on urban layout to ensure good access to solar gain, daylighting and passive cooling. It enables designers to produce comfortable, energy-efficient buildings surrounded by pleasant outdoor spaces, in an urban context that minimizes energy consumption and the effects of pollution.

BRE, BR380, 2000, 162pp
ISBN: 978-1-86081-339-9 **£62.50**

Environmental design guide for naturally ventilated and daylight offices

Sound decisions early in the design process can reduce energy consumption by up to 50 %. They can also double daylight levels and avoid overheating in summer. The design tables in this guide predict the maximum internal air temperature on a hot summer day, and the level of daylight on an overcast day in winter, for common cases such as rectangular rooms with a window in one or both ends. The guide also describes concisely and with 150 illustrations, the principles for designing well daylight offices that will not overheat in summer.

BRE, BR345, 1998, 68pp
ISBN: 978-1-86081-227-9 **£37.50**

Environment, competitiveness and profitability

Environmental management in the construction products sector

Material extraction, processing, component assembly, transport and construction all create environmental impact. To remain competitive, companies are continually seeking ways to be more cost-effective and to differentiate their products from those of the competition. Examples of good practice from the producer's and customer's perspective demonstrate the range of approaches currently being taken.

BRE, BR342, 1998, 40pp
ISBN: 978-1-86081-216-3 **£35.00**

Towards a framework for environmental assessment of building materials and components

Materials used in construction have considerable environmental impact. This is most obvious during raw material extraction and product manufacture, but building design, use of materials and demolition can have equally significant environmental effects. This report aims to develop a framework, acceptable across Europe, for assessment of the major environmental impacts of building materials.

BRE, BR355, 1998, 114pp
ISBN: 978-1-86081-252-1 **£35.00**

Assessing environmental impacts of construction

Industry consensus, BREEAM and UK Ecopoints

This Digest describes the methodology and results of a study of the weightings of sustainability issues from buildings and construction. These provide a basis for analysing environmental effects and setting priorities for action. To undertake holistic analysis of the environment, different impacts must be compared on a single scale (such as Ecopoints). A consensus about the importance of different environmental issues is necessary to calculate such a score. The weightings determined by BRE can now be used for this. Two examples of environmental analysis are described.

BRE, DG446, 2000, 12pp
ISBN: 978-1-86081-398-6 **£15.00**

Whole life costing and life-cycle assessment for sustainable building design

The integration of Whole Life Costing and Life-Cycle Assessment presents a powerful route to improving the sustainability of the construction industry. Combining economic and environmental assessment tools to obtain 'best value' solutions in both financial and environmental terms has the potential to make a significant contribution to achieving sustainable building design. This Digest describes the issues relating to the use of the two tools and provides examples from recent projects.

BRE, DG452, 2000, 8pp
ISBN: 978-1-86081-441-9 **£15.00**

Potential implications of climate change in the built environment

As the built environment has an expected life of 20–100 years plus, it is important that climate change impacts are considered for building stock being built in the coming decades. This publication includes technical assessments of potential impacts and adaptation strategies, based on the UKCIP98 'Medium-high' climate change scenario. Detailed analyses are given on the impact on buildings of wind, flood and coastal erosion, subsidence and soil movement, driving rain, durability and performance of materials, and on the construction process. A methodology is included for assessing climate change impacts, their significance and recommendations for adaptation.

FBE, FB2, 2000, 74pp
ISBN: 978-1-86081-447-1 **£50.00**

BEST SELLER: A sustainability checklist for developments

A common framework for developers and local authorities

One of the biggest challenges facing developers, designers and planners is how to ensure that our towns and cities are developed and regenerated to be sustainable for the future. This checklist provides practical tools and indicators to measure the sustainability of developments (both buildings and infrastructure) at site or estate level, and a common framework for discussions between developers, local authorities and communities.

BRE, BR436, 2002, 95pp
ISBN: 978-1-86081-533-1 **£52.50**

Managing sustainable construction

Profiting from sustainability

Addressing economic, social and environmental sustainability can bring opportunities and bottom line benefits to business; a failure to tackle these will pose significant risks. 'MaSC: profiting from sustainability' introduces the process of managing your business' sustainability practice. It is of particular relevance to board members and senior managers.

BRE, AP146, 2002
ISBN: 978-1-86081-551-5 **£15.00**

Managing Sustainable Construction (MaSC ALP)

This accelerated learning pack, prepared with the collaboration of construction firms across the supply chain, will help you to manage your business more sustainably. It contains a set of tools that you can use by drawing on your in-house expertise or employing consultants to use them on your behalf. Either way the outcome should be the same. After 12 months, your business should have enhanced in-house capacity for effectively managing sustainable practice.

BRE, BR444, 2002, 59pp
ISBN: 978-1-86081-552-2 **£80.00**

Sustainability estimator tool for utilities

The utilities estimator has been developed from a DTI-funded project to identify sustainability indicators that utilities companies of all types can use to measure their environmental performance. Designed to help companies assess the impact of service provision, such as laying new pipes or cables, the Utilities Estimator consists of five spreadsheets, a user guide and Information Paper 'Sustainability indicators for utilities'.

BRE, AP150, Software, 2002
ISBN: 978-1-86081-594-2 **£40.25**

Reducing the effects of climate change by roof design

The construction industry must prepare for climate change. Buildings designed for today will have to cope with different conditions in the future. This Digest summarises the views of experts in the roofing industry on how roof design may mitigate the effects of climate change.

BRE, DG486, 2004, 6pp
ISBN: 978-1-86081-692-5 **£9.00**

Green guide to composites

An environmental profiling system for composite materials and products

J Anderson, A Jansz, K Steele, P Thistlethwaite, G Bishop and A Black

The guide will allow everyone involved in composite design and manufacture to improve the sustainability performance of their products and present clear sustainability rationales to potential clients, increasing their business and stimulating growth in the composites industry. The life-cycle impacts of each material and process choice from the cradle to the factory gate are presented in simple comparative rankings, allowing informed decisions to be made. Its easy-to-use format means that basic life-cycle assessment data for composite materials and processes can be easily understood, materials and processes can be compared, and informed decisions made.

BRE, BR475, 2004, 40pp
ISBN: 978-1-86081-733-5 **£30.00**

BEST SELLER: Putting a price on sustainability

BRE Centre for Sustainable Construction and Cyril Sweett Sustainability and Cost Consulting Teams

One of the principal barriers to the wider adoption of more sustainable design and construction solutions is the perception that they cost a large amount of money. Evidence collected by BRE and Cyril Sweett contradicts this assumption. This report identifies the costs associated with a range of sustainable solutions for different building types, demonstrating that significant improvements in the sustainability performance of a building can be achieved at very little additional cost. In addition, this report also demonstrates that more sustainable buildings can offer major life-cycle cost benefits.

BRE Trust, FB10, 2005, 28pp
ISBN: 978-1-86081-750-2 **£22.50**

Designing for pedestrians: A guide to good practice

Provides detailed technical and best practice guidance on design of facilities for pedestrians. Prepared by Essex County Council, drawing on the experience that has been developed throughout the county - with information and recommendations which can be readily adapted and applied to local circumstances throughout the UK.

Invaluable for those involved in planning, designing and constructing pedestrian facilities.

Includes discussion of giving greater access to persons with mobility impairment; crossing facilities; signing; sharing facilities between pedestrians and cyclists, and more.

Essex County Council, EP67, 2006, 72pp
ISBN: 978-1-86081-895-0 **£20.00**

Designing for cyclists: a guide to good practice

Designing for cyclists: a guide to good practice is required reading for everyone concerned with improving cycle facilities. Based on national guidelines and accepted good practice, the guide has been developed as part of Essex County Council's move towards a more sustainable transport system and an improved environment. This guide: Summarises current design advice and highlights key points; Clarifies standards for cycle facilities; Outlines the legal processes necessary to introduce cycling facilities; Provides sources of more detailed information. It is intended not just for those directly concerned with the provision of cycling facilities, but for engineers, planners, developers and others involved with roads, traffic, transportation and development.

Essex County Council, EP68, 2006, 114pp
ISBN: 978-1-86081-896-7 **£25.00**

Creating environmental weightings for construction products

Results of a study

L Hamilton, S Edwards, C Aizlewood, D Shiers, P Thistlethwaite and K P Steele

This Report gives the results of a BRE study conducted in 2006 to update weightings for a range of environmental issues first established in 1999. An international panel of 10 experts was set up to judge the importance of 13 parameters and their individual responses have been aggregated to create a single set of weightings. The Report also explains how the weightings are applied to BRE's tools for assessing the environmental impact of construction products. The Report:

- describes the methodology,
- analyses the statistical techniques employed and the statistical robustness of the weightings obtained, and
- explains how the weightings contribute to the Environmental Profiles methodology for measuring the environmental performance of construction products.

BRE, BR493, 2007, 22pp
ISBN: 978-1-86081-968-1 **£25.00**

Sustainability and green issues pack

DIGESTS

Assessing environmental impacts of construction (DG446)

Life cycle impacts of timber: review of environmental impacts (DG470)

Reducing the effects of climate change by roof design (DG486)

Whole life costing and life-cycle assessment for sustainable building design (DG452)

INFORMATION PAPERS

Costing sustainability: how much does it cost to achieve BREEAM and Ecohomes ratings (IP4/05)

Environmental benchmarking for property portfolio managers (IP1/01)

Environmental sustainability in bridge management (IP14/04)

Environmental weightings: their use in environmental assessment of construction products (IP4/07)

Green buildings revisited (2-part set) (IP13/00)

Local authorities' performance on sustainable construction (IP7/01)

Refurbishment or redevelopment of office buildings? (2-part set) (IP9/02)

Sustainable buildings (4-part set) (IP13/03)

Sustainability indicators for utilities (IP21/01)

Sustainability lessons from private finance and similar private initiatives (IP13/02)

Whole Life Value: sustainable design in the built environment (IP10/04)

Managing sustainable construction (AP146)

BRE, AP247, Ringbound set, 2007

ISBN: 978-1-86081-973-5 £50.00

BEST SELLER: Putting a price on sustainable schools

A Surgenor and I Butters

This report will provide an understanding of the cost benefit implications of building to BREEAM ratings and low/zero-carbon standards. One of the principal barriers to the wider adoption of more sustainable design and construction solutions is the perception that they may cost much more.

BRE Trust, FB15, 2008, 30pp

ISBN: 978-1-84806-019-7 £25.00

BEST SELLER: Sustainability through planning

Local authority use of BREEAM, EcoHomes and the Code for Sustainable Homes

J Prior and C Williams

This report shows how the BRE Environmental Assessment Method (BREEAM), EcoHomes and the Code for Sustainable Homes are being used by local authorities to deliver their sustainable development objectives through the planning system.

BRE, BR498, 2008, 48pp

ISBN: 978-1-84806-028-9 £35.00

NEW: Green Guide to Specification, 4th Edition

J Anderson and D Shiers

The fourth edition of The Green Guide to Specification has been revised and updated by BRE to provide designers and specifiers with easy-to-use guidance on making the best environmental choices when selecting construction materials and components. It is more comprehensive than its predecessors and contains more than 1200 specifications used in six generic building types: commercial, educational, healthcare, retail, residential and industrial.

The Guide provides robust information to assist decision-making by translating numerical life-cycle assessment data into a simple A+ to E scale of environmental ratings, enabling specifiers to make meaningful comparisons between materials and components. The performance of each specification is measured against a range of environmental impacts, including climate change, toxicity, fossil fuel and ozone depletion, levels of emissions and pollutants, and mineral and water extraction. The principal building elements covered are floors, roofs, walls, windows, insulation and landscaping.

The Green Guide to Specification is an essential tool for architects, surveyors, building managers and property owners seeking to reduce the environmental impact of their buildings by informed and responsible selection of construction materials and components.

BRE, BR501, 2009, 256pp

ISBN: 978-1-4051-1961-0 £69.50

NEW: Sustainability in the built environment

An introduction to its definition and measurement

C Atkinson, A Yates and M Wyatt

The measurement of environmental performance and sustainability in the built environment is one of the most important issues facing policy makers and industry today. This report brings together current thinking on defining and measuring sustainability. It sets out concisely the key issues in this large and complex area. This subject is rapidly moving and this introductory primer provides a clear overview of the key issues and initiatives in the UK and internationally. It outlines a representative sample of the major tools and other initiatives that encourage improved performance in this field and describes the common features of assessment tools.

BRE, BR502, 2009, 40pp

ISBN: 978-1-84806-084-5 £25.00

Sustainable retail premises

An environmental guide to design, refurbishment and management of retail premises

The aim of this guide is to reduce the impacts of retail buildings on the environment and at the same time enhance business for developers, investors and retailers. The guide will: increase understanding of owners, developers, designers and users, of impacts of buildings on the environment; set standards exceeding those in regulations and legislation; encourage best practice in design, fitting-out, operation and maintenance; provide a route to market recognition for buildings where the environmental impacts have been reduced or minimised.

BRE, BR366, 1999, 94pp

ISBN: 978-1-86081-279-8 £42.50

BEST SELLER: ECOHOMES - the environmental rating for homes

Considers the broad environmental concerns of climate change, resource use and impact on wildlife, but balances these against the needs for a high quality, safe and healthy internal environment. Issues assessed are grouped into seven categories: energy, transport, pollution, materials, water, ecology and land use, and health and well being. Provides a credible, transparent label for new and converted/renovated homes, including houses, apartments and sheltered accommodation. The document also contains a Rating Prediction Checklist.

BRE, BR389, 2000, 24pp

ISBN: 978-1-86081-375-7 £30.00

WASTE MATERIALS AND RECYCLING

Using small volume wastes in construction

For many years the efforts of government, industry and research bodies have focused on encouraging the use of large volume by-product materials (eg pulverised fuel ash and blastfurnace slags) in construction; smaller volume materials, though, have received less attention. This information paper gives the main findings of a Partners in Innovation project to examine the non-technical barriers to using small volume wastes (SVWs) as raw materials in construction. The project examined a limited range of industries in UK, mainly reflecting the interests of the project partners, and concentrated primarily on materials with potential applications in cementitious products, aggregates, fill and hardcore. The paper reviews the locations, tonnages, and current and potential uses of a range of SVWs identified under the project. It describes the barriers to their use and proposes strategies to overcome them.

BRE, IP9/05, 2005, 8pp

ISBN: 978-1-86081-761-8 £9.00

Recycling fibre reinforced polymers in the construction industry

This paper reviews fibre reinforced polymer (FRP) recycling initiatives and techniques, and materials usage and current practice. Technical, economic and policy issues necessary to improve the future recyclability of FRPs are discussed, and the refurbishment potential and possibility of re-use of FRP components are investigated.

BRE, IP4/04, 2004, 6pp
ISBN: 978-1-86081-687-1 **£9.00**

Reclamation and recycling of building materials

Industry position report

The construction industry is increasingly committed to lessening its impact on the environment; reducing waste and making better use of unavoidable waste is key to this commitment. Cost, time, availability and quality all affect the use of reclaimed and recycled materials. Based on surveys, this paper gives a snapshot of the present position in the reclamation and recycling industries.

BRE, IP7/00, 2000, 8pp
ISBN: 978-1-86081-367-2 **£9.00**

Plastics recycling in the construction industry

This paper discusses the options available to the construction industry for recycling waste plastics materials. It summarises standard terminology, and gives examples of recycling initiatives already in place.

BRE, IP12/97, 1997, 4pp
ISBN: 978-1-86081-186-9 **£9.00**

Management of construction and demolition wastes

In order to make informed decisions on waste management policies it is necessary to be aware of what wastes are likely to arise, the waste management options available for those wastes, and the legal requirements for those options. Also, there is now greater emphasis on deciding waste management policy in terms of the best practicable environmental option. This paper discusses these issues in the context of construction and demolition wastes.

BRE, IP1/96, 1996, 4pp
ISBN: 978-1-86081-073-2 **£9.00**

Site accounting for waste of materials

Describes a simple accounting system which involves a minimum of extra work whilst enabling builders to identify waste on site both as it occurs and while work is still in progress.

BRE, IP30/79, 1979, 4pp
£9.00

Process integration in building services

BRE has examined the potential for applying process integration techniques to the provision of heating and cooling services in buildings through involvement in trial projects associated with extensive hospital sites. This report draws on these projects to describe the analysis methods and to provide general conclusions concerning the use of PI for building services.

BRE, BR192, 1991, 48pp
ISBN: 978-0-85125-474-6 **£35.00**

Household waste: storage provision and recycling

This publication is full of practical information that can be applied to real planning and handling situations. It will improve understanding of the subject and will be invaluable to all those involved in the design, planning, collection and disposal of household waste.

BRE, BR356, 1998, 80pp
ISBN: 978-1-86081-253-8 **£30.00**

Waste minimisation on a construction site

The rising costs of raw materials and waste disposal will increase interest in waste minimisation schemes. This Digest demonstrates the savings achievable through a properly designed and managed waste minimisation system. The results challenge the common view that construction waste minimisation is cost inefficient by showing that an effective waste minimisation system on a construction site is an efficient and cost-effective way of operating.

BRE, DG447, 2000, 8pp
ISBN: 978-1-86081-400-6 **£15.00**

Use of non-ferrous metals industry wastes in construction

This report reviews current arisings of wastes from the non-ferrous metals industry, their potential for use in highway construction, and the barriers to their use. Benefits from their use include reduction in waste materials sent to landfill, reduced consumption of natural resources, and sustainability of construction projects.

BRE, BR423, 2001, 26pp
ISBN: 978-1-86081-500-3 **£40.00**

Deconstruction and reuse of construction materials

This report gives an overview of the waste arisings in the construction and demolition industries and the legislative, strategic, fiscal and policy issues relating to deconstruction. It also explores how the deconstruction process can work effectively within the construction, demolition and recycling industries.

BRE, BR418, 2001, 34pp
ISBN: 978-1-86081-478-5 **£40.00**

Construction and demolition waste

With increasing costs of raw materials and of waste disposal, better management of waste makes sense. Industry and government are exploring ways of tackling waste to identify best practicable environmental options for reclamation and reuse of building components, and recovery and recycling of materials. Benefits of a waste management policy include: savings in disposal and transport costs, revenue from reuse and recycling, reduced purchasing of materials and improved environmental credentials. Part 1 puts construction and demolition waste into context and outlines the options for better management. Part 2 gives advice on dealing with waste during demolition and construction.

BRE, GG57, 2 parts, 2003, 12pp
ISBN: 978-1-86081-832-5 **£20.00**

ENVIRONMENT AND SERVICES

ACOUSTICS AND SOUND INSULATION

Rain noise from glazed and lightweight roofing

This paper is intended to help designers to assess the likely effect of rain noise from lightweight roofs and roof elements on the indoor ambient noise levels in rooms. It contains results from measurements of the sound intensity levels caused by artificial heavy rainfall on roof glazing, polycarbonate roofing and ETFE roofing, the latter with and without rain suppressors. The measured sound intensity data allow comparison of products and estimation of the reverberant sound pressure level in a room due to rain noise.

BRE, IP2/06, 2006, 4pp
ISBN: 978-1-86081-898-1 **£9.00**

Dealing with poor sound insulation between new dwellings

When a test demonstrates that the sound insulation between new houses, flats or rooms for residential purposes does not meet the performance requirements of Section 0 of Approved Document E, appropriate remedial treatment is needed. This Information Paper describes how to rectify faults that can cause sound insulation to be lower than expected. Its advice is intended for developers, builders, designers, and others concerned with rectifying defects that cause poor sound insulation.

BRE, IP14/02, 2002, 4pp
ISBN: 978-1-86081-549-2 **£9.00**

Reducing impact and structure-borne sound in buildings

Noise from neighbours is one of the principal causes of complaint about the indoor environment in dwellings. The noise is generated by airborne sound sources such as speech, or by impact sound sources such as footsteps on floors and stairs, banging doors and plumbing. This paper describes methods for reducing impact and structure-borne sound in buildings using both remedial treatments and design features. The advice will be mainly of use to architects, builders, and others concerned with designing new buildings or upgrading existing ones.

BRE, IP4/01, 2001, 8pp
ISBN: 978-1-86081-462-4 **£9.00**

The sound insulation provided by windows

Describes experiments on a number of elements which affect sound insulation, including the sealing of openable panes, the type of frame material, the size of the window panes, and the spacing of panes in multiple pane systems.

BRE, IP6/94, 1994, 4pp
£9.00

Effects of environmental noise on people at home

This paper will be of interest to all those involved in the assessment of environmental noise and the design and assessment of housing.

BRE, IP22/93, 1993, 4pp
£9.00

The noise climate around our homes

Reports on a noise incidence study undertaken to establish the noise climate outside homes in England and Wales.

BRE, IP21/93, 1993, 4pp
£9.00

Sound insulation and the 1992 edition of Approved Document E

In the 1992 revision to Approved Document E, the technical specifications in England and Wales, Scotland and Northern Ireland have been harmonised. There are two new sections, one describing an additional approval procedure based on full-sized mock-up tests, the other dealing with material change of the use of a dwelling.

BRE, IP18/92, 1992, 4pp
£9.00

The insulation of dwellings against external noise

This paper describes the relationship between the levels of noise from road traffic and different types of window. Various methods used to quantify noise reduction are considered, together with methods for maintaining ventilation while achieving reduced noise levels.

BRE, IP12/89, 1989, 4pp
£9.00

Methods for improving the sound insulation between converted flats

Noise from neighbours is a common complaint from occupants of houses converted into flats. Even if party floors have been sound-insulated, flanking transmission through walls may allow the problem to continue. This IP describes solutions and advice based on field trials of various options.

BRE, IP6/88, 1988, 4pp
£9.00

British Standard BS 5821:1980: Ratings of the sound insulation of post-1970 party walls

Performance ratings according to the system defined in BS 5821:1980 are given for the types of party wall for which (in earlier papers) ratings in terms of 'aggregate adverse deviations' relative to the Party Wall Grade reference values were given.

BRE, IP9/83, 1983, 4pp
£9.00

British Standard BS 5821:1980: Ratings of the sound insulation of floating party floors

Earlier papers listed floors tested to obtain field data on common types and gave performance ratings for airborne and impact insulation in terms of 'aggregate adverse deviations' (AADs) relative to Grade I reference values. Ratings in terms of the system defined in BS 5821:1980 are given here on the basis of the same data.

BRE, IP10/83, 1983, 4pp
£9.00

Sound control for homes

Provides practical, state-of-the-art advice on the control within dwellings of noise from outside sources and noise transmitted within and between dwellings.

BRE, BR238, 1993, 132pp
ISBN: 978-0-85125-559-0 **£47.50**

Minimising noise from domestic fan systems

Fan-assisted radon mitigation systems

Fan systems can be noisy. This guide describes how to design a fan system for removing from dwellings condensation and odours with the minimum of noise disturbance. Applies to domestic fan systems and to fan-assisted radon sump systems.

BRE, GG26, 1996, 8pp
ISBN: 978-1-86081-094-7 **£15.00**

Quiet homes

A guide to good practice and reducing the risk of poor sound insulation between dwellings

This manual is a guide to achieving good sound insulation between dwellings. It complements the Guidance given in England and Wales Building Regulation Approved Document E. The information is not about innovative construction types with enhanced sound insulation but about avoiding mistakes that reduce the sound insulation of existing widely used construction types.

BRE, BR358, 1998, 80pp
£25.00

Traffic noise and overheating in offices

A brief guide on how to deal, through design, with the problems of traffic noise while maintaining acceptable temperature and ventilation standards.

BRE, DG162, 1973, 4pp
ISBN: 978-0-85125-125-7 **£9.00**

Improving the sound insulation of separating walls and floors

The Digest suggests methods of improving the sound insulation between adjoining dwellings. It indicates the improvement in insulation likely to be achieved by such methods as adding an independent leaf to one side of the wall, or constructing an independent ceiling or floating floor.

BRE, DG293, 1985, 4pp
ISBN: 978-0-85125-084-7 **£9.00**

Sound insulation: basic principles

The constructional techniques available for providing a reasonable standard of sound insulation between dwellings are based on a few simple principles. This publication explains the terminology and basic principles of the subject.

BRE, DG337, 1994, 8pp
ISBN: 978-0-85125-365-7 **£15.00**

Insulation against external noise

This Digest explains how windows, walls and roofing affect the level of noise that is transmitted into a building from the outside. Various factors are involved, and certain planning measures will reduce exposure to outside noise.

BRE, DG338, 1989, 8pp
ISBN: 978-0-85125-369-5 £15.00

Improving sound insulation

BRE inspections of rehabilitation work in progress have revealed instances of inadequate separating walls between dwellings, gaps or absence of walls in roof spaces, and holes alongside floor joists or other timbers built into the walls. The principle of sound insulation is to ensure that the resistance of separating walls is satisfactory by blocking all holes or by constructing an independent leaf. This Guide advises builders, householders and landlords on diagnosing a sound insulation problem and deciding on remedial action. There is also advice on sound insulation for flat conversions.

BRE, GR22, 2 parts, 1999, 10pp
ISBN: 978-1-86081-273-6 £15.00

Specifying dwellings with enhanced sound insulation

This document gives designers information on materials and construction details for enhanced levels of sound insulation compared with the standard implied in the Building Regulations Approved Document E.

Achieving good sound insulation also depends on workmanship so the details are chosen to be as proof against poor workmanship as possible. The document gives advice on reducing impact noises not covered by the Building Regulations, increasing the sound insulation of facades, and controlling noise transmission in dwellings.

BRE, BR406, 2000, 54pp
ISBN: 978-1-86081-434-1 £25.00

CONDENSATION AND DAMPNES

Modelling condensation and airflows in pitched roofs

The risk of condensation in cold pitched roofs is dominated by airflows from the living areas of a house into the loft and through the loft to the outside. The effect of these airflows is excluded from the current British Standard procedure for assessing interstitial condensation risks. This paper discusses the factors that are necessary to construct a realistic model to predict condensation risk in structures with significant airflows, and describes the sources of the data needed to run such a model and the resulting outputs.

BRE, IP5/06, 2006, 12pp
ISBN: 978-1-86081-912-4 £9.00

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 these properties and the appropriate boundary conditions that should be used, and makes recommendations on which models should be used for a range of different types of structure. This guidance is intended for those involved in the design and construction of buildings.

BRE, IP2/05, 2005, 12pp
ISBN: 978-1-86081-738-0 £9.00

Temperature and humidity in batten voids

Changes in construction methods and materials, such as breathable membranes and high performance thermal insulation, introduce new issues for the integrity of buildings. This Information Paper describes measurements within batten voids to determine the conditions in which condensation occurs; and whether the condensation leads, in turn, to increased levels of moisture in battens. In theory, there could be risks of condensation in batten voids which may affect the moisture content of battens.

BRE, IP20/01, 2001, 12pp
ISBN: 978-1-86081-520-1 £9.00

Assessing condensation risk and heat loss at thermal bridges around openings

This paper gives guidance on assessing the risk of surface condensation and mould growth at thermal bridges around openings in the external elements of buildings, and describes a method of assessing their effect on overall heat loss. It supports the 1995 revision of the Building Regulations for conservation of fuel and power.

BRE, IP12/94, 1994, 4pp
ISBN: 978-1-86081-520-1 £9.00

Mould and its control

Information about the nature of mould and the factors which govern its growth. The basis for specifying cleaning and re-decoration procedures is discussed.

BRE, IP11/85, 1985, 4pp
ISBN: 978-1-86081-520-1 £9.00

Moisture relations in timber-framed walls

Examines the effects of different types of occupancy on the moisture levels within the external walls of timber-framed houses.

BRE, IP21/82, 1982, 4pp
ISBN: 978-1-86081-520-1 £9.00

Tackling condensation

This guide is the result of BRE monitoring carried out in more than 100 occupied buildings over six winters. It describes the basic principles of condensation and the interacting dynamic environmental conditions which cause it, suitable site investigation methods and available remedies. It also contains case studies which give examples of problems and their solutions.

BRE, BR174, 1991, 110pp
ISBN: 978-0-85125-444-9 £30.00

Effects of moisture in porous masonry

Reviews the subject of moisture movement in masonry materials. Looks at the theory of wetting, theory of drying, movement of water in materials, computer modelling of water movement, and measurement of moisture movement, and examines moisture-related problems.

BRE, BR304, 1996, 54pp
ISBN: 978-1-86081-071-8 £22.50

Estimation of thermal and moisture movements and stresses

Considers movements in building materials and components, their sources and design strategies for accommodating them, and the causes of deformation and stress. See also Digest 228.

BRE, DG227, 1978, 8pp
ISBN: 978-0-85125-168-4 £15.00

Drying out buildings

Describes methods of drying out new buildings and of testing the condition of walls, floors and joinery.

BRE, DG163, 1973, 4pp
ISBN: 978-0-85125-126-4 £9.00

Condensation in roofs

A review of design principles for minimising the risk of condensation in roofs and consequential damage to decorations or structure.

BRE, DG180, 1986, 4pp
ISBN: 978-0-85125-219-3 £9.00

Estimation of thermal and moisture movements and stresses

An analysis of thermal and moisture effects including tabulated data for assessing the change of size and shape of materials. See also Digest 227.

BRE, DG228, 1978, 8pp
ISBN: 978-0-85125-169-1 £15.00

Estimation of thermal and moisture movements and stresses: part 3

Guidance on estimation of deformations and associated forces.

BRE, DG229, 1979, 8pp
ISBN: 978-0-85125-170-7 £15.00

Surface condensation and mould growth in traditionally-built dwellings

Condensation and mould growth are widespread problems in all housing sectors. This Digest considers the circumstances that lead to surface condensation and mould growth, and suggests ways of reducing their incidence in dwellings of traditional construction.

BRE, DG297, 1985, 8pp
ISBN: 978-0-85125-341-1 £15.00

Interstitial condensation and fabric degradation

Discusses the occurrence of interstitial condensation and its possible damaging effects on the structural integrity of buildings. Gives advice on preventative and remedial measures.

BRE, DG369, 1992, 8pp
ISBN: 978-0-85125-519-4 £15.00

Damp-proof courses

Water penetration is the prime cause of deterioration in building structures and materials. The presence of excess moisture encourages the growth of moulds and wood-rotting fungi. This Digest discusses moisture exclusion, selection of materials, and installation of damp-proof courses in walls and chimneys.

BRE, DG380, 1993, 8pp
ISBN: 978-0-85125-564-4 £15.00

Treating dampness in basements

Several problems can be encountered following conversion of a basement in an older property into habitable accommodation: the most serious is probably dampness because early forms of basement construction had no damp-proofing. Although basements used as kitchens and servants' rooms were reasonably dry, many others suffer from penetrating dampness, mould growth and deterioration of timbers. This is unacceptable for habitable rooms. This Good Repair Guide gives advice to builders and householders on ways of treating dampness in basements by treating internal surfaces.

BRE, GR23, 1999, 6pp
ISBN: 978-1-86081-277-4 £9.00

Diagnosing the causes of dampness

This Guide is the first in a series, and deals with the first step to solving any damp-related problem – diagnosing the cause correctly.

BRE, GR5, 1997, 4pp
ISBN: 978-1-86081-115-9 £9.00

Treating rising damp in houses

Householders, and even some surveyors, are too quick to assume that problems with dampness are caused by rising damp. In fact, true rising damp is not very common. Because the remedies for rising damp are so expensive, it is doubly important to ensure the diagnosis is correct before starting work. This Guide presents a systematic approach to the problem.

BRE, GR6, 1997, 4pp
ISBN: 978-1-86081-126-5 £9.00

Treating condensation in houses

Over 2 million UK homes suffer from widespread condensation and dampness. This guide discusses what causes the condensation, how to make a correct diagnosis, and what the householder can do to cure the problem. It outlines simple measures including improving ventilation, heating and insulation.

BRE, GR7, 1997, 4pp
ISBN: 978-1-86081-136-4 £9.00

Treating rain penetration in houses

This Good Repair Guide (one of a series on diagnosing and dealing with dampness and related problems) explains how to determine if rain penetration is the problem; how to pinpoint the exact route the water is taking; and how to remedy the problem.

BRE, GR8, 1997, 4pp
ISBN: 978-1-86081-135-7 £9.00

Remediating condensation in domestic pitched tiled roofs

One of the most common and cost-effective ways of saving energy in houses is to insulate the roof space, usually by laying insulation between the ceiling joists. But adding insulation increases the risk of condensation in the roof and can lead to damage to the contents of the loft, the insulation and possibly even the roof structure. This Good Repair Guide describes how to find out whether a pitched tiled roof is at risk from condensation and how to minimise it.

BRE, GR30, 2001, 8pp
ISBN: 978-1-86081-474-7 £15.00

Assessing moisture in building materials

This Good Repair Guide provides building professionals with examples of analytical techniques which can be used to supplement visual information on the identification of moisture problems. The number of techniques is large so only a limited number can be reviewed. Part 1 summarises the sources of moisture in building fabric and gives advice on analysing the possible causes. Part 2 discusses a range of techniques available for measuring moisture content in building materials and Part 3 gives advice on how to interpret the data from moisture and environmental data.

BRE, GR33, 3 parts, 2002, 18pp
ISBN: 978-1-86081-870-7 £22.50

BEST SELLER: Understanding dampness

P Trotman, C Sanders and H Harrison

Despite all the technical advice that has been published about dampness in the past there is still a significant set of problems. This book seeks to address them. With an emphasis on existing buildings and some coverage of the design of new build, it lists the causes of dampness and explores its effects. It also discusses the maintenance of protection against dampness, and remedies for the problems dampness can cause.

BRE, BR466, 2004, 224pp
ISBN: 978-1-86081-686-4 £42.50

BEST SELLER: Condensation and dampness pack

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Treating rising damp in houses (GR6)

INFORMATION PAPERS

Modelling and controlling interstitial condensation in buildings (IP2/05)
Modelling condensation and airflows in pitched roofs (IP5/06)
Temperature and humidity in batten voids (IP20/01)

BRE, AP255, Ringbound set, 2007
ISBN: 978-1-86081-993-3 £50.00

Condensation checklist

This checklist is for use on site when investigating dwellings where condensation is suspected. It is based on BR 174 and designed to be used in conjunction with it. Pack of 20 checklists.

BRE, AP58, 1991
ISBN: 978-1-86081-764-9 £15.00

ELECTRICAL AND CONTROL SYSTEMS

NEW: An introduction to intelligent buildings (2-part set)

This two-part Information Paper provides an introduction to intelligent buildings. The first part gives an overview of the potential benefits, the technologies, potential applications and how these are delivered, and explains some of the jargon used; the second part outlines some of the relevant legislation and summarises essential points to consider when designing intelligent buildings.

BRE, IP13/08, 2 parts, 2008, 12pp
ISBN: 978-1-84806-077-7 £15.00

Internet Protocol: an introductory guide

Internet Protocol is the language that computers use to communicate with each other over networks. With the convergence of IT and building management networks, IP is likely to emerge as the predominant communications standard for such networks. This Information Paper provides an introduction to IP and its application to building services such as CCTV/security, VoIP, HVAC, lighting and entertainment systems. Issues such as security and reliability of IP communication must be considered before implementing fully integrated IP based services, and this paper will facilitate the decision making process.

BRE, IP1/07, 2007, 8pp
ISBN: 978-1-86081-956-8 £9.00

Electronic tagging and wireless technologies

Wireless and tagging technologies have been used successfully in several sectors of industry. Their potential for costs savings and productivity improvement for construction is estimated to be hundreds of millions of pounds. The two parts of this paper give the findings of a scoping study to evaluate the potential for the use of information and communication technologies within the supply chain of the construction industry, and, in particular, in the logistics of construction related products.

BRE, IP16/02, 2 parts, 2002, 12pp
ISBN: 978-1-86081-871-4 £12.50

Standardised and prefabricated wiring for buildings

Benefits of standardising and prefabricating the electrical and electronic wiring systems in buildings for power distribution, environmental monitoring and control, data and voice communications include: simpler design and project planning, better quality control, faster, easier and safer installation, assured performance and reliability, enhanced system flexibility and reusability, and lower whole-life costs. Part 1 focuses on the whole-life benefits, and ways of overcoming barriers to their wider use. Part 2 describes case studies highlighting savings that can be achieved.

BRE, IP15/01, 2 parts, 2001, 8pp
ISBN: 978-1-86081-492-1 £12.50

Advanced technologies for 21st century building services

In the 21st century there will be increasing demand for high performance building services, providing better energy efficiency as well as being robust, user friendly and providing an excellent indoor environment. This Paper reviews technologies examined in the DETR-funded Advanced Technology Transfer Project, and indicates areas where further work would be worthwhile.

BRE, IP17/00, 2000, 8pp
ISBN: 978-1-86081-417-4 £9.00

Magnetic fields and building services

Focuses on the magnetic fields in non-domestic buildings produced by building services equipment.

BRE, IP2/97, 1997, 4pp
ISBN: 978-1-86081-103-6 £9.00

Electromagnetic compatibility of building services: towards a European standard

Advanced electronic controls used in building services can be affected by electrical noise from other sources. BRE has developed an electromagnetic compatibility standard for building services electronics.

BRE, IP15/89, 1989, 4pp
ISBN: 978-1-86081-103-6 £9.00

A new method for predicting energy saving from on/off photoelectric controls

Automatic daylight-linked lighting controls can reduce building energy costs if enough daylight is available on working areas during the year. This paper describes a new method, based on recent daylight measurements at BRE, to enable these energy savings to be predicted more accurately.

BRE, IP14/84, 1984, 4pp
ISBN: 978-1-86081-103-6 £9.00

Protecting buildings against lightning

A lightning protection system (LPS) for any structure is a sensible precaution, but its installation is particularly important where there is a clear risk to life, the structure or its contents are irreplaceable, or essential services could be affected. This Digest gives guidance on calculating the risk of a building being struck by lightning and describes the principles of designing LPS for new and existing buildings.

BRE, DG428, 1998, 8pp
ISBN: 978-1-86081-130-2 £15.00

Electrical interference in buildings

Electrical interference has been identified as a main cause of malfunction in electronic building services equipment. A description is given of the types of electrical disturbance causing interference and suggestions are provided on techniques to minimise its effects.

BRE, DG335, 1988, 8pp
ISBN: 978-0-85125-357-2 £15.00

Installing BMS to meet electromagnetic compatibility requirements

Advises on avoiding electrical interference to building management systems (BMS), which like all electronic products are inherently susceptible to it.

BRE, DG424, 1997, 12pp
ISBN: 978-1-86081-101-2 £15.00

Photovoltaics: integration into buildings

Electrical power from solar energy has been investigated and used in small-scale applications for many years. Environmental considerations now make it imperative to apply the technology to buildings. This Digest describes photovoltaic options and installations in relation to standards and regulations, compatibility with other building elements, safety and ease of maintenance. It will help architects, designers of building components, specifiers and owners to identify the main issues and practicalities of using photovoltaic systems to supplement conventional electricity generation for buildings.

BRE, DG438, 1999, 6pp
ISBN: 978-1-86081-293-4 £9.00

Information technology trends and the construction industry

This report examines different areas of information technology, and comments on the implications of IT development for the construction industry. The techniques described, along with all the other aspects of emerging IT, are likely to have the greatest impact on tomorrow's construction industry.

BRE, BR269, 1994, 56pp
ISBN: 978-0-85125-646-7 £62.50

Electromagnetic fields: a review of the evidence for effects on health

Considers theories that exposure to electric or magnetic fields at work or in the home can damage health and reviews the literature. Contains analysis of problems in study methods and examines biological experiments on possible mechanisms for the interaction of living tissue and magnetic fields of extremely low frequency. Specialist terms are explained in a glossary.

BRE, BR206, 1991, 38pp
ISBN: 978-0-85125-498-2 **£30.00**

Specification of building management systems

Proceedings of a symposium held by BRE in association with CIBSE at Garston in May 1983.

BRE, BR46, 1984, 60pp
ISBN: 978-0-85125-071-7 **£22.50**

Electromagnetic compatibility requirements for microelectronics in building services

A proposed standard

The proposed standard specifies the levels of electromagnetic emission and immunity which manufacturers' products need to satisfy if they are to function satisfactorily in the intended electromagnetic environment, without adversely affecting that environment or other electronic systems.

BRE, BR102, 1987, 42pp
ISBN: 978-0-85125-264-3 **£30.00**

Review of knowledge-based systems for the construction industry

This report reviews work relating to knowledge-based systems (KBSs), explains key concepts and alternative approaches, and reviews the current status of KBSs in the construction industry. It describes the UK knowledge-based network, its progress to date and the future workplan. It summarises areas of application of importance to the construction industry and which seem to be amenable to the development of KBSs. (Available on CD ROM 10/98)

BRE, BR348, 1998
ISBN: 978-1-86081-232-3 **£40.00**

Prefabricated power cabling for buildings

Procuring, installing and testing

Prefabricated cabling systems for lighting and small power distribution in buildings can speed up the installation of systems and equipment. Building owners, consultants, electrical contractors and suppliers of electrical fittings cannot afford to ignore the technologies and products now available. This Digest presents guidance on procuring and installing prefabricated cabling systems, including a suggested procedure for on-site inspection and testing of products that have been pretested in the factory.

BRE, DG456, 2001, 6pp
ISBN: 978-1-86081-491-4 **£9.00**

Electrical, lighting, acoustics and control systems pack

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BRE, AP257, Ringbound set, 2007
ISBN: 978-1-86081-995-7 **£95.00**

ENERGY AND HOUSING

NEW: An introduction to PassivHaus

A guide for UK application

This Information Paper provides an introduction to the key principles of PassivHaus design for developers, architects and aspiring self-builders. The term 'PassivHaus' refers to a voluntary, ultra-low-energy construction standard developed in the early 1990s at the PassivHaus Institut, Darmstadt, Germany. The focus of PassivHaus design is to dramatically reduce the requirement for space heating and cooling. This can be achieved without compromising comfort or needing to rely on the falling costs of renewable energy technologies. PassivHaus incorporates some features of passive design (a solar efficient design combined with high thermal efficiency) but incoming fresh air is pre-heated using a carefully designed ventilation system; this is an 'active' approach.

BRE, IP12/08, 2008, 8pp
ISBN: 978-1-84806-075-3 **£9.00**

The scope for reducing carbon emissions from housing

The Government has set a target of reducing carbon emissions to the atmosphere by 60% by 2050. This Information Paper evaluates the scope for cost-effective reductions in emissions through energy efficiency measures in housing. From a starting point of 2001, it considers the potential for reductions by 2010, 2020 and 2050. It is derived from a wider BRE study, 'Reducing carbon emissions from the UK housing stock' (BR 480).

BRE, IP15/05, 2005, 8pp
ISBN: 978-1-86081-892-9 **£9.00**

Domestic energy use and carbon emissions: scenarios to 2050

This paper describes five scenarios for energy consumption and carbon emissions from the domestic sector up to 2050. In addition to traditional energy efficiency measures, it looks at changes to heating systems to introduce low carbon technologies, the use of solar panels and photovoltaics, and increased low carbon electricity generation from the national grid. The costs and savings of each scenario relative to the reference scenario are examined. Overall cumulative costs range between £10 billion and £55 billion. In all scenarios the cumulative savings outweigh the costs by about 2012 indicating that, considered as an entire package, each of the scenarios would be cost-effective for society as a whole. It is derived from a wider BRE study, 'Reducing carbon emissions from the UK housing stock' (BR 480).

BRE, IP16/05, 2005, 6pp
ISBN: 978-1-86081-893-6 **£9.00**

Energy use and carbon dioxide emissions for UK housing: two possible scenarios

This paper presents the results of two possible scenarios for energy use and carbon dioxide emissions of the UK housing stock, developed using the BREHOMES model. One of them represents what is likely to happen if current trends continue, and is an update to the scenario in BRE Information Paper IP9/94. The second represents what could happen if the rates of uptake of energy efficiency measures increased. It shows that reductions in carbon dioxide emissions could be considerable: by 2020 they could amount to about 250 PJ (or 21 million tonnes of CO₂) per year, representing roughly 13% of the corresponding energy use and CO₂ emissions both now and, at current trends, in 2020. Furthermore, the cost savings if rates of energy efficiency improvement increase, are shown to be considerably greater than the extra expenditures when assessed over the period up to 2020.

BRE, IP7/97, 1997, 4pp £9.00
ISBN: 978-1-86081-146-3

A guide to the development of BREDEM

This paper describes the development of the BRE Domestic Energy Model (BREDEM). It acts as a guide to the different versions of the model and indicates the likely direction of future developments.

BRE, IP4/95, 1995, 4pp £9.00

Energy efficiency in new housing

Case studies show the marketing advantage of an energy efficiency specification for new housing, and how higher standards can be achieved at little or no extra cost. This paper advocates an integrated approach to energy-efficient design, and is intended for architects, designers and specifiers of new social and private housing.

BRE, IP15/94, 1994, 4pp £9.00

Energy use in the housing stock

This paper provides information about energy use and energy efficiency trends in British homes since 1970. It demonstrates that energy efficiency measures have played a very important part in keeping average dwelling energy consumption relatively constant and in helping to reduce associated carbon dioxide emissions, while also making it possible to achieve improved levels of service.

BRE, IP20/94, 1994, 4pp £9.00

Assessing programs which predict the thermal performance of buildings

Discusses the problems of validating programs that predict the thermal performance of buildings, outlines sources of error and describes techniques to detect them.

BRE, IP7/92, 1992, 4pp £9.00

The U-value of ground floors: application to building regulations

Describes a method for obtaining the U-value of ground floors (including floors of irregular shape) from their area and perimeter measurements. A table shows the thickness of insulation to be applied to a floor to achieve a U-value of 0.45 W/m²K.

BRE, IP3/90, 1990, 4pp £9.00

Improving energy efficiency in housing

Provides a summary of the principle opportunities for improving energy efficiency in both new and existing housing. It partly draws on experience gained from projects carried out under the Energy Efficiency Demonstration Scheme.

BRE, IP24/89, 1989, 4pp £9.00

An energy-efficient refurbishment of electrically heated high-rise flats

Describes the results and lessons learned from the extensive monitoring of two blocks of high-rise flats which had a comprehensive package of energy efficiency measures included as part of a major refurbishment programme.

BRE, IP20/89, 1989, 4pp £9.00

Domestic warm-air heating systems using low-grade heat sources

The practicability of using warm-air distribution systems with low-temperature heat sources (eg, solar, heat pump and geothermal) has been demonstrated in a test room. A wide range of conditions were studied, and optimal air-supply rates and source temperatures for comfortable conditions determined.

BRE, IP1/89, 1989, 4pp £9.00

Energy assessment for dwellings using BREDEM worksheets

Data is given for a 'worksheet' calculation of energy-use in dwellings using a simplified BREDEM methodology. The worksheet - one copy is included with the paper - is constructed for use with a hand-held calculator and IBM-compatible microcomputers. (Additional worksheets: AP 45).

BRE, IP13/88, 1988, 4pp £9.00

Energy efficiency in the housing stock

BREHOMES is a model of energy use in the UK housing stock developed by BRE. Results from various surveys are presented in this paper which is addressed to all those concerned with improving energy efficiency in buildings.

BRE, IP22/88, 1988, 4pp £9.00

Investing in energy efficiency: Domestic hot water systems

This paper describes economic assessment of energy efficiency measures comprising the addition of an insulating jacket to a hot water storage system, installation of a shower for use instead of a bath, and installation of various heating system automatic controls. Sample calculations are given.

BRE, IP1/87, 1987, 4pp £9.00

Investing in energy efficiency: 3. New housing

The third of a short series of Information Papers concerned with the economic assessment of energy efficiency measures in housing. This paper examines the effects of installing additional thermal insulation or maximising solar energy heating in a 'standard' semi-detached house.

BRE, IP22/86, 1986, 4pp £9.00

Investing in energy efficiency: 2. Existing housing

Uses the appraisal technique described in Information Paper 17/86 to assess the economic value of several energy efficiency measures applied to existing housing. Examples are given for loft insulation, wall insulation, double glazing and reflective foil behind radiators. The basic procedure is explained and sources of further information given.

BRE, IP20/86, 1986, 4pp £9.00

Investing in energy efficiency: 1. Appraisal techniques and assumptions

Reviews several investment appraisal techniques and discusses how they can be used to assess the economic benefits of different energy efficiency measures in housing.

BRE, IP17/86, 1986, 4pp £9.00

BREDEM: The BRE Domestic Energy Model

A summary of the report BR66 'BREDEM - the BRE Domestic Energy Model - background, philosophy and description'.

BRE, IP16/85, 1985, 4pp £9.00

An assessment of the cost-effectiveness and potential of heat pumps for domestic hot water heating

Indicates the circumstances in which the heat pump would be cost-effective, with the most promising potential markets in commercial premises and in dwellings with a high hot water use.

BRE, IP8/85, 1985, 4pp
£9.00

The cost effectiveness of heat pumps in highly insulated dwellings: an assessment

It was found that savings in the running costs of electric heat pumps compared with most conventional central heating systems do not currently justify their extra capital cost. This paper discusses how, once a 40 per cent reduction in capital cost, a 43 per cent increase in performance, or smaller improvements in both, are achieved, the heat pump will be cost-effective as a replacement for oil-fired heating.

BRE, IP7/85, 1985, 4pp
£9.00

Optimum start controls in modern low-energy buildings

Using the BRE low-energy office at Garston as an example, this paper describes how the incorporation of an optimum start control to meet the new Part Q of the Building Regulations, in a building insulated to the new standards of Part FF, means that special attention needs to be given to system design and installation.

BRE, IP3/83, 1983, 4pp
£9.00

Field studies on the effect of increased thermal insulation in some electrically heated houses

Describes measurements recorded in a study of local authority two-storey terraced houses taken to assess the practical benefits of an improved standard of thermal insulation.

BRE, IP10/79, 1979, 4pp
£9.00

Building regulations: conservation of fuel and power

The 'energy target' method of compliance for dwellings

Sets out, for dwellings, the 'energy target' method of complying with the 1990 Building Regulations in the form of a worksheet. The data needed for calculations, sample calculation and blank worksheet are also provided. Additional worksheets, packed in 50s, are available (reference AP 47).

BRE, BR150, 1989, 16pp
ISBN: 978-0-85125-390-9 £22.50

Domestic energy fact file

1993 update

Updates the BRE Report 'Domestic energy fact file', providing information about energy use and energy efficiency in British homes up to and including 1991. The tables relate to national totals and will be of use mainly to government departments and others interested in research or planning at that level.

BRE, BR251, 1993, 8pp
ISBN: 978-0-85125-597-2 £15.00

Domestic energy factfile

This publications gathers together some of the more important trends related to domestic energy and the measures that have been taken to improve energy efficiency with which it is used. This edition covers the period between 1970 and 1996.

BRE, BR354, 1998, 54pp
ISBN: 978-1-86081-248-4 £35.00

BREDEM – BRE Domestic Energy Model

Background, philosophy and description

Describes a procedure for calculating the annual energy requirements of houses. It is designed to provide realistic results while being relatively simple to operate using a calculator or computer. BREDEM is based on many years' practical experience of what happens in buildings, and represents a synthesis of available information.

BRE, BR66, 1985, 92pp
ISBN: 978-0-85125-351-0 £22.50

Energy efficiency in dwellings

Levels of energy efficiency required for new dwellings by the Building Regulations and improvements to the efficiency of existing buildings, particularly considering the opportunities created by major refurbishments, are described. This Digest identifies the factors determining energy requirements and the methods used to assess energy efficiency.

BRE, DG355, 1990, 8pp
ISBN: 978-0-85125-467-8 £15.00

Improving energy efficiency

This Good Repair Guide suggests some ways of improving insulation. It will be of interest to householders and builders involved in refurbishment.

BRE, GR26, 1999, 6pp
ISBN: 978-1-86081-309-2 £9.00

Domestic energy fact file: owner occupied homes

One of four reports providing information on trends in energy use and energy efficiency in four sectors of the UK housing stock between 1970 and 1998. It presents tables, graphs and charts equivalent to those in the Domestic Energy Fact File 1998, which covers all tenures and provides a full discussion and explanation. Although this report focuses on owner occupied homes it also draws comparisons with other tenures (primarily local authority homes) to illustrate important points.

BRE, BR408, 2000, 26pp
ISBN: 978-1-86081-448-8 £40.00

Domestic energy fact file: local authority homes

One of four reports providing information on trends in energy use and energy efficiency in four sectors of the UK housing stock between 1970 and 1998. It presents tables, graphs and charts equivalent to those in the Domestic Energy Fact File 1998, which covers all tenures and provides a full discussion and explanation. Although this report focuses on local authority homes it also draws comparisons with other tenures (primarily owner occupied homes) to illustrate important points.

BRE, BR409, 2000, 26pp
ISBN: 978-1-86081-449-5 £40.00

Domestic energy fact file: Registered Social Landlord (RSL) homes

One of four reports providing information on trends in energy use and energy efficiency in four sectors of the UK housing stock between 1970 and 1998. It presents tables, graphs and charts equivalent to those in the Domestic Energy Fact File 1998, which covers all tenures and provides a full discussion and explanation. Although this report focuses on RSL homes from the mid-1980s onwards it also draws comparisons with other tenures (primarily owner occupied homes) to illustrate important points.

BRE, BR411, 2000, 28pp
ISBN: 978-1-86081-451-8 £40.00

Domestic energy fact file: private rented homes

One of four reports providing information on trends in energy use and energy efficiency in four sectors of the UK housing stock between 1970 and 1998. It presents tables, graphs and charts equivalent to those in the Domestic Energy Fact File 1998, which covers all tenures and provides a full discussion and explanation. Although this report focuses on private rented homes it also draws comparisons with other tenures (primarily owner occupied homes) to illustrate important points.

BRE, BR410, 2000, 28pp
ISBN: 978-1-86081-450-1 £40.00

Domestic energy factfile: England, Scotland, Wales and Northern Ireland

Presents information on trends in energy use and energy efficiency of the housing stocks of England, Scotland, Wales and Northern Ireland from the mid-1970s to 1999. It forms part of the established series of publications that have focused thus far on Great Britain and on individual tenures. The report presents tables, graphs and charts equivalent to those in the Domestic Energy Fact File for Great Britain published in 1998, which provides a full discussion and explanation.

BRE, BR427, 2001, 100pp
ISBN: 978-1-86081-512-6 **£50.00**

BREDEM-12: model description

This document describes the technical basis of BREDEM-12, the current annual version of the BRE Domestic Energy Model. This model estimates energy consumption in dwellings, including estimates for space heating, water heating, cooking, lights and appliances. The principles behind the model are discussed and the equations are listed. Sufficient information to implement the model is given. 2001 update.

BRE, BR438, 2002, 88pp
ISBN: 978-1-86081-536-2 **£47.50**

BREDEM-8: model description

This document describes the technical basis of BREDEM-8, the current monthly version of the BRE Domestic Energy Model. This model estimates energy consumption in dwellings, including estimates for space heating, water heating, cooking, lights and appliances. The principles behind the model are discussed and the equations are listed. Sufficient information to implement the model is given. 2001 update, with corrections May 2002.

BRE, BR439, 2002, 102pp
ISBN: 978-1-86081-537-9 **£47.50**

Carbon emission reduction from energy efficiency improvements to the UK housing stock

This report updates BRE work on energy use and carbon dioxide emissions for housing taking account of new data and improved analytical techniques. The work follows three lines of investigation: assessment of the cost-effectiveness of 28 energy-efficiency measures or products and the carbon savings these could produce; assessment of the success of past energy-efficiency policies (ie grants for energy efficiency improvements); and future scenarios for energy use and carbon emissions of the housing stock.

BRE, BR435, 2001, 72pp
ISBN: 978-1-86081-532-4 **£42.50**

Domestic energy fact file 2003

Domestic energy use represents a large proportion of total national energy use and has risen from 25% of the total in 1970 to 30% in 2001. This edition updates the 1998 Fact File, presenting up-to-date information and introducing some new topics. It gathers in one volume data on important trends related to domestic energy use and, in particular, information on the measures taken to improve energy efficiency. The Fact File covers the period 1970–2001.

BRE, BR457, 2003, 104pp
ISBN: 978-1-86081-623-9 **£35.00**

Reducing carbon emissions from the UK housing stock

L D Shorrock, J Henderson and J I Utley

The UK Government set itself the goal of working towards reducing carbon emissions by 60% by 2050. This report explores the scope for achieving such reductions within the housing stock through energy efficiency measures and the uptake of low carbon technologies, such as renewable energy. It examines the current potential for such improvements, including their cost-effectiveness and assesses the effects that past energy efficiency policies have had. Extensive tabulations of hard-to-find data on cost-abatement analyses and past policies are included. Finally, it considers what could happen in the future.

BRE, BR480, 2005, 80pp
ISBN: 978-1-86081-752-6 **£50.00**

Mechanical installation of roof-mounted photovoltaic systems

This Digest gives guidance on installing and using photovoltaic systems on roofs. The guidance refers only to the mechanical installation of roof mounted integrated and stand-off photovoltaic systems; it provides best practice guidance on installation requirements and does not constitute fixing instructions. A classification system for photovoltaic systems is included, which incorporates illustrations of commercially available systems. Care, maintenance and inspection are also covered. This Digest has been prepared as part of a Partners in Innovation project funded by the Department of Trade and Industry.

BRE, DG495, 2005, 6pp
ISBN: 978-1-86081-869-1 **£9.00**

BEST SELLER: Part L explained - The BRE guide

BRE

This guide will help architects and builders understand the energy performance requirements in the 2006 edition of Part L of the Building Regulations. It explains:

- the background to the changes
- the EU Energy Performance of Buildings Directive (EPBD)
- the Regulations and approved guidance that implement the changes
- designing buildings to meet the new carbon dioxide emission targets
- new standards for work in existing buildings.

It is presented in a concise and accessible format to help you understand the major changes in the Regulations and approved documents, and get up to speed without delay. It draws on BRE's close involvement in supporting the government work in drawing up the new Regulations.

"The changes to Part L are radical and far reaching. This guide is designed to help designers and builders through the maze and to provide clear guidance in achieving cost-effective compliance with the new requirements." From the Foreword by Professor David Strong, MD of BRE Environment and Chairman of UK advisory group on implementation of the EPBD

BRE, BR489, 2006, 120pp
ISBN: 978-1-86081-910-0 **£25.00**

Domestic energy fact file

Set of four reports

BRE, AP139, 4 parts, 2000
ISBN: 978-1-86081-772-4 **£85.00**

ENERGY USE AND EFFICIENCY

Micro-wind turbines on house roofs

This Information Paper gives guidance on the optimum siting of micro-wind turbines above typical house roofs to maximise the wind energy potential and hence power output.

BRE, IP4/08, 2008, 6pp
ISBN: 978-1-84806-047-0 **£9.00**

Determining the minimum thermal resistance of cavity closers

Guidance on determining the design thermal resistance of cavity closers as defined in Accredited Construction Details. Additional instruction and procedures are given and illustrated by worked examples. The guidance can be used in assessing the adequacy of the thermal performance of both proprietary and ad-hoc cavity closers. A4 12pp

BRE, IP8/08, 2008, 12pp
ISBN: 978-1-84806-053-1 **£12.50**

SBEM for non-domestic buildings

SBEM, the Simplified Building Energy Model, is a tool for calculating the energy used by a non-domestic building.

This information paper will help designers, building services engineers, facilities managers and building control officers to understand what SBEM is and how it works as a core energy calculation tool.

BRE, IP2/07, 2007, 12pp
ISBN: 978-1-86081-957-5 **£12.50**

Assessing the effects of thermal bridging at junctions and around openings

This paper gives guidance on assessing the effects of thermal bridging at junctions and around openings in the external elements of buildings and how to assess their effect on the overall heat loss (or heat gain). It enables a satisfactory estimate of these heat transfers to be made for the purposes of carrying out building regulations compliance calculations. It supports the building regulations for the conservation of fuel and power in all three jurisdictions within the UK. The guidance is primarily intended for junction and opening details that are not as recommended in 'Accredited construction details' or MCRMA/EPIC guidance. This paper is a revision of IP17/01 which is now withdrawn.

BRE, IP1/06, 2006, 6pp
ISBN: 978-1-86081-904-9 **£9.00**

Small scale, building integrated, wind power systems

This Information Paper provides an overview of the key issues for government, regulators, suppliers and designers in enabling greater use of small scale wind power. It also gives brief overviews of companies and wind power systems. It is based on the proceedings of the 2005 BRE/British Wind Energy Association Conference. The UK's renewable energy target for 2010 will be mostly met through large scale renewable energy projects. However, small scale installations will also have an important role to play. Renewable energy is an indispensable factor in developing sustainable communities and small scale production is an effective way for a community to produce its own electricity. At the right scale, and on appropriate sites, wind energy is one of the most economic and rapid means of reducing carbon dioxide emissions.

BRE, IP12/05, 2005, 12pp
ISBN: 978-1-86081-879-0 **£9.00**

Dynamic insulation for energy saving and comfort

A dynamic insulation system works by drawing outdoor air into a building through an insulation layer which is permeable to air. Heat, otherwise be lost by conduction, is recovered in the incoming ventilation air. This paper describes dynamic insulation systems and discusses energy savings and practicalities of building with them. It also covers practical design and buildability issues. The energy savings from the use of dynamic insulation are limited to the conduction loss expected for the same level of conventional insulation. The major benefit is improved comfort due to the ventilation air being preheated.

BRE, IP3/03, 2003, 8pp
ISBN: 978-1-86081-618-5 **£9.00**

Solar energy in urban areas

The exploitation of solar energy in cities is difficult owing to a combination of factors. For example, obstructing buildings can block solar access. This paper discusses the problems and shows how they can be overcome. It will be of interest to architects, engineers, consultants and urban planners.

BRE, IP5/01, 2001, 6pp
ISBN: 978-1-86081-464-8 **£9.00**

Modelling the performance of thermal mass

This Paper looks at the impact on thermal and energy performance of: building envelope, internal heat gains, operating period, ventilation, thermal mass and control. It highlights the importance of reducing infiltration and conduction losses when refurbishing a building to include thermal mass, the difference between winter mid-season and summer operation and the impact of the night cooling strategy selected on energy use. It considers the effect on acoustics and lighting of the introduction of exposed ceilings. It also gives guidelines for modelling thermal mass performance. BRE Digest 454 gives guidance on incorporating thermal mass into office buildings.

BRE, IP6/01, 2001, 12pp
ISBN: 978-1-86081-465-5 **£9.00**

Performance of air-conditioning systems with alternative refrigerants

A new EC Regulation is being considered that may prohibit the continued use of CFCs for maintaining existing refrigeration systems and the use of HCFCs in new systems. This paper outlines the options for replacing CFCs and HCFCs in building air-conditioning systems, and reports recent findings from BRE work to investigate the performance of systems converted to an alternative refrigerant. This paper will be of interest to building owners and operators, architects, and building services engineers and consultants.

BRE, IP6/98, 1998, 4pp
ISBN: 978-1-86081-199-9 **£9.00**

Demonstration of re-use and recycling of materials: BRE energy efficient office of the future

This paper details a project to identify and study the practicalities of re-use and recycling, regarding commercial, operational and contractual issues. It provides valuable information for those concerned with demolition and waste management.

BRE, IP3/97, 1997, 4pp
ISBN: 978-1-86081-131-9 **£9.00**

Comfort, control and energy efficiency in housing

In well designed and well managed buildings, comfort and energy efficiency can go together. Occupants should enjoy reasonable comfort under automatic control, but should also be able to alleviate discomfort manually when necessary. BRE studies show that improved controls for temperature, light and ventilation, will lead to energy savings.

BRE, IP3/95, 1995, 4pp
£9.00

The safety and environmental requirements of new refrigerants

This paper gives information and guidance on the safety and environmental requirements that are associated with the use of new refrigerants to replace CFCs and HCFCs in building air-conditioning systems. It also alerts designers, owners and operators to the requirements of the revised British Standard on refrigeration safety (BS 4434:1995) and to their statutory duties under UK health and safety legislation.

BRE, IP16/95, 1995, 4pp
£9.00

Phase-out of CFCs and HCFCs: options for owners and operators of air conditioning systems

This paper gives owners and operators of air conditioning systems advice on options for coping with the CFC and HCFC phase-outs and end-use controls.

BRE, IP14/95, 1995, 4pp
ISBN: 978-1-86081-035-0 **£9.00**

Energy use by office equipment: reducing long-term running costs

This paper explains how a better understanding of the power needs of office equipment can lead to cost savings through the use of energy-efficient equipment and a reduction in office cooling requirements.

BRE, IP10/94, 1994, 4pp
£9.00

Financial benefits of energy efficiency to housing landlords

A new study shows how housing landlords can benefit financially by investing in energy efficiency measures. For every £1 potentially saved by tenants, a similar saving is available to the landlord in previously unquantified management and maintenance costs. This information will be of particular interest to housing managers and others responsible for targeting investment in social housing.

BRE, IP11/94, 1994, 4pp

£9.00

Energy consumption in public and commercial buildings

An appraisal of the total delivered energy used to supply building services to UK public and commercial buildings in 1991. Estimates of the split of that energy between the different services and fuels are given for each of the major economic groups. This paper will interest those wanting a general overview of buildings-related carbon dioxide emissions and energy use.

BRE, IP16/94, 1994, 4pp

£9.00

Energy efficiency in schools

Schools could save money and benefit the environment if their buildings were made more energy-efficient. It is not widely recognised that many energy-saving measures are simple and inexpensive, and that they could be cost-effectively incorporated in a programme of routine maintenance and refurbishment.

BRE, IP2/94, 1994, 4pp

£9.00

Future energy use and carbon dioxide emissions for UK housing: a scenario

This paper describes a method of estimating future energy use and carbon dioxide emissions for the United Kingdom housing stock and presents the results of a scenario based on this method. The method relies on BRE's energy balance model (BREHOMES) and the resulting scenario can be used to judge progress towards the UK's aim, under the Climate Change Convention, of returning carbon dioxide emissions to 1990 levels by the year 2000.

BRE, IP9/94, 1994, 4pp

£9.00

U-values for basements

Gives data for determining the insulation needed to achieve U-values of 0.45 W/m²K for basements, as currently required by the Elemental Method of satisfying the 1995 edition of the Building Regulations.

BRE, IP14/94, 1994, 4pp

£9.00

Minimising refrigerant emissions from air conditioning systems in buildings

Tells building owners, operators and their consultants what they can do to minimise leakage of harmful refrigerants (CFCs and HCFCs).

BRE, IP1/94, 1994, 4pp

£9.00

Condensing boilers: a review of their performance in practice

Condensing boilers are more energy-efficient and environmentally friendly than conventional plant. This paper summarises the results of extensive studies of condensing boiler installations, and demonstrates that they can be a highly cost-effective way of saving energy. It will be of interest to building designers, owners and users, and to services specialists.

BRE, IP19/94, 1994, 4pp

£9.00

Industrial building refurbishments: opportunities for energy efficiency

Describes the results of market research into refurbishment, motivation and attitudes. Assesses opportunities for energy efficiency and discusses why this is often neglected. Relevant to policies, planning and project proposals of anyone involved in refurbishment of industrial buildings.

BRE, IP2/93, 1993, 4pp

£9.00

Energy use in office buildings

Reviews average and 'good practice' energy use and costs in four types of office building. Analyses energy consumption by various end-uses in typical and good practice buildings.

BRE, IP20/92, 1992, 4pp

£9.00

Energy audits and surveys

Gives an overview of good practice in implementing energy audits and surveys in commercial, industrial and public-sector buildings

BRE, IP12/92, 1992, 4pp

£9.00

Improving the energy-efficient performance of high-rise housing

This paper draws on a survey of high-rise housing owned by ten local authorities, highlights some of the problems and suggests strategic improvements in the way buildings are refurbished and managed.

BRE, IP4/91, 1991, 4pp

£9.00

The BRE low-energy office: an assessment of electric heating

The conclusions drawn from an assessment of the costs and benefits following installation of electric heating in BRE's Low Energy Office.

BRE, IP16/90, 1990, 4pp

£9.00

Retail warehouses: the potential for increasing energy efficiency

A description of an assessment of opportunities for energy-efficient design and retrofit for industrial shed-type retail warehouses. The assessment related to cost savings and environment benefits, and resulted from the examination of five major retail operations.

BRE, IP8/90, 1990, 4pp

£9.00

High-tech mixed-use buildings: attitudes to energy efficiency

An overview of market research into high-tech, mixed-use office and industrial developments. Attitudes to energy efficiency and environment are examined in relation to the process of building selection and development.

BRE, IP1/90, 1990, 4pp

£9.00

Energy-efficient factories: design and performance

BRE's assessment of, and the increased energy efficiency that can be achieved in, factories built with higher standards of insulation than those required by the Building Regulations.

BRE, IP13/89, 1989, 4pp

£9.00

The gas engine driven heat pump dehumidification system at the Farnborough Recreation Centre - an assessment

A 12-month monitoring period has demonstrated that the performance of a gas engine driven dehumidification system for an indoor swimming pool at the Farnborough Recreation Centre has exceeded design expectations and achieved a 70% saving in heating energy. The system itself and the economics of it are described here.

BRE, IP14/86, 1986, 4pp

£9.00

Reliability of underground heat mains in the UK

Provides objective data on the reliability and costs in use of heat distribution networks in district heating schemes throughout the country, based primarily on the experience and records of owners and operators.

BRE, IP1/86, 1986, 4pp

£9.00

Selection of building energy management systems

Examines the features, attributes and limitations of available systems and discusses the factors affecting their suitability for particular types of application from the point of view of the user. It considers specification, application software, the man-machine interface, hardware, and supply and cost factors.

BRE, IP6/85, 1985, 4pp £9.00

Performance of a PSA trial energy management system

Provides a detailed assessment of energy and other savings achieved in a medium-sized conventionally heated Government office building after the installation of a microprocessor-based energy management system (EMS) by the Property Services Agency.

BRE, IP2/85, 1985, 4pp £9.00

The assessment of U-values for insulated roofs

Reports the results of some measurements on insulated ceilings carried out for BRE in the Agreement Board's 'hot box'. It discusses their relationship with conventional calculation procedures for the assessment of U-values, and identifies the need for more information on air speeds in loft spaces.

BRE, IP3/81, 1981, 4pp £9.00

A practical guide to infra-red thermography for building surveys

This report is concerned with the thermal behaviour of buildings and their components, and describes methods and precautions to be adopted with the technique of infra-red thermography.

BRE, BR176, 1991, 120pp £47.50
ISBN: 978-0-85125-448-7

BEST SELLER: Thermal insulation: avoiding risks

Prepared to support the Building Regulations for the conservation of fuel and power, this guide represents the recommendations of BRE on good design and construction practice associated with thermal standards. Technical risks are highlighted and these are followed by actions that could be taken to avoid the risk. The third edition of this well-established guide contains a number of revisions resulting from developments in research, changes in materials, construction techniques and the Building Regulations.

BRE, BR262, 2001, 86pp £32.50
ISBN: 978-1-86081-515-7

Energy use in buildings and carbon dioxide emissions

About half of the total UK emissions of the major greenhouse gas, carbon dioxide, is attributable to buildings; of this, about 60% is from dwellings. This report analyses and reviews evidence of emissions in the UK and the world as a whole, and considers the potential for reducing them.

BRE, BR170, 1990, 56pp £35.00
ISBN: 978-0-85125-436-4

Electric heating in highly-insulated buildings

Experiences from the BRE Low Energy Office

An assessment of the design, installation, operation and performance of electric heating in BRE's Low Energy Office building following its refurbishment.

BRE, BR175, 1990, 80pp £35.00
ISBN: 978-0-85125-447-0

Energy economy and heat retention

Construction Products Directive of the European Communities. Draft Interpretative Document

One of a series of reports following seminars involving the presentation and discussion of five of the six drafts of the Interpretative Documents. These IDs will provide the links between the Essential Requirements of the Directive and the mandates for producing European Standards, Technical Approvals and other technical specifications.

BRE, BR179, 1990, 70pp £22.50
ISBN: 978-0-85125-451-7

Non-domestic buildings energy fact file

This document gathers key statistics relating to structure and energy use of the UK's non-domestic buildings. It includes historical information on the way energy is used and how this relates to carbon dioxide emissions; the occurrence of building services; and the structure of the stock.

BRE, BR339, 1998, 132pp £42.50
ISBN: 978-1-86081-205-7

Performance of HVAC systems and controls in buildings

Proceedings of a symposium held at BRE, Garston, on advances in the understanding of complex interactions of HVAC systems, their controls and the buildings in which they are installed, and the role this plays in the realisation of greater energy efficiency.

BRE, BR64, 1985, 342pp £37.50
ISBN: 978-0-85125-349-7

Facilities Managers' Energy Primer

This guide is written for anyone whose job involves energy management. It considers how to integrate energy efficiency into all aspects of the management of a facility. It shows how to reduce energy consumption and running costs and gives guidance on increasing awareness of energy conservation.

EP46, 1997, 72pp £22.50
ISBN: 978-1-86081-129-6

The thermal efficiency of large oil-fired boilers

Investigation of factors affecting the thermal efficiency of seven commercial/industrial oil-fired boilers

Gives the results of tests on seven boilers with rated outputs from 111 to 5689 kW to determine the factors affecting their thermal efficiency when run at less than full load. The results can be used to achieve energy savings over a wide range of boiler types.

BRE, BR140, 1988, 90pp £42.50
ISBN: 978-0-85125-363-3

Trends in thermal comfort research

Among the many topics covered in this review are: the discrepancy between field study and climate chamber predictions for thermal comfort, the effects on thermal comfort of air movement, thermal radiation, clothing and physiology, thermal comfort indices, instrumentation developments, the subjective assessment of the environment, and energy conservation.

BRE, BR266, 1994, 42pp £22.50
ISBN: 978-0-85125-635-1

Reliability and performance of solar-collector systems

Advice for design and installation of systems using liquid heat transfer. This Digest describes some of the more common problems and their possible solutions, and gives guidance on methods of checking the operation of systems.

BRE, DG254, 1981, 8pp £15.00
ISBN: 978-0-85125-302-2

Condensing boilers

Condensing boilers can usually offer valuable savings in energy compared to conventional boilers, the extra capital cost being recouped within one to five years. This Digest summarises system design, equipment selection, installation, commissioning and maintenance, and outlines economic appraisal of a new system.

BRE, DG339, 1989, 8pp £15.00
ISBN: 978-0-85125-371-8

Domestic heat pumps: performance and economics

This report describes the performance of electrically driven air-to-water heat pumps in domestic systems. It is based on the results of full and part-load assessments at BRE and at trial installations; it also considers the economics of heat pump purchase and operation, alternative heat sources and types of heat pump.

BRE, BR126, 1988, 44pp
ISBN: 978-0-85125-276-6 £25.00

VAV systems

Review of current guidance and research

This report presents a critical review of UK and American publications on variable air volume (VAV) air conditioning systems. Abstracts and interpretations of the main points of each document are given. It concentrates on the role of the building engineering services designer responsible for the complete package, including construction, commissioning, testing and maintenance of the installation. To increase awareness of design techniques for enhancing the energy efficiency of VAV systems, each review identifies specific and definitive design information.

BRE, BR371, 1999, 70pp
ISBN: 978-1-86081-298-9 £30.00

Low energy cooling

Technology selection and early design guidance

This publication contains two reports from the International Energy Agency's Annex 28 to assist with the design of low energy cooling systems. It provides guidance on the initial selection of suitable low energy technologies, and presents a collection of simplified tools based on design charts and tables, and practical guidance, to assist with early design development of a technology.

IEA, EP56, 2001, 120pp
ISBN: 978-1-86081-458-7 £52.50

The Carbon Performance Rating for offices

This Digest describes a target-based method of assessing the likely energy efficiency of a non-domestic building design. It is referenced in the 2002 edition of Approved Document L2 of the Building Regulations which includes a simple assessment method to address the design of air conditioning and mechanical ventilation systems. The method described in this Digest extends that method to include heating and lighting design. Both methods have been developed specifically for office building services design, and to address carbon emission as a Carbon Performance Rating.

BRE, DG457, 2001, 12pp
ISBN: 978-1-86081-524-9 £15.00

BEST SELLER: Conventions for U-value calculations (2006)

B Anderson

'Conventions for U-value calculations' guides the architect and specifier for calculating U-values by:

- indicating the methods of calculation appropriate for different construction elements - roofs, walls, floors, basements, windows and doors
- providing further information about using the methods
- providing data relevant to typical UK constructions.

Particular guidance is given on thermal conductivity of materials, and on various issues commonly arising when calculating U-values and how they apply to different construction types.

This 2006 edition of the guide is fully updated in line with Part L of the Building Regulations that came into effect in April 2006.

BRE, BR443, 2006, 44pp
ISBN: 978-1-86081-924-7 £37.50

Thermal mass in office buildings

This Digest describes how thermal mass can be designed into a building, the options available, and the strategic decisions that may be made in design that require understanding between the design team. Although mainly relevant to non-domestic buildings, it is also appropriate to refurbishment schemes. Part 1 defines thermal mass and outlines its effects in a number of scenarios. Part 2 discusses the effective incorporation of thermal mass into building designs. A companion Information Paper (IP 6/01) deals with modelling the performance of thermal mass to minimise annual energy use while maintaining occupant comfort.

BRE, DG454, 2 parts, 2001, 16pp
ISBN: 978-1-86081-823-3 £22.50

Installing thermal insulation

Good site practice

This Good Building Guide gives practical help in the different methods of building insulation into each part of the house (eg ground floors, external walls, windows/doors and roofs). Deficiencies in detailing that allow air leakage and thermal bridging will cause condensation, mould growth and excessive energy use in the finished house. Following the advice in this Good Building Guide will result in a well-insulated house that is warmer to live in, cheaper to run and better for the environment. Part 1 covers: General principles of preventing thermal bridging and air leakage, Ground floors, Pitched roofs and rooms-in-the-roof. Part 2 covers: External cavity walls, Windows and doors, Further reading.

BRE, GG68, 2 parts, 2006, 16pp
ISBN: 978-1-86081-933-9 £20.00

Conventions for calculating linear thermal transmittance and temperature factors

T Ward and C Sanders

This guide gives the conventions that should be followed by numerical modellers to produce consistent, reproducible results. For building regulation purposes two key modelling outputs, temperature factor and linear thermal transmittance, are identified.

BRE, BR497, 2007, 48pp
ISBN: 978-1-86081-986-5 £37.50

Micro-wind turbines in urban environments

An assessment

R Phillips, P Blackmore, J Anderson, M Clift, A Aguilero-Rullan and S Pester

There is little experience of the operation of small wind turbines mounted on domestic buildings in urban environments and little data on their performance in terms of power generation, service life and maintenance. This study shows that, in addition to the initial embodied carbon and efficiency of the turbine, the payback period is highly sensitive to local wind conditions, transport costs, and the maintenance requirements and service life of the turbine.

BRE Trust, FB17, 2007, 48pp
ISBN: 978-1-84806-021-0 £30.00

Siting micro-wind turbines on house roofs

P Blackmore

This report provides a simple tool for selecting the most suitable location for siting a wind turbine on a duo-pitch house roof and for calculating the expected wind speeds over house roofs to determine its power output. It describes a programme of wind tunnel testing to measure wind speeds above house roofs.

BRE Trust, FB18, 2008, 44pp
ISBN: 978-1-84806-022-7 £25.00

BEST SELLER: U-value calculator (Single user)

BRE

Calculates U-values according to the appropriate European standards and other documents. Covers most types of building element, except those that need to be assessed by detailed numerical analysis. Selects the correct method and the appropriate inputs according to the type of element being assessed. Changes to the data are immediately reflected in the calculated U-value, so that the effect of different options is readily assessed. This program does not cover dewpoint calculations. Runs on PCs only and is available on CD and as a download

Related document: BR 443 Conventions for U-value calculations

BRE, AP901, Software, 2007

£57.50

U-value calculator (Site License)

BRE

BRE, AP902, Software, 2007

£287.50

BREEAM 98 for offices

BREEAM was launched in 1990 to provide an environmental assessment and labelling scheme for buildings. The scheme is updated periodically to ensure that it continues to represent best practice. This publication describes the version for offices and provides a background to the scheme and the benefits that it can present as well as describing the structure and content of the assessment process.

BRE, BR350, 1998, 56pp
ISBN: 978-1-86081-238-5

£32.50

HEATING, INSULATION AND AIR CONDITIONING**Perimeter chilled beams**

Passive chilled beams installed in the perimeter of buildings can be highly effective for off-setting direct solar gains and ensuring good thermal comfort in the perimeter zone. This Paper presents the findings of a research project that has investigated the performance of perimeter chilled beams and developed guidance on avoiding the design pitfalls.

BRE, IP11/04, 2004, 12pp

ISBN: 978-1-86081-722-9

£9.00

Free cooling with displacement ventilation

Recent BRE research has shown that displacement ventilation on its own using appropriate diffusers can deal with heat loads of 50–60 W/m² in typical office environments without causing thermal discomfort outside the diffuser outflow zone. This opens up the possibility of using free cooling to reduce the energy used for cooling.

BRE, IP6/02, 2002, 8pp

ISBN: 978-1-86081-561-4

£9.00

Ammonia refrigerant in buildings: minimising the hazards

Ammonia is being increasingly used as a refrigerant in air conditioning systems because of its low environmental impact and excellent refrigeration properties. However, ammonia is toxic which means that great care is needed in its use. This paper shows that the design of safe ammonia systems must also take into account dispersal mechanisms.

BRE, IP18/00, 2000, 6pp

ISBN: 978-1-86081-419-8

£9.00

Air as a refrigerant in air conditioning systems in buildings

Using air as refrigerant in air conditioning systems has enormous advantages over conventional refrigerants, many of which have harmful environmental effects, and are flammable or toxic. However, using air for refrigeration in buildings has been held back by the perception of poor energy efficiency of air cycle systems. This paper reports on collaborative research by BRE and the University of Bristol to build an air cycle system for simultaneous heating and cooling in buildings, with lower overall energy consumption and environmental impact than conventional heating and refrigeration plant.

BRE, IP21/00, 2001, 6pp

ISBN: 978-1-86081-456-3

£9.00

Condensing boilers: how they compare with other systems in the BRE low-energy office

The BRE low-energy office (LEO) at Garston was among the first buildings constructed in the UK with the aim of minimising energy use. This paper reports on the performance of this condensing boiler-based wet heating system (refurbished in 1989) and compares it with other performances in previous years, including that of the building's electric heating system.

BRE, IP6/91, 1991, 4pp

£9.00

An introduction to infra-red thermography for building surveys

Infra-red thermography is a valuable tool for measuring the thermal performance of buildings. This paper is concerned with the thermal behaviour of buildings and their components, and describes methods and precautions to be adopted with the technique.

BRE, IP7/90, 1990, 4pp

£9.00

Condensing boilers: reduced space-heating costs in large residential dwellings

Owners of buildings in which space heating is provided by centralised, gas-fired plants can reduce costs with highly efficient condensing boilers.

BRE, IP19/89, 1989, 4pp

£9.00

The performance of condensing boilers in non-domestic dwellings

Monitoring of gas-fired condensing boilers providing space heating to hospital buildings on a widely-dispersed site has shown that the extra capital cost of these boilers compared with conventional plant was recouped by one year's energy savings. Similar installations in offices, etc, should lead to payback periods of fewer than five years.

BRE, IP14/89, 1989, 4pp

£9.00

Space and hot water heating: energy-efficiency in large gas-fired systems

Some schemes for large gas-fired systems may lead to operating inefficiencies. The author describes some simple energy-efficient measures that can be applied to the design and specification of centralised heating plants for residential accommodation.

BRE, IP11/89, 1989, 4pp

£9.00

The performance of gas-fired condensing boilers in family housing

A review of the results and lessons learned from an extensive programme of monitoring family houses in which gas-fired condensing boilers for space and domestic hot water heating were compared with houses containing conventional boilers. Economic aspects of operating the boilers are considered.

BRE, IP10/88, 1988, 4pp £9.00

The BRESTART self-adaptive optimum start algorithm

Describes the new optimum start algorithm BRESTART for control of heating plant in conventionally heated buildings.

BRE, IP17/85, 1985, 4pp £9.00

Cost and performance of solar water-heating systems in the UK

Experience of installing over 80 solar water heating systems in single family dwellings is analysed to assess the potential for cost reduction.

BRE, IP14/81, 1981, 4pp £9.00

Evaporative heat meters in district heating schemes

Compares evaporative radiator heat meters with other methods of apportioning heat consumption.

BRE, IP15/81, 1981, 4pp
ISBN: 978-0-11670-775-8 £9.00

District heating combined with electricity generation: cost-effectiveness factors

Several issues which have a bearing on the cost-effectiveness of district heating with electricity generation (CHP/DH) are examined.

BRE, IP17/81, 1981, 4pp £9.00

Thermal comfort: past, present and future

Proceedings of a conference held at BRE, Garston, 9–10 June 1993.

BRE, BR264, 1994, 254pp
ISBN: 978-0-85125-633-7 £57.50

Air conditioning systems in buildings using air cycle technology

This guide describes options for air cycles to meet different building load profiles; these include using multiples of the demonstration system to meet either or both of the maximum heating/cooling loads where the air cycle system is sized to match.

BRE, BR416, 2001, 42pp
ISBN: 978-1-86081-470-9 £40.00

Cooling buildings in London

Overcoming the heat island

Significant underestimates of cooling loads can result from the use of rural temperature data. This guide presents the results of long-term measurements of air temperatures at 80 sites around London and includes on a diskette a design tool to allow the designer to modify Bracknell temperature data. It also outlines techniques to reduce the effects of the Central London heat island by careful design of the building and its surroundings.

BRE, BR431, 2001, 38pp
ISBN: 978-1-86081-526-3 £32.50

BRE Building Elements

BEST SELLER: Building services

Performance, diagnosis, maintenance, repair and the avoidance of defects

This book is about the entire range of fuelled, piped, ducted, wired and mechanical facilities in the UK's building stock for space heating and cooling, electricity and communications, ventilation, plumbing and drainage, mechanical handling and so on. It draws on BRE's activities over many years in research, site investigation, advisory services and the development of codes and standards. It includes numerous case studies, many of which highlight problems that have occurred in practice. It will be invaluable for all building professionals.

BRE, BR404, 2000, 272pp
ISBN: 978-1-86081-424-2 £47.50

Energy, insulation and air conditioning pack

BRE

DIGESTS

Condensing boilers (DG339)

Energy efficiency in dwellings (DG355)

Mechanical installation of roof-mounted photovoltaic systems (DG495)

Reliability and performance of solar-collector systems (DG254)

The Carbon Performance Rating for offices (DG457)

Thermal mass in office buildings (2-part set) (DG454)

GOOD BUILDING GUIDES

Installing thermal insulation: good site practice (2-part set) (GG68)

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INFORMATION PAPERS

Air as a refrigerant in air conditioning systems in buildings (IP21/00)

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Assessing the effects of thermal bridging at junctions and around openings (IP1/06)

Domestic energy use and carbon emissions (IP16/05)

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SBEM for non-domestic buildings (IP2/07)

Small scale, building integrated, wind power systems (IP12/05)

Solar energy in urban areas (IP5/01)

The scope for reducing carbon emissions from housing (IP15/05)

BRE, AP258, Ringbound set, 2007

ISBN: 978-1-86081-996-4 £70.00

LIGHTING

Impact of horizontal shading devices on peak solar gains through windows

Horizontal shading devices such as overhangs, brise soleils, louvres and light shelves are often very effective in reducing peak summertime solar gains. This Information Paper quantifies the effects of these devices. It gives data that can be used as correction factors for the method shown in Appendix H of Approved Document L2 (2002 edition) of the Building Regulations, as a way to meet the requirement to limit solar overheating in buildings other than dwellings.

BRE, IP17/03, 2004, 4pp
ISBN: 978-1-86081-674-1 £9.00

Whole life performance of domestic automatic door controls

Automatic door controls improve access for disabled and elderly people and generally work well. Their high initial cost is the main input to the whole life costs. Maintenance costs are necessary to maintain performance. Each installation needs to be considered on its merits. Controls may be installed so they are part of the permanent fixtures and the cost and performance can be viewed over the whole life of the building, or at least in its current use. More commonly, controls are fitted in existing housing to meet the needs of an individual for a limited time.

BRE, IP2/02, 2002, 16pp
ISBN: 978-1-86081-538-6 £9.00

Dwellings and energy efficient lighting

New regulation Part L

Part L of the Building Regulations for England and Wales contains requirements on energy efficient lighting. An Approved Document gives examples of ways to meet the requirements. In the 2002 edition, these requirements have been extended to cover internal and external lighting in dwellings. This paper describes the scope of the requirements, and explains the guidance in the Approved Document.

BRE, IP5/02, 2002, 4pp
ISBN: 978-1-86081-543-0 £9.00

Control of solar shading

A wide range of motorised shading systems is available. The way these systems are controlled can have an important impact on building energy efficiency and on occupant comfort. This paper gives guidance on whether to use automatic or manual control or a mixture of the two, and describes control strategies and ways to implement them. It will be of interest to building designers and services engineers, and shading manufacturers and installers.

BRE, IP12/02, 2002, 8pp
ISBN: 978-1-86081-584-3 £9.00

Retrofitting solar shading

Solar shading can have an important benefit on the environment in buildings and can give valuable savings in cooling energy. This paper describes the shading systems commonly used in retrofit and gives guidance on their selection and design. It will be of interest to building owners and facilities managers, energy auditors and interior designers.

BRE, IP11/02, 2002, 6pp
ISBN: 978-1-86081-583-6 £9.00

Developments in innovative lighting

Innovative daylighting systems work by redirecting incoming sunlight or skylight to areas where it is required. 'Designing with innovative daylighting' (BR305) gives detailed design information, including a review of the systems available or under development in 1996. This Paper updates that information with details of new developments. It covers new system types, case study buildings, and research findings on energy related issues.

BRE, IP9/00, 2000, 6pp
ISBN: 978-1-86081-369-6 £9.00

Hospitals in the best light

An introduction to hospital lighting

Hospitals are complex buildings for a lighting designer; a wide range of issues must be considered, many concerning financial and process-related issues. It is essential that the lighting designer is included early in the decision process. The designer should consider functional aspects of the lighting, appearance, the economics of energy efficiency, maintenance and costs. If considered in a holistic way, the lit environment is likely to be a success. Examples of lighting requirements that need to be considered are for entrance areas and circulation spaces, wards and nurses' stations, laboratories, storerooms and offices.

BRE, IP14/00, 2000, 8pp
ISBN: 978-1-86081-388-7 £9.00

Photoelectric control of lighting

Design, setup and installation issues

This paper gives the latest research information on the design and commissioning of automatic, daylight-linked lighting controls. Both switching and dimming controls are considered. It will be of interest to controls manufacturers, lighting designers and engineers, and facilities managers.

BRE, IP2/99, 1999, 8pp
ISBN: 978-1-86081-319-1 £9.00

Interior lighting calculations: a guide to computer programs

There are many computer programs that perform lighting calculations. They vary enormously in speed, sophistication and cost. Occasionally, surveys are published which compare programs in terms of their features. While these can be of direct benefit to purchasers, they tend to go out of date quickly, as new programs and new versions of old programs are released. This guide, therefore, does not focus on individual programs but on the issues which are common to all programs, and in particular the algorithms that underly them. Guidance is given on the features that are common to each type of program and on some of the extra features that may be useful to designers. This guide helps lighting designers to select appropriate interior lighting calculation software.

BRE, IP16/98, 1998, 4pp
ISBN: 978-1-86081-257-6 £9.00

Daylight in atrium buildings

Daylight is an essential component of a visually attractive and energy efficient atrium building. Good control of electric lighting is vital for energy efficiency. Areas surrounding the atrium can suffer from poor penetration of natural light unless care is taken in design. Solar shading also needs to be considered. This paper explains the issues involved and gives guidance. It should be of interest to architects, engineers and their clients.

BRE, IP3/98, 1998, 4pp
ISBN: 978-1-86081-194-4 £9.00

Assessment of emergency wayfinding lighting systems in smoke

Offers a basis for an interim method for assessment of wayfinding systems for visual effectiveness in smoke.

BRE, IP10/97, 1997, 4pp
ISBN: 978-1-86081-171-5 £9.00

Emergency lighting and wayfinding systems for visually impaired people

Summarises the findings of studies on the use of emergency lighting and wayfinding systems by visually impaired people and offers interim design guidance for escape routes.

BRE, IP9/97, 1997, 4pp
ISBN: 978-1-86081-169-2 £9.00

People and lighting controls

Aimed at designers, manufacturers, installers and occupiers, this paper considers the purposes of lighting controls and how to match them to the needs of occupants.

BRE, IP6/96, 1996, 4pp
ISBN: 978-1-86081-096-1 £9.00

Daylighting design for display screen equipment

This paper describes practical techniques to realise the benefits of daylight in interiors with display-screen equipment. It deals with potential problems of screen reflections and glare that can arise in daylight spaces. It will be of interest to all those involved in the design, maintenance and refurbishment of buildings where display-screen equipment is used.

BRE, IP10/95, 1995, 4pp
ISBN: 978-1-86081-012-1 £9.00

Emergency wayfinding lighting systems in smoke

A summary of the interim findings of studies on the visibility of emergency lighting systems in smoke. This paper should be of interest to those concerned with the design of escape routes.

BRE, IP17/94, 1994, 4pp £9.00

New ways of predicting discomfort glare

When a range of luminances is too great, people may experience discomfort glare with possible adverse implications. This paper summarises the three major international models used to calculate discomfort glare, and reports on the development of a single, unified glare rating system based on them.

BRE, IP24/93, 1993, 4pp £9.00

Measuring daylight

People like daylight in buildings, and daylight can make a building more energy-efficient. This paper draws on measurements made at BRE to illustrate the changing nature of light from the sky. It gives advice on how to measure daylight under the real sky or an artificial sky.

BRE, IP23/93, 1993, 4pp £9.00

Lighting uniformity: subjective studies

Three studies of people's responses to electric lighting in a simulated office have proved valuable both in the current revision of the professional code for interior lighting in the UK and for draft European standards. This paper discusses the three studies, and gives guidance on acceptable illuminance variation from electric lighting in an office environment.

BRE, IP15/93, 1993, 4pp £9.00

Daylighting requirements for display-screen equipment

Discusses the problems posed by the daylighting of workstations with display-screen equipment, and provides general guidance on how these problems can be addressed during design or refurbishment.

BRE, IP14/93, 1993, 4pp £9.00

Emergency wayfinding lighting systems

Guidance on the use of emergency wayfinding lighting systems as an alternative or supplement to traditional lighting of emergency escape routes.

BRE, IP1/93, 1993, 4pp £9.00

BEST SELLER: Site layout planning for daylight

Outlines new BRE guidance on site layout planning to achieve good daylighting, both in buildings and in the open spaces between them.

BRE, IP5/92, 1992, 4pp £9.00

Site layout for sunlight and solar gain

Gives guidance on planning to achieve good access to sunlight and solar heat, both for buildings and the open spaces between them.

BRE, IP4/92, 1992, 4pp £9.00

Non-uniform lighting: the prediction of illuminance distributions

Illuminance is the primary lighting design parameter and the prediction of illuminance distributions in a space is important, particularly for non-uniform lighting. This paper reviews the accuracy which can be achieved using currently available software together with manufacturers' published lamp and luminaire data.

BRE, IP14/90, 1990, 4pp £9.00

Innovative daylighting systems

Maximising the benefits of natural light in buildings can produce better working and living conditions, and save on energy. This paper describes situations and systems for using daylight - mirrors, prismatic glazing, light shelves and light pipes; it also provides a checklist for design.

BRE, IP22/89, 1989, 4pp £9.00

Average daylighting factor: a simple basis for daylight design

Good design of windows should include planning for daylight at the early design stage. This paper describes formulae developed at BRE for calculating average daylight factor quickly and accurately. It will be especially useful in determining target glazing areas.

BRE, IP15/88, 1988, 4pp £9.00

Lighting controls: an essential element of energy-efficient lighting

This paper illustrates the robustness of the control strategies previously given in BRE Digest 272 by reference to practical experience gained in projects sponsored by DoE as part of the Energy Efficiency Demonstration Scheme.

BRE, IP5/87, 1987, 4pp £9.00

Solar dazzle reflected from sloping glazed facades

This paper presents a method which can be used at the design stage to calculate whether solar dazzle will result from a proposed building facade.

BRE, IP3/87, 1987, 4pp £9.00

Designing with innovative daylighting

Up to 40% of the energy needed to light a building can usually be saved when good use is made of daylighting. With such savings in mind, building designers have started using innovative daylighting systems. These work by redirecting incoming natural light to where it is needed, for instance to the rear of deep rooms, whilst reducing glare and discomfort for occupants. This book evaluates more than 30 such innovative systems.

BRE, BR305, 1996, 72pp
ISBN: 978-1-86081-046-6 £40.00

Daylighting as a passive solar energy option

An assessment of its potential in non-domestic buildings

The exploitation of daylight is internationally recognised as a valuable means of improving energy efficiency. This report examines the opportunities for exploiting daylight in non-domestic buildings and assesses the factors which will determine its success.

BRE, BR129, 1988, 64pp
ISBN: 978-0-85125-287-2 £22.50

BEST SELLER: Site layout planning for daylight and sunlight

A guide to good practice

This important and widely used guide complements BS 8206: Part 2 and CIBSE Applications manual on window design by providing advice on the planning of the external environment. It covers: rights to light and indicators to calculate access to skylight, sunlight and solar radiation; how to protect the daylighting and sunlighting of existing buildings when new developments are proposed; and gives guidance on passive solar site layout, the sunlighting of gardens and amenity areas, and more.

BRE, BR209, 1998, 92pp
ISBN: 978-1-86081-041-1 £50.00

Availability of daylight

Comprehensive data to help designers to estimate more accurately the necessary and likely hours of use of artificial lighting in buildings.

BRE, BR21, 1979, 90pp
ISBN: 978-1-86081-844-8 £22.50

Designing buildings for daylight

This guide reviews the art and science of designing for daylight. It includes extensively illustrated examples of where daylight has been successfully used in a variety of building types, clear explanations of the key elements of daylight design, and worked examples and practical exercises that bring together the principles involved in designing buildings for daylight.

BRE, BR288, 1996, 100pp
ISBN: 978-1-86081-026-8 £30.00

Solar shading of buildings

In winter, the window can act as a passive solar collector, helping to heat up the building. Windows have their adverse effects too, but these can mostly be avoided by providing a suitable shading device. There are three main reasons why shading might be needed: to reduce overheating, to reduce glare from windows, and to provide privacy.

BRE, BR364, 1999, 33pp
ISBN: 978-1-86081-275-0 £42.50

Calculating access to skylight sunlight and solar radiation on obstructed urban sites in Europe

Conventional solar prediction techniques tend to assume an unobstructed site, but nearly all urban and suburban sites are obstructed to some degree. This report contains manual tools to find, for almost all of Europe, how much skylight, sunlight and solar gain reach the outside of an obstructed window or a point in a building layout. Complex as well as simple obstruction profiles can be modelled. The tools comprise: a skylight indicator, sunlight availability indicators, sunpath indicators, and solar gain indicators.

BRE, BR379, 1999, 64pp
ISBN: 978-1-86081-325-2 £35.00

The Waldram Diagram

Diagram for CIE overcast sky and vertically glazed apertures.

BRE, BR85, 1986
ISBN: 978-1-86081-846-2 **£15.00**

Sun-on-ground indicators

Set of 12 transparent indicators for use with 'Site layout planning for daylight and sunlight', BR209.

BRE, AP60, 1992
ISBN: 978-0-85125-507-1 **£25.88**

Daylight protractors

Protractor set (2nd series), numbers 1 to 10 plus a guide. The full set of protractors covers rooflight and side windows, and both overcast and uniform skies. The protractors calculate the sky component of daylight factor. In conjunction with BRE Digests 309 and 310, they can be used to find the daylight factor at a point indoors. For assessing the loss of light to an existing building following construction of a development next door, BR209 'Site layout planning for daylight and sunlight' should be used.

BRE, AP68, 1991
ISBN: 978-1-86081-765-6 **£34.50**

Daylight protractor No 2

Protractor for an overcast sky and vertical glazing only. For the full set, see package AP68. The protractors calculate the sky component of daylight factor. In conjunction with BRE Digests 309 and 310, they can be used to find the daylight factor at a point indoors. For assessing the loss of light to an existing building following construction of a development next door, BR209 'Site layout planning for daylight and sunlight' should be used.

BRE, AP69, 1991, 1pp
ISBN: 978-1-86081-766-3 **£15.00**

Estimating daylight in buildings

These two Digests present daylight prediction methods that can be used as a first stage in assessing the visual and energy impacts of window design and the effectiveness of daylight-linked lighting controls (see Digest 272). Part 1 covers the calculation of sky component and externally-reflected component; Part 2 deals with the internally-reflected component and corrections (for glazing, maintenance, etc) to the total daylight factor, and the calculation of average daylight factor.

BRE, DG309, 1986, 8pp
ISBN: 978-0-85125-205-6 **£15.00**

Office lighting

Much office lighting is installed and maintained by non-lighting specialists and the aim of this design guide is to introduce the key lighting concepts, with simple, practical guidance on lighting provision. It summarises recent research, including key results from BRE's work, covering daylight provision, lighting controls, user requirements for illuminance, and energy efficiency. Also covers research on 'hot topics' like polarised and full spectrum lighting.

BRE, BR415, 2001, 40pp
ISBN: 978-1-86081-463-1 **£42.50**

Energy efficient lighting

Part L of the Building Regulations explained

This report provides clarification of Part L and its revisions, helping you to fully understand the requirements and ways of demonstrating compliance in new and existing buildings.

BRE, BR430, 2001, 20pp
ISBN: 978-1-86081-521-8 **£27.50**

Availability of sunshine

Describes the use of the sunlight availability protractor and discusses its applicability. Gives tables of sunrise, sunset and maximum possible duration of sunshine for London. Analyses average measured sunshine data for London and Edinburgh.

BRE, AP155, 1975, 30pp
ISBN: 978-1-86081-776-2 **£25.00**

Summertime solar performance of windows with shading devices

P Littlefair

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: external shading including overhangs and fins, screens and louvres, internal and mid-pane blinds, and combinations of the above. The data allow the designer to compare the effectiveness of different forms of shading devices, and can be used as input to simple calculation methods. A calculation tool is included on a CD-ROM that enables the effective summertime solar transmittance of windows with shading devices to be calculated, together with data on radiation.

BRE Trust, FB9, 2005, 28pp
ISBN: 978-1-86081-739-7 **£35.00**

Lighting

Lighting is of critical importance in all types of buildings. Part 1 General principles, Part 2 Domestic and exterior, Part 3 Non-domestic

BRE, GG61, 3 parts, 2004, 24pp
ISBN: 978-1-86081-834-9 **£22.50**

Selecting lighting controls

Lighting controls can give important energy savings and their reasonable provision is required by Building Regulations whenever lighting work is carried out in buildings that are not dwellings. When lighting controls are chosen it is important to take into account the type of space, how it is used and the amount of daylight available. This Digest explains how to do this and describes the common types of control and how to calculate energy savings. It will be of interest to building owners, designers, building services contractors and building control bodies.

BRE, DG498, 2006, 8pp
ISBN: 978-1-86081-905-6 **£15.00**

RADON AND GAS EMISSIONS

VOC emissions from flooring adhesives

European test methods and labelling

This Information Paper discusses the methods for testing emissions of volatile organic compounds (VOCs) from flooring adhesives, and the related European standards. Provides data about the criteria required by labelling schemes for flooring adhesives and evaluates the test methods used to define 'low-emission' products.

BRE, IP12/03, 2003, 8pp
ISBN: 978-1-86081-639-0 **£9.00**

Potential carbon emission savings from energy efficiency in commercial buildings

This paper presents an initial analysis of the extent to which carbon emissions could be reduced by the implementation of a few simple energy efficiency measures in the United Kingdom's commercial buildings.

BRE, IP3/96, 1996, 4pp
ISBN: 978-1-86081-081-7 **£9.00**

Potential carbon emission savings from combined heat and power in buildings

This paper presents an initial analysis of the extent to which carbon emissions could be reduced through the application of combined heat and power in UK buildings. The results are of interest to those wishing to gain an overview of the scope for buildings-related energy savings through increased efficiency.

BRE, IP4/96, 1996, 4pp
ISBN: 978-1-86081-082-4 **£9.00**

Potential carbon emission savings from energy efficiency in housing

This paper analyses the extent to which carbon emissions could be reduced by simple energy-efficiency measures in the housing stock. It will be of interest to those wishing to gain an overview of the scope for housing-related energy savings through increased efficiency.

BRE, IP15/95, 1995, 4pp £9.00

The importance of indoor surface pollution in sick building syndrome

There is growing evidence that indoor surface pollution (ISP) is one of the causes of sick building syndrome. ISP includes contaminants such as dust, fibres and micro-organisms, which are deposited on building surfaces and in office furnishings. This paper addresses the relative importance for sick building syndrome of ISP and airborne pollution, and recommends ways to reduce ISP in offices. It will be of interest to researchers, building managers and occupational hygienists.

BRE, IP3/94, 1994, 4pp £9.00

Greenhouse-gas emissions and buildings in the United Kingdom

The authors explore the relationship between building energy use and the emission of carbon dioxide and other greenhouse gases. They also consider the scope for reducing CO₂ emissions through applying energy efficiency measures in existing buildings.

BRE, IP2/90, 1990, 4pp £9.00

CFCs and the building industry

A review of how and when the ban on CFCs and halons - now accepted as contributors to depletion of the atmosphere's ozone layer and to the greenhouse effect - will affect the production and use of refrigeration and air conditioning plant, thermal insulation materials and fire-fighting equipment.

BRE, IP23/89, 1989, 4pp £9.00

Formaldehyde vapour from urea-formaldehyde foam insulation

Describes type of walls where formaldehyde vapour ingress may be high.

BRE, IP25/82, 1982, 4pp £9.00

CFCs in buildings

It is now generally accepted that CFC emissions are contributing to the depletion of the ozone layer and that production must be phased out as soon as possible. One of a series on issues of environmental significance, this Digest summarises recent and proposed changes the current phase-out timetables, and replacement options.

BRE, DG358, 1991, 8pp
ISBN: 978-0-85125-854-6 £15.00

Protecting dwellings with suspended timber floors

BRE guide to radon remedial measures in existing dwellings

P A Welsh, P W Pye and C R Scivyer

Describes the solutions available to reduce radon levels, including enhanced natural underfloor ventilation, mechanical underfloor ventilation systems, sump systems, positive pressurisation systems, replacing suspended timber floors with concrete slabs, sealing the timber floor and house ventilation.

BRE, BR270, 1994, 18pp
ISBN: 978-0-85125-647-4 £22.50

Radon sump systems

BRE guide to radon remedial measures in existing dwellings

This guide advises surveyors, builders and householders who are trying to reduce indoor radon levels by means of a radon sump system. A radon sump is essentially a hole in the ground with a fan connected to it sucking from the hole, creating negative pressure and thus preventing radon-laden air from entering.

BRE, BR227, 1998, 18pp
ISBN: 978-1-86081-223-1 £25.00

Surveying dwellings with high indoor radon levels

BRE guide to radon remedial measures in existing dwellings

This report supplements guidance in The Householders' Guide to Radon, obtainable from local environmental health officers or from the DoE.

BRE, BR250, 1993, 34pp
ISBN: 978-0-85125-582-8 £22.50

Major alterations and conversions

BRE guide to radon remedial measures in existing dwellings

This report describes how radon-protection measures may be incorporated within a building when major alterations or conversion works are being carried out. The report covers buildings used as living accommodation.

BRE, BR267, 1994, 16pp
ISBN: 978-0-85125-638-2 £22.50

Positive pressurisation

BRE guide to radon remedial measures in existing dwellings

Positive pressurisation uses a house pressurising fan unit, usually positioned in the roof space, to blow filtered fresh air into the dwelling. This guide is intended to help surveyors, builders and householders who are trying to reduce indoor radon levels using this method.

BRE, BR281, 1995, 12pp
ISBN: 978-1-86081-007-7 £22.50

Radon in the workplace

This guide is principally aimed at building owners, tenants and estate managers, but also surveyors and builders dealing with radon in the workplace. Guidance is given on the legislation relating to radon in the workplace, radon measurement, possible remedial measures and how to get the work done. Advice is offered for the majority of construction types and building uses.

BRE, BR293, 1995, 52pp
ISBN: 978-1-86081-040-4 £22.50

Time-dependent modelling of soil gas movement

A literature review

This reports reviews papers covering many aspects of soil gas modelling, and those involving time dependence in particular. The principal areas of interest are the development and migration of gas from landfill sites, and the effect of changing atmospheric pressure on radon and landfill gas emissions from the ground.

BRE, BR298, 1995, 26pp
ISBN: 978-1-86081-057-2 £30.00

Dwellings with cellars and basements

BRE guide to radon remedial measures in existing dwellings

One of a series giving practical advice on methods of reducing radon levels in existing dwellings, based on a large body of remedial work carried out to advice given by BRE, and on discussions with others working in the field. It will help surveyors, builders and householders who are trying to reduce indoor radon levels in houses with cellars or basements.

BRE, BR343, 1998, 36pp
ISBN: 978-1-86081-219-4 £30.00

Radon: guidance on protective measures for new dwellings in Scotland

Radon is a colourless, odourless, radioactive gas. It is formed where uranium and radium are present and can move through cracks and fissures into the subsoil, and so into the atmosphere or into spaces under and in dwellings. Where radon occurs in high concentrations it can pose a risk to health. This publication contains detailed maps of designated radon-affected areas in Scotland and guidance on protective measures.

BRE, BR376, 1999, 28pp
ISBN: 978-1-86081-334-4 £27.50

Buildings and radon

Divided into four sections, this highly-illustrated guide draws together different areas of BRE radon-related research: 1 Passive radon sump systems; 2 Communal radon sump systems; 3 Spillage of combustion products; 4 Protecting new extensions and conservatories. It supplements existing guidance.

BRE, GG25, 1996, 12pp
ISBN: 978-1-86081-070-1 £15.00

Sealing cracks in solid floors

BRE guide to radon remedial measures in existing dwellings

Deals mainly with concrete floors laid directly on the ground, but some of the principles could be used with suspended concrete floors and, to a lesser extent, with large stone slabs.

BRE, BR239, 1993, 12pp
ISBN: 978-0-85125-560-6 **£20.00**

A questionnaire for studies of sick building syndrome

A report to the Royal Society of Health Advisory Group on sick building syndrome

This report describes the development of a standard questionnaire for use in investigating sick building syndrome (SBS) in specific cases and in research projects. The questionnaire itself is packaged with the report.

BRE, BR287, 1995, 22pp
ISBN: 978-1-86081-019-0 **£22.50**

Radon: guidance on protective measures for new dwellings in Northern Ireland

Gives guidance, in support of the Building Regulations for Northern Ireland, on reducing the concentration of radon in new dwellings and extensions, and hence the risk to occupants. It focuses on constructional features that affect this risk, and provides practical details on methods of protecting new dwellings and extensions to existing buildings. The guidance is also useful for new structures whose form of construction and compartmentation is similar to that of housing.

BRE, BR413, 2001, 26pp
ISBN: 978-1-86081-469-3 **£27.50**

BEST SELLER: Protective measures for housing on gas-contaminated land

A practical guide to good practice for the detailing and construction of passive soil gas protective measures for new and existing residential development. The main gases considered are methane, carbon dioxide and mixtures of the two.

BRE, BR414, 2001, 70pp
ISBN: 978-1-86081-460-0 **£47.50**

Carbon dioxide emissions from non-domestic buildings: 2000 and beyond

This report summarises current knowledge of energy consumption and carbon emissions of UK non-domestic buildings. It gives a detailed assessment of the technical and economic potential for carbon savings in public and commercial buildings. Information is presented at the sector level to provide a detailed understanding of emissions that arise from patterns of energy use in different types of building activity. The results of modelling future carbon emissions from public and commercial buildings are also presented.

BRE, BR442, 2002, 69pp
ISBN: 978-1-86081-545-4 **£42.50**

Buying homes in radon-affected areas

Practical advice for anyone involved in buying or selling homes in areas affected by radon. Although radon is important, this guide shows how dealing with it need not prevent or delay property transactions. It explains simply what radon is, the health risks, where it is found, how to measure it and practical methods for reducing the risk. The guide is written mainly for solicitors, conveyancers, surveyors and estate agents, but it will also be of interest to buyers and sellers.

BRE, BR464, 2004, 56pp
ISBN: 978-1-86081-678-9 **£27.50**

VOC emissions from building products

Building materials and furnishing products are significant sources of VOCs in indoor environments. VOCs have a strong impact on indoor air quality during the first two years of a new building. The pollution load can be reduced by selecting low emission materials. An emission database is being developed at BRE and will enable designers and users to evaluate the impact of materials on indoor air quality. Part 1 describes sources and methods for measuring VOC emissions, and data for assessing health risks and pollution loads. Part 2 describes available guidelines and labelling schemes for control of VOC emissions in buildings.

BRE, DG464, 2 parts, 2002, 16pp
ISBN: 978-1-86081-874-5 **£22.50**

Radon protection for new domestic extensions and conservatories with solid concrete ground floors

C Scivyer

The aim of this guide is to give practical advice and guidance on providing radon protection to new domestic extensions and conservatories with concrete floors and to explain why it is necessary. The Guide will also help house owners and builders in radon-affected areas to determine whether protection is needed for a new extension or conservatory and the level of protection that is required. Two further Good Building Guides will cover radon-protective measures for new dwellings and larger buildings (eg workplaces).

BRE, GG73, 2008, 8pp
ISBN: 978-1-84806-054-8 **£15.00**

Radon protection for new dwellings
Avoiding problems and getting it right!

C Scivyer

This Good Building Guide gives practical advice and guidance on the successful installation of radon-protective measures in new dwellings. In recent BRE studies an increasing number of new homes built with radon-protective measures are being tested and found to have elevated indoor radon levels. This Guide will help designers, site managers, building control authorities and site operatives to ensure that radon-protection measures work. It should be read in conjunction with BRE Report BR 211 (2007) 'Radon: guidance on protective measures for new buildings'. Two other Good Building Guides cover radon-protective measures for new extensions and conservatories (GBG 73) and larger buildings (GBG 75).

BRE, GG74, 2008, 8pp
ISBN: 978-1-84806-067-8 **£15.00**

NEW: Radon protection for new large buildings

C Scivyer

Provides practical advice and guidance on the successful installation of radon-protective measures within large buildings, eg laying a radon-proof barrier across a large floor area, how many sumps to install and how to construct the sump and pipework. In addition to the requirements of building regulations, a building used as a workplace has to meet the requirements of the Ionising Radiations Regulations 1999. This guide should be read in conjunction with BRE Report BR211 (2007) 'Radon: guidance on protective measures for new buildings'. Two companion Guides cover radon-protective measures for new extensions and conservatories (GG73) and new dwellings (GG74).

BRE, GG75, 2009, 8pp
ISBN: 978-1-84806-072-2 **£16.00**

NEW: Radon protection for new large buildings

Set of 3 Good Building Guides

C Scivyer

These three Good Building Guides give practical advice and guidance on the successful installation of radon-protective measures in new domestic extensions and conservatories with concrete floors, new dwellings and large buildings, and explains why it is necessary. They will help building owners in radon-affected areas to determine whether protection is needed and the level of protection required. They should be read in conjunction with BRE Report BR211 (2007) 'Radon: guidance on protective measures for new buildings'.

BRE, AP274, 3 parts, 2009, 24pp
ISBN: 978-1-84806-085-2 £25.00

VENTILATION AND AIR QUALITY**Airtightness of ceilings. Energy loss and condensation risk**

Typically about 20% of the air entering a house leaves via its loft, adding to the risk of condensation in the loft and reducing the energy efficiency of the roof. This airflow, together with the ventilation of the loft space, is not accounted for in standard diffusion-based methods of condensation risk analysis, which therefore do not apply to cold pitched roofs. This paper describes the airflow routes between a house and its loft and the steps that can be taken to reduce the flow. The methods that can be used to measure the airtightness of ceilings are discussed and a method for assessing the condensation risk, taking account of the airflows, proposed.

BRE, IP4/06, 2006, 12pp
ISBN: 978-1-86081-911-7 £9.00

Ventilation and indoor air quality in schools

Reports on the investigation of ventilation performance of schools. Provides ventilation rates and indoor air quality from a study conducted in eight UK primary schools.

BRE, IP6/05, 2005, 8pp
ISBN: 978-1-86081-751-9 £9.00

Maintaining good air quality in your home

Helps you achieve good indoor air quality in your home by proper use of features designed to give adequate ventilation. It also advises on the sources of pollutants that may be present or introduced into your home.

BRE, IP9/04, 2004, 4pp
ISBN: 978-1-86081-714-4 £9.00

Background ventilators for dwellings

Trickle vents in window frames and airbricks in walls have been used to ventilate dwellings for many decades. However, the concept of background ventilation as part of an overall ventilation strategy did not appear in the Building Regulations until 1990. Initially, only simple manually adjustable background vents were used, but innovative vents incorporating automatic flow control and other features are now on the market. This paper discusses the philosophy behind background ventilation in Building Regulations, the types and merits of vents available, and a method of vent performance testing proposed in a forthcoming European Standard.

BRE, IP2/03, 2003, 6pp
ISBN: 978-1-86081-610-9 £9.00

Improving air quality in homes with supply air windows

This Information Paper describes the development of supply air windows and summarises recent research by BRE and the Martin Centre. It also presents results of a modelling study for the design of a PSV system with supply air windows incorporated in two demonstration houses for a DTI Partners in Innovation project.

BRE, IP6/03, 2003, 6pp
ISBN: 978-1-86081-628-4 £9.00

Airtightness in UK dwellings

Adequate ventilation is essential for the health and comfort of building occupants, but excessive ventilation leads to energy waste and sometimes discomfort. Often, the planned ventilation is augmented by unwanted infiltration through air leakage paths in the building envelope; this leads to the concept of 'build tight – ventilate right'. Attention has focused on reducing unwanted infiltration by the review of Part L of the Building Regulations, which will lead to reduced energy consumption in buildings and will interest those involved in design, specification and supervision of construction of new dwellings.

BRE, IP1/00, 2000, 8pp
ISBN: 978-1-86081-355-9 £9.00

Positive input ventilation

Positive input ventilation is the usual name for systems in which 'fresh' air is supplied to a dwelling from the roof space by means of a fan. While there is anecdotal evidence that these units can improve indoor humidity conditions, measurements of performance have been few. This paper summarises results from performance measurements in a BRE test house and in 15 occupied dwellings. It will be of interest to dwelling designers, landlords and domestic property managers.

BRE, IP12/00, 2000, 8pp
ISBN: 978-1-86081-387-0 £9.00

Ventilators: ventilation and acoustic effectiveness

This Information Paper discusses work carried out on window-mounted trickle ventilators and through-wall ventilators to assess their acoustic and ventilation properties. This was done to provide information on the acoustic performance of ventilators as a basis for providing advice for noisy areas and for supporting the development of national and international standards.

BRE, IP4/99, 1999, 8pp
ISBN: 978-1-86081-321-4 £9.00

Humidistat controlled extract fans: performance in dwellings

The project reported here demonstrated the efficiency of modern humidistat-controlled fans. This Information Paper will be of interest to manufacturers, specifiers, installers and householders.

BRE, IP5/99, 1999, 8pp
ISBN: 978-1-86081-329-0 £9.00

Trickle ventilators in offices

Trickle ventilators are identified in Approved Document F as a means of providing natural background ventilation in office buildings. Research at BRE determined their optimum open areas, and their effectiveness was assessed by airflow modelling, laboratory tests and field measurements in occupied offices. Purpose-designed trickle ventilators, sized according to these criteria and incorporated in the overall ventilation strategy of an office building, can provide the required background ventilation during the heating season without compromising thermal comfort.

BRE, IP12/98, 1998, 4pp
ISBN: 978-1-86081-236-1 £9.00

Night ventilation for cooling office buildings

Night ventilation is a low-energy strategy for cooling a building, providing a more comfortable environment for the occupants during hot daytime periods. It works by using natural or mechanical ventilation to cool the surfaces of the building fabric at night so that it can absorb heat during the day. This paper describes the weather and building design conditions for an effective application of the technique to office buildings.

BRE, IP4/98, 1998, 4pp
ISBN: 978-1-86081-197-5 £9.00

The passive gas tracer method for monitoring ventilation rates in buildings

BRE has developed a new technique for measuring time-averaged ventilation rates in occupied buildings using a perfluorocarbon tracer gas. The new technique has the potential to allow routine performance monitoring of both natural ventilation and forced air supply systems, thereby helping users to save energy and to meet the health, safety and comfort requirements of the building's occupants.

BRE, IP13/95, 1995, 4pp
ISBN: 978-1-86081-025-1 £9.00

Testing the performance of terminals for ventilation systems, chimneys and flues

This paper discusses a testing procedure that establishes both the wind performance and flow resistance of free-standing terminals. It can be used as a basis for terminal manufacturers to test their designs.

BRE, IP5/95, 1995, 4pp
 £9.00

Flow resistance and wind performance of some common ventilation terminals

This paper discusses the performance of several terminal designs. Such information can be used to ensure terminal behaviour is matched to system requirements.

BRE, IP6/95, 1995, 4pp
 £9.00

De-stratification of air in industrialised buildings

This paper describes how the problem of stratification is perceived by building occupiers and discusses types of equipment which can be used to de-stratify the air.

BRE, IP9/95, 1995, 4pp
ISBN: 978-1-86081-011-4 £9.00

Passive stack ventilation systems: design and installation

Passive stack ventilation is a means of removing unwanted moisture from dwellings. The proper design and installation of these systems is vital to their successful performance. This paper gives detailed guidance on this subject and is in support of the 1995 edition of the Approved Document to Part F of the Building Regulations.

BRE, IP13/94, 1994, 4pp
 £9.00

The BRESIM technique for measuring air infiltration rates in large dwellings

BRESIM is a simplified technique for non-specialists to determine approximately the infiltration and ventilation rates of large and complex buildings. This paper describes the underlying basis of BRESIM, including the equipment and procedures used, and its application to two dissimilar buildings.

BRE, IP11/90, 1990, 4pp
 £9.00

Use of BREFAN to measure the air tightness of non-domestic buildings

BREFAN is a fan pressurisation rig for testing buildings for air leakage. Field measurements with BREFAN in two office buildings are described, and show how a 'leakage' index can be evaluated and used as a diagnostic measure of constructional quality.

BRE, IP6/89, 1989, 4pp
 £9.00

Domestic mechanical ventilation: guidelines for designers and installers

Guidelines are given on the design and installation of mechanical ventilation in typical UK housing, covering ducted extract systems and balanced supply and extract systems, with or without heat recovery. Characteristics of the dwelling, heating and ventilation systems, controls, fire precautions, installation, cleaning and maintenance are included.

BRE, IP18/88, 1988, 4pp
 £9.00

BEST SELLER: Design methodologies for smoke and heat exhaust ventilation

This book summarises the advice available from FRS to designers of Smoke and Heat Exhaust Ventilation Systems (SHEVS) for atria and other buildings. It provides practical guidance on the design of smoke-control systems. It reflects current knowledge and is based on published and unpublished research. It also draws on the authors' experience of design features required for regulatory purposes in many individual smoke-control applications.

BRE, BR368, 1999, 150pp
ISBN: 978-1-86081-289-7 £85.00

Natural ventilation in atria for environment and smoke control

An introductory guide

This guide introduces the key principles of natural environmental ventilation and smoke control in the event of fire, considers how to combine these strategies to achieve a successful design, describes a simple design tool, and presents two examples and their design implications. The guide aims to increase awareness of the possibilities for combining natural environmental ventilation in atria with smoke control so this can be considered at the detailed design stage, thus optimising performance.

BRE, BR375, 1999, 18pp
ISBN: 978-1-86081-308-5 £30.00

Carbon monoxide detectors

Combustion appliances in the home can generate levels of carbon monoxide (CO) that may affect the health of the occupants. Each year, about 60 accidental deaths occur in the UK from the use of these appliances and there are many more non-fatal incidents. This Guide makes recommendations for CO detection systems in the home, based on the requirements for early detection, audibility and the need to minimise cost.

BRE, GG30, 1999, 4pp
ISBN: 978-1-86081-283-5 £9.00

Indoor air 99 proceedings

Proceedings of the 8th International Conference on Indoor Air Quality and Climate, Edinburgh, August 1999. Five volumes or PDFs on CD ROM.

BRE, AP129, 1999
ISBN: 978-1-86081-769-4 £100.00

Continuous mechanical ventilation in dwellings

Design, installation and operation

This Digest deals with ducted extract systems and balanced supply and extract systems, with and without heat recovery. It considers the characteristics of dwellings and their heating systems, and the design, controls, fire precautions, installation, cleaning and maintenance of such systems.

BRE, DG398, 1994, 8pp
ISBN: 978-0-85125-641-2 £15.00

Natural ventilation in non-domestic buildings

Gives designers and building users design guidance for using natural ventilation in energy-efficient non-domestic buildings.

BRE, DG399, 1994, 8pp
ISBN: 978-1-86081-042-8 £15.00

Improving ventilation in housing

Without enough ventilation, homes suffer from condensation. Central heating, making windows and doors more airtight, sealed double glazing and sealing of chimneys and flues have made it necessary to change the way existing houses are ventilated. Changes in the way new homes are ventilated have been reflected in updates to building regulations. Refurbishment gives an opportunity for improving ventilation in existing housing so builders and householders need to be aware of the guidance in local building regulations. This Good Repair Guide explains the changes to Approved Document F1 and gives advice on avoiding problems.

BRE, GR21, 1998, 6pp
ISBN: 978-1-86081-268-2 £9.00

Indoor air quality in homes

Part 1

This describes the results of a BRE study on the indoor environment, providing data on the range and concentrations of pollutants in UK homes and identifying the factors such as household characteristics and occupant activities, which influence the level of pollutants. The study was carried out in collaboration with the Avon Longitudinal Study of Pregnancy and Childhood (ALSPAC).

BRE, BR299, 1996, 126pp
ISBN: 978-1-86081-059-6 £35.00

Indoor air quality in homes

Part 2

This describes the results of a BRE study on the indoor environment, providing data on the range and concentrations of pollutants in UK homes and identifying the factors such as household characteristics and occupant activities, which influence the level of pollutants. The study was carried out in collaboration with the Avon Longitudinal Study of Pregnancy and Childhood (ALSPAC). This second part contains the statistical data and results obtained in the indoor environment study.

BRE, BR300, 1996, 194pp
ISBN: 978-1-86081-060-2 £40.00

Background ventilation of dwellings

A review

All dwellings need fresh air – for occupants' health and comfort, to control condensation, and to ensure safe and efficient operation of combustion appliances. This review summarises current thinking on providing ventilation by design.

BRE, BR162, 1989, 14pp
ISBN: 978-0-85125-417-3 £22.50

Airtightness in UK dwellings

BRE's test results and their significance

This paper summarises the findings from a large number of airtightness measurements carried out by BRE in UK dwellings. It describes how airtightness may be measured in single dwellings, the relationship of air leakage with ventilation, and ways to improve airtightness. It is aimed at those responsible for designing and supervising construction work for new and existing dwellings, both in the public and private sectors.

BRE, BR359, 1998, 48pp
ISBN: 978-1-86081-261-3 £35.00

Minimising air infiltration in office buildings

This report is an outline guide to design, setting out the principles of providing an effective airtightness layer, and advising on some of the common pitfalls which can reduce the performance of this layer.

BRE, BR265, 1994, 42pp
ISBN: 978-0-85125-634-4 £22.50

Indoor air quality in homes in England

Volatile organic compounds

This report is a supplement to BR433, Indoor air quality in homes in England, BRE's survey of air pollutants in 876 homes. The survey extends and refines knowledge of baseline levels of indoor pollutants in homes, to identify regional differences in pollutant levels and to permit a detailed analysis of factors associated with high indoor pollutant concentrations.

BRE, BR446, 2002, 68pp
ISBN: 978-1-86081-566-9 £45.00

Airtightness in commercial and public buildings

Addresses the importance of airtightness in commercial and public buildings and supports the requirements on airtightness specified in Approved Document L2 (2002 edition) to the Building Regulations. The report is an outline guide to design, setting out the principles of providing an effective airtightness layer and advising on common pitfalls. It covers the mechanics that cause air infiltration to occur; the benefits which result from increasing airtightness; designing and specifying for airtightness; site practice for airtight construction; and testing buildings.

BRE, BR448, 2002, 36pp
ISBN: 978-1-86081-578-2 £52.50

A protocol for the assessment of indoor air quality

BRE specialists reviewed the parameters that determine indoor air quality (IAQ) and drafted a protocol for undertaking an IAQ assessment. This report provides the final protocol, revised following comments from experts and a field trial, and is intended as guidance for specialists undertaking an IAQ assessment and building owners/managers concerned about IAQ. The key parameters are temperature, humidity, non-biological particles and fibres, biological particles, radon, other inorganic gases, organic compounds and gases associated with landfill sites (eg methane).

BRE, BR450, 2002, 52pp
ISBN: 978-1-86081-590-4 £32.50

Indoor air quality in homes in England

This gives results of BRE's national representative survey of air pollutants in 876 homes in England. The survey lasted for 17 months from October 1997. The pollutants measured were nitrogen dioxide, carbon monoxide, formaldehyde and total volatile organic compounds. The report describes the sampling methods, summarises the levels of pollutants found, and gives results of the statistical analysis.

BRE, BR433, 2001, 100pp
ISBN: 978-1-86081-530-0 £40.00

Improving air quality in urban environments

Guidance for the construction industry

V Kukadia and Hall D

An introduction to the issues that the building design project team will need to be aware of when considering building developments and refurbishment projects. It focuses on outdoor pollution and sustainability, and provides guidance on how to address air quality issues during the design and construction process. Air quality is an issue that building design teams, developers and contractors increasingly will need to consider when planning a new development or refurbishment project. With increasing levels of pollution in urban areas, the need to improve air quality is increasing. In response, local authority planning and environmental health departments are demanding that those who specify, design or construct buildings should minimise pollution emitted during construction and the building's subsequent use, and the amount that infiltrates the building.

BRE, BR474, 2004, 52pp
ISBN: 978-1-86081-729-8 £42.50

Controlling emissions of particles, vapour and noise on construction sites

V Kukadia, S Upton and C Grimwood

A series of five guides intended to assist with the control of air pollution and noise emissions from construction sites. They set out guidance on controlling pollution emissions associated with construction fabrication processes and internal and external finishes. Although techniques have not been validated under controlled conditions and therefore must be used with care, recommendations are drawn from cases where they have been found to be effective.

BRE, AP160, 5 parts, 2003, 32pp
ISBN: 978-1-86081-878-3 **£40.00**

Ventilation, air tightness and indoor air quality in new homes

C Dimitriloupolou, D Crump, S K D Coward, V Brown, R Squire, H Mann, M White, B Pierce and D Ross

A report on a study of ventilation and indoor air quality in 37 homes built in England since 1995. It assesses 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. It improves the understanding of the relationships between air leakage, ventilation and indoor air quality.

BRE, BR477, 2005, 64pp
ISBN: 978-1-86081-740-3 **£35.00**

Achieving airtightness: General principles

The aim of this three-part Good Building Guide is to give the best advice on achieving airtightness in new buildings. It is based on data obtained from laboratory testing and observations made while undertaking air leakage audits in buildings. This first part describes the common air leakage paths and sets out the principles to follow when developing energy-efficient construction details. Parts 2 and 3 provide practical guidance on airtightness techniques appropriate to most building types.

BRE, GG67, 3 parts, 2006, 24pp
ISBN: 978-1-86081-926-5 **£22.50**

Air quality, radon and ventilation pack

BRE

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Airtightness of ceilings (IP4/06)
Background ventilators for dwellings (IP2/03)
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Controlling emissions of particles, vapour and noise on construction sites (5-part set) (PG1-5)

BRE, AP250, Ringbound set, 2007
ISBN: 978-1-86081-988-9 **£85.00**

WATER SUPPLY, DRAINAGE AND SANITATION

Self-sealing waste valves for domestic use

An assessment

This Information Paper is a revision of IP 5/05, which presented 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.

BRE, IP8/07, 2007, 8pp
ISBN: 978-1-86081-958-2 **£9.00**

Drainage design for buildings with reduced water use

This Information Paper reports on a project on the effect of low water usage in domestic buildings on the upstream parts of the drain and sewer system, i.e. those parts most likely to be affected by reductions in water use and therefore most likely to block. It summarises the types and characteristics of appliances used for reducing water consumption, estimates current and future water volumes, and gives guidance for design of drain and sewer systems for systems for up to 10 houses.

BRE, IP1/04, 2003, 6pp
ISBN: 978-1-86081-671-0 **£9.00**

Preventing hot water scaldings in bathrooms: using TMVs

Hot bath water is responsible for the highest number of fatal and severe scald injuries in the home. Young and old are most at risk. There is no legal requirement to limit water delivery temperatures in homes, but several recent changes in regulations and recommended practice have been introduced. This Paper explains how to reduce the risk of scalding and contains technical guidance on the selection, installation and maintenance of products to provide hot water at temperatures to minimise severe scalding risks to users of baths and showers.

BRE, IP14/03, 2003, 8pp
ISBN: 978-1-86081-651-2 **£9.00**

Weathering of plastics pipes and fittings

This Information Paper summarises work to evaluate the resistance of plastics pipes to artificial weathering. Most of the pipes and fittings tested discoloured severely, and became embrittled. However, some were affected much more than others. Plastics pipes should not be exposed to sunlight for prolonged periods unless known to be resistant to UV light. When specifying plastics piping systems, consider whether any parts will be exposed, establish whether the system is resistant to UV exposure, and take protective measures if appropriate.

BRE, IP8/01, 2001, 6pp
ISBN: 978-1-86081-480-8 **£9.00**

Water conservation: low flow showers and flow restrictors

This Paper contains information on the types of appliance available and their suitability for various applications, gathered from manufacturers, research bodies and standards. The guidance refers to, and complements, codes of practice and specifications for products. It also gives information on web sites. It will interest installers and specifiers of plumbing installations, and anyone specifying low-flow appliances in retrofit programmes or new build.

BRE, IP2/00, 2000, 4pp
ISBN: 978-1-86081-356-6 **£9.00**

Water conservation

Water conservation has become increasingly important in the UK as demand for water has increased and shortfalls in supply have occurred. There is growing public awareness of the scarcity of water in some areas of the UK and of its economic value. The benefits of conserving water include: maintaining the availability of the water supply during drought periods; reduced pumping and treatment costs (with associated energy savings); wastewater reduction, protection of the environment and the possible reduction in costs for the consumer.

BRE, IP15/98, 1998, 4pp
ISBN: 978-1-86081-250-7 **£9.00**

Unvented hot water storage systems: microbial growth in expansion vessels

The design of a hot water supply system is an important aspect in reducing the risk of bacterial growth. Poor design and maintenance of water services can lead to conditions where bacteria, such as legionella, can multiply and subsequently become aerosolised leading to an increased health risk for the users of a building. This paper gives advice on design, and lists available guidance documents.

BRE, IP1/97, 1997, 4pp
ISBN: 978-1-86081-123-4 £9.00

Water conservation: Part 1 - a guide for designers of low flush WCs, Part 2 - a guide for installation and maintenance of low flush WCs

Contains detailed information intended for designers of these appliances.

BRE, IP8/97, 1997, 4pp
ISBN: 978-1-86081-166-1 £9.00

Spillage of flue gases from solid-fuel combustion appliances

This paper describes how the main types of solid-fuel appliance work and describes how to test them for spillage.

BRE, IP7/94, 1994, 4pp
 £9.00

Hard-water scale in hot water storage cylinders

Examines the formation of scale, usually calcium carbonate, in once-through hot water storage cylinders, and makes design recommendations to minimise scale deposition and its effects.

BRE, IP13/93, 1993, 4pp
 £9.00

Unvented hot water supply systems

The 1986 Model Water Byelaws permit the use, without a vent, of mains-fed hot water storage systems of over 15 litres capacity. With reference to the Building Regulations 1985 and British Standards, the need for safety devices and controls in the absence of and open vent are explained.

BRE, IP9/90, 1990, 4pp
 £9.00

Rats in drains

Rats carry diseases, contaminate food and cause damage in buildings. This IP suggests ways of preventing them from entering buildings through drainage systems, and describes methods for their eradication or limitation.

BRE, IP6/90, 1990, 4pp
 £9.00

Legionnaires' disease - the implications for design and use of hot water systems

A review of knowledge of the time (late 1984) to provide guidance on design and operation of water supply systems to help avoid the risk of Legionnaires' disease. It aims to draw attention to the fact that outwardly trivial aspects of water systems may encourage bacterial multiplication.

BRE, IP5/85, 1985, 4pp
 £9.00

BREVAC: A mechanised method of emptying sanitation chambers

To complement the development of permanent double-pit latrines in developing countries, BRE has developed a mechanised method for emptying all types of on-site sanitation system. This method, known as BREVAC, dispenses with manual emptying which is often offensive and hazardous to health.

BRE, IP1/84, 1984, 4pp
 £9.00

Water economy with the Skevington/BRE controlled flush valve for WCs

A method of reducing water consumption by WC suites is to convert existing cisterns so that each user can control the amount of water flushed. One device is the Skevington/BRE valve, designed to be versatile, cheap and easy to install. Monitoring of trial installations has shown the device to be reliable and capable of saving up to 40 per cent of the water normally used for WC flushing.

BRE, IP12/83, 1983, 4pp
 £9.00

A basis for the revision of scales for sanitary accommodation in schools

Rational scales of provision for sanitary appliances in schools are proposed, based on data collected on the use of cloakroom accommodation collected in a number of schools and incorporated in a computer simulation model.

BRE, IP10/82, 1982, 4pp
 £9.00

Water conservation design, installation and maintenance requirements for the use of low-flush WCs flushed siphonically or by valves

This Report describes the findings of an investigation into the installation, commissioning and maintenance requirements for low flush WC's in order to minimise the volume of water used. The guidance includes details of the various flushing mechanisms: WCs siphonically flushed (traditional UK practice), WCs flushed using valves (including flap-valve, drop-valve, interruptible flush and pressurised cistern) and dual-flush WCs.

BRE, BR328, 1997, 62pp
ISBN: 978-1-86081-162-3 £22.50

Repairing and replacing rainwater goods

Describes common defects in gutters and downpipes and gives advice on how to choose between replacement and repair.

BRE, GR9, 1997, 6pp
ISBN: 978-1-86081-147-0 £15.00

Potential health risks associated with the use of expansion vessels with hot water installations

Gives results of a project to investigate the potential for expansion vessels, installed with unvented hot water storage systems, to support and encourage the growth of bacteria, including Legionella.

BRE, BR309, 1996, 48pp
ISBN: 978-1-86081-083-1 £25.00

Sanitary pipework

Part 1. Design basis

Digests 248 and 249 consider the design of unvented above-ground drainage systems for high and low-rise domestic, public and office buildings, based on performance criteria given in BS 5572: 1978.

BRE, DG248, 1981, 4pp
ISBN: 978-0-85125-297-1 £9.00

Sanitary pipework

Part 2. Design of pipework

Digests 248 and 249 consider the design of unvented above-ground drainage systems for high and low-rise domestic, public and office buildings, based on performance criteria given in BS 5572: 1978.

BRE, DG249, 1981, 8pp
ISBN: 978-0-11725-082-6 £15.00

Access to domestic underground drainage systems

Examines the requirements for access to underground drains and recommends typical drainage systems.

BRE, DG292, 1985, 8pp
ISBN: 978-0-11727-214-9 £15.00

Unvented domestic hot water systems

This Digest summarises the differences between vented and unvented systems, explains how, in the absence of a vent, there is a need for safety devices and controls, describes the new Building Regulations procedures, and advises on the inspection of installations.

BRE, DG308, 1986, 8pp
ISBN: 978-0-85125-204-9 £15.00

Disposing of rainwater

Getting rainwater off the roof, down to the ground and away from the building is not always as simple as it seems. All the rain falling on the building has to be led down to ground level without spilling, and into a below-ground drainage system. And that system has to be able to cope with potentially large and sudden influxes of storm water. This Guide shows how to avoid some common pitfalls in roof drainage systems and soakaways for new housing.

BRE, GG38, 2000, 6pp
ISBN: 978-1-86081-382-5 **£9.00**

Protecting pipes from freezing

Each winter a spell of cold weather catches a lot of builders and householders napping, resulting in frozen water supplies, burst pipes and consequent building damage. This is the time to think about taking steps to prevent a repeat performance. The cost of repairing the damage caused by water from a burst pipe is out of all proportion to the cost of installing protection. This Good Building Guide looks at how to prevent freezing of water supplies, inside and out, with advice for both new and existing buildings.

BRE, GG40, 2000, 4pp
ISBN: 978-1-86081-416-7 **£9.00**

Low-water-use washdown WCs

Describes research by BRE into the viability of flushing WCs using a reduced volume of water. Suitable performance in use was a primary consideration and work was confined mostly to wash-down pans.

BRE, BR115, 1987, 24pp
ISBN: 978-0-85125-261-2 **£22.50**

Unvented domestic hot-water systems

BRE papers given at the joint BRE/BBA seminar held in March 1986, dealing with how unvented systems would be affected by requirements for the prevention of back-siphonage and on the Model Water Bye-laws.

BRE, BR125, 1988, 56pp
ISBN: 978-0-85125-281-0 **£22.50**

Reed beds for the treatment of domestic wastewater

This report provides an overview of the specification and design of reed bed systems for the treatment of domestic wastewater, in the context of the UK climate and regulations. It is targeted at those wishing to gain an overview and clarification of the technologies available. Case studies of different types of system and application are included.

BRE, BR420, 2001, 46pp
ISBN: 978-1-86081-486-0 **£40.00**

Dealing with noisy plumbing

Noise in plumbing and heating systems is best avoided by getting the design and installation right in the first place. But there are ways of reducing noise in existing systems. This Good Repair Guide looks at some typical problems and suggests practical solutions.

BRE, GR32, 2002, 6pp
ISBN: 978-1-86081-572-0 **£9.00**

Mound filter systems for the treatment of domestic wastewater

R D S Phelps (Fife Council) and J Griggs

Describes mound filters for domestic wastewater after primary treatment (settling) and after secondary treatment (aerobic or anaerobic biological treatment). It draws on work from around the world, including the UK. The design guidance covers the most common types of mound filters likely to be employed in the UK in the near future. The guide includes an introduction to wastewater treatment, guidelines on construction and maintenance of mound filters, design criteria, and trouble-shooting solutions.

BRE, BR478, 2005, 60pp
ISBN: 978-1-86081-747-2 **£50.00**

BEST SELLER: BRESOAK

Soakaway design software (unlimited use)

BRE, AP241, Software, 2007
£402.50

BRESOAK

Soakaway design software (annual use)

BRESOAK software helps designers to plan soakaways in ways that are consistent with the advice in BRE Digest 365 Soakaway design, which is included as a pdf file on the CD.

BRESOAK software will save time for developers and engineers in designing soakaways, and give confidence that the results will be fully in line with Digest 365 and acceptable for building control purposes.

BRE, AP246, Software, 2007
£143.75

Water supply, drainage and sanitation pack

BRE

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Dealing with noisy plumbing (GR32)

Repairing and replacing rainwater goods (GR9)

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Drainage design for buildings with reduced water use (IP1/04)

Preventing hot water scaldings in bathrooms: using TMVs (IP14/03)

Self-sealing waste valves for domestic use: an assessment (IP8/07)

Water conservation: low flow showers and flow restrictors (IP2/00)

Weathering of plastics pipes and fittings (IP8/01)

BRE, AP266, Ringbound set, 2007
ISBN: 978-1-84806-004-3 **£45.00**

Reed beds

Proposed revisions to the Building Regulations make reference to reed bed systems for treating domestic wastewater. This Guide provides guidance on typical applications and current minimum design specifications for reed beds treating settled domestic wastewater. Part 1 of this Guide deals with the application and specification of reed beds. Part 2 deals with designing, constructing and maintaining reed beds.

BRE, GG42, 2 parts, 2000, 14pp
ISBN: 978-1-86081-872-1 **£20.00**

WIND, FLOODS AND CLIMATE

A review of gale damage to buildings in the UK

On average, 200,000 buildings are damaged by high winds every year in the UK. The types of wind damage which have occurred to buildings and the features of construction which have made them more susceptible to damage are discussed, along with steps which could be taken to reduce wind damage to buildings.

BRE, IP13/86, 1986, 4pp
£9.00

A test rig for proof-testing building components against wind loads

Describes a test rig developed at BRE to generate suction loads in any plane on most non-porous substances.

BRE, IP19/84, 1984, 4pp
£9.00

Buildings and tropical windstorms

Every year severe tropical windstorms occur causing extensive damage and disruption of communities. Examples are given of damage to different types of buildings, and the nature of the windflow around them is discussed. Advice is given on the assessment of wind loads, and on the design and construction of buildings to resist windstorms.

BRE, IP23/81, 1981, 4pp
£9.00

Climate and site development

The factors of climate as they affect buildings, and how planning a climatically-sensitive site layout can benefit building performance by reducing energy consumption and improving durability.

BRE, DG350, 3 parts, 1989, 28pp
ISBN: 978-1-86081-815-8 £22.50

The assessment of wind loads

Introduction to a series compatible with BS 6399: Part 2 which incorporates several changes from the previous CP3 Chapter V: Part 2: 1972.

BRE, DG346, 8 parts, 1989, 44pp
ISBN: 978-1-86081-876-9 £27.50

Building overseas in warm climates

This Digest provides an introduction for those new to designing for warm climates and summarises the main sources of information available.

BRE, DG302, 1985, 8pp
ISBN: 978-0-85125-177-6 £15.00

New materials in hot climates

Gives guidance on the selection and use of building materials and products that are available for use in tropical countries, including plastics, roofing membranes, sealants, thermal insulating materials and surface coatings.

BRE, DG382, 1993, 12pp
ISBN: 978-0-85125-578-1 £15.00

Building in hot climates

A compendium of 35 BRE Overseas Building Notes covering materials (lime, materials in the Arabian Gulf, concrete, no-fines concrete, lightweight concrete, stabilised soil, bricks, mortar, metals, steelwork, timber, plastics, paints, bitumen), sanitation and sewage treatment, foundations, management of sites, comfort, thermal performance, roofs, avoiding faults and failures, building in earthquake areas, low-cost housing.

BRE, SO25, 1980, 520pp
ISBN: 978-0-11670-759-8 £50.00

Cyclone-resistant houses for developing countries

This report reviews the overseas work of BRE on the effects of winds on buildings. It describes the characteristics of windstorms and general principles for the location, structural design of low-cost houses, and construction details to enhance structural integrity during windstorms.

BRE, BR131, 1988
ISBN: 978-0-85125-292-6 £22.50

Investigation into the structural adequacy of relocatable buildings under wind loading

Gives results of an assessment of the structural adequacy of single-storey relocatable buildings of the sort particularly vulnerable to damage during the severe storms in England in early 1990. Suggests measures to reduce their vulnerability to wind damage.

BRE, BR215, 1991, 14pp
ISBN: 978-0-85125-518-7 £22.50

Impact of climate change on building and building materials

This report describes predicted climate changes in the UK and how buildings may be affected. Three areas where impact will be experienced are: the construction process, the building fabric, and the indoor environment. Responses required through building regulations and standards are suggested. (Available on CD ROM 11/98)

BRE, BR361, 1998
ISBN: 978-1-86081-266-8 £30.00

Directional driving rain indices for the United Kingdom

Computation and mapping

Driving rain indices are relevant to the weathering and staining of building facades and assessing the risk of rain penetration. They are the basis of BSI Draft for Development 93 'Methods for assessing exposure to wind-driven rain', which gives the full design method and driving rain maps for the whole of the UK.

BRE, BR59, 1985, 28pp
ISBN: 978-0-85125-085-4 £22.50

Gale damage to buildings in the UK

An illustrated review

This review shows the forms of damage caused to buildings by high winds, indicates the wind effects involved, and shows the ways in which the risks of damage may be reduced in design and construction.

BRE, BR91, 1986, 72pp
ISBN: 978-0-85125-354-1 £22.50

Wind loads on canopy roofs

Deals with the assessment of wind loads on free-standing canopy roofs without walls including the effects of blockage caused by stacked contents. It should be used in conjunction with Digest 346 'The assessment of wind loads'.

BRE, DG284, 1984, 4pp
ISBN: 978-0-11727-205-7 £9.00

Wind scour of gravel ballast on roofs

This Digest gives a method of estimating the threshold wind speeds for scour. It is based on published information from wind tunnel tests conducted for this specific purpose and should be used in conjunction with Digest 346, Parts 1 to 8, and with Digest 295 if paving stones are used on the roof.

BRE, DG311, 1986, 4pp
ISBN: 978-0-85125-211-7 £9.00

Wind around tall buildings

Describes wind flow around tall buildings, shows how to decide at an early design stage whether a building is likely to give a satisfactory environment, and suggests measures to achieve safe and comfortable conditions, particularly in open air pedestrian areas.

BRE, DG390, 1994, 12pp
ISBN: 978-0-85125-620-7 £15.00

Wind actions on buildings and structures

This Digest provides information for engineers and architects about the nature of wind action on and around buildings and structures. It describes common types and causes of wind damage, and shows how good design can minimise wind actions on buildings. The Digest also discusses the principal differences between BS 6399: Part 2 and the previous wind loading Code of practice.

BRE, DG406, 1995, 8pp
ISBN: 978-1-86081-018-3 £15.00

Sultanate of Oman: building conditions and materials

This report is intended for the use of British construction firms, consultants, contractors, building materials suppliers, operating in Oman.

BRE, BR92, 1986, 42pp
ISBN: 978-0-85125-218-6 £22.50

The October gale of 1987: damage to buildings and structures in the south east of England

A report, with charts and statistical tables, of structural damage resulting from the hurricane force winds during the night of 15–16 October 1987.

BRE, BR138, 1988, 24pp
ISBN: 978-0-85125-362-6 £22.50

Design guide for wind loads on unclad framed building structures during construction

Supplement to 'The designer's guide to wind loading of building structures'. Wind forces on an unclad structure can be comparable to those when the building is clad but without the dead weight that can help counteract tensions due to uplift. This guide provides a quick but realistic assessment of these forces.

BRE, BR173, 1990, 28pp
ISBN: 978-0-85125-442-5 £25.00

The gales of January and February 1990: damage to buildings and structures

Assesses the scale of damage, and implications for the building industry, of the 35-day period which saw many deaths and injuries as buildings collapsed and more than a million houses were damaged. Concludes that buildings designed according to sound practice given in codes and standards behaved well in the gales.

BRE, BR248, 1993, 24pp
ISBN: 978-0-85125-573-6 £22.50

Building in winter

Winter weather often makes it difficult for builders to get on with the job. In very severe winters, sites can be at a standstill for weeks. Even in less severe weather, building operations are more difficult and working hours are bound to be reduced. Frost, rain and wind can play havoc with newly built work unless precautions are taken. Some of these problems can be reduced by planning, good preparation of the site, care of stored materials and protection of completed work. This Guide gives tips and advice on how to keep interruptions to building to a minimum during winter weather, how to protect materials, and when it is vital to stop work.

BRE, GG34, 1999, 6pp
ISBN: 978-1-86081-327-6 £9.00

Repairing frost damage

This Guide gives advice on diagnosing frost damage and its likely course, and method of repair. Advice is given on the choice of whether to replace or repair, to help surveyors and contractors decide on appropriate action.

BRE, GR20, 2 parts, 1998, 8pp
ISBN: 978-1-86081-245-3 £15.00

Repairing flood damage

These four guides deal with repairs to damage caused by flooding.

Part 1 gives advice on cleaning the building in the first few days after the water has receded: such action can reduce the reoccupation time and minimise repairs and replacement.

Part 2 deals with the treatment and repair of floors, and draining under-floor areas and basements. Information is given on drying, ventilation, measuring moisture contents, and reinstatement of flooring.

Part 3 covers the treatment and repair of foundations and walls affected by flooding. This advice is given for solid, cavity, timber-frame and non-traditional walls. Information is also given on wall finishes.

Part 4 gives advice on equipment, partitions, doors, windows and fittings in a building damaged by flood. It deals with the period after the initial cleaning, inspection, drying and repair of each item.

BRE, GR11, 4 parts, 1997, 16pp
ISBN: 978-1-86081-150-0 £22.50

Wind loads on unclad structures

This Special Digest provides guidance on designing lattice structures and individual members for wind loading. Much of the current UK guidance for wind loads on frames, lattice structures and individual members is based on CP3: Chapter V: Part 2. This Standard, which was withdrawn in 2001, gave force coefficients for a range of unclad structures, including single and multiple frames, lattice structures and individual members. CP3-V has now been superseded by BS 6399-2, which is principally applicable to buildings and their components and includes only limited information on structural members and unclad structures.

BRE, SD5, 2004, 16pp
ISBN: 978-1-86081-702-1 £27.50

Wind loads on temporary stage decks

P Blackmore and P Freathy

Temporary stages for outdoor events are generally free-standing structures with a flat timber deck supported on system scaffolding or other proprietary systems. General guidance on the design, use and procurement of these structures is available from the Institution of Structural Engineers, but this does not cover wind loads on temporary stage decks. This Digest provides a procedure for designing temporary stage structures for wind loads that follows BS 6399-2.

BRE, DG483, 2004, 12pp
ISBN: 978-1-86081-681-9 £15.00

Wind loads on roof-based photovoltaic systems

This Digest reviews the wind loading information appropriate for roof-based photovoltaic (PV) systems and gives recommendations and guidance for the design of roof-based PV systems for wind loads. It has been developed from work undertaken during a Partners in Innovation project funded by DTI.

BRE, DG489, 2004, 8pp
ISBN: 978-1-86081-713-7 £15.00

Climate change

This Good Building Guide considers how the climate is changing, the potential risks this will bring to buildings and, as a consequence, how building design and construction will need to change.

BRE, GG63, 2004, 8pp
ISBN: 978-1-86081-735-9 £15.00

Repairing flooded buildings: an insurance industry guide to investigation and repair

Flood Repairs Forum

Flood damage is a complex area, in terms of insurance and building repair issues. This publication has been compiled by the Flood Repairs Forum to rationalise and simplify the issues involved, with the aim of improving service to the building owner from the insurance, loss adjusting, surveying and contracting sectors. It follows the sequence of events in a flood claim - insurance, inspection, drying, monitoring, repair, health and safety, and damage avoidance. It helps those who are less experienced in flood repairs to understand the basic insurance and technical issues involved, and the key elements of customer care - recognising that communication and management of expectation rest at the heart of many of the difficulties which can occur.

EP69, 2006, 108pp
ISBN: 978-1-86081-903-2 £27.50

Wind, floods and climate pack

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Weathering of plastics pipes and fittings (IP8/01)

BRE, AP267, Ringbound set, 2007
ISBN: 978-1-84806-005-0 £85.00

NEW: The LiFE handbook

Long-term initiatives for flood-risk environments

Baca Architects and BRE and in collaboration with Cyril Sweett, Halcrow Group, Fulcrum Consulting and LDA Design

The LiFE Handbook aims to help manage and reduce unacceptable levels of flood risk by raising awareness and aiding delivery of more sustainable development. It is intended to be used by decision makers, designers and developers before and during the early stages of design. The general principles of the approach can be used on all sites, but three illustrated examples and case studies focus on sites near rivers and coasts.

The LiFE project is one of six projects funded by Defra's Flood and Coastal Erosion Risk Management - Innovation Fund, and is part of Defra's Making Space for Water programme. The project identifies ways in which flood risk management may be integrated with sustainable, responsible development. The LiFE approach promotes good design, where the means of managing flood risk become an asset to the development and the wider community.

BRE, EP97, 2009, 28pp
ISBN: 978-1-84806-088-3 **£10.00**

BEST SELLER: Wind loading on buildings

This Digest provides background information to ensure BS 6399-2 is applied correctly. Part 1 uses a question-and-answer format arranged in the same order as the Standard. Parts 2 and 3 provide worked examples of the BS 6399-2 method. The guidance will help users to select the choices in BS 6399-2 that are equivalent to previous practice. It will also help to eliminate conservatism in the standard method by considering wind direction, even when the orientation of a building is unknown. The Digest is aimed at architects, engineers and professionals who need to know the effect of wind on buildings, and design options that minimise it.

BRE, DG436, 3 parts, 1999, 40pp
ISBN: 978-1-86081-818-9 **£25.00**

FIRE AND SECURITY

FIRE ASSESSMENT, DESIGN AND MODELLING

Self-heating and spontaneous combustion

Isothermal test methods

Spontaneous ignition resulting from slow oxidation of combustible material can be an industrial fire hazard and is known to occur in a wide variety of materials given the right conditions. Pulverised coal, milk powder and dried sewage sludge are well known as having the potential for self-heating leading to combustion, but there are many other industrial examples. This Information Paper describes a simple and powerful test method that can be used to assess the spontaneous ignition hazard of particulate matter.

BRE, IP11/08, 2008, 6pp
ISBN: 978-1-84806-069-2 **£9.00**

NEW: Risks of dust fires and explosions

A review of European test methods

Fine particulate material (dust or powder) not only has the potential to burn, but also to explode - a so-called 'dust explosion'. Materials known to be susceptible include coal, sawdust, flour, sugar and powdered milk. Prevention and protection together control the hazard of industrial dust explosions, and a detailed knowledge of a dust's ignition and explosion properties underpins the whole basis of safety. To that end, a number of European test standards have been developed. This Paper describes the tests and how the results may be applied in practice to protect people, plant and property.

BRE, IP14/08, 2008, 8pp
ISBN: 978-1-84806-080-7 **£9.00**

The development of a fire risk assessment model

Describes a model under development at FRS which will be used to prioritise remedial action and test the validity of new guidelines for building control officers

BRE, IP8/92, 1992, 4pp
£9.00

Statistical studies of fires

This paper summarises some recent statistical studies carried out by the Fire Research Station to consider deliberately started fires and fires in road vehicles and hospitals. First-aid firefighting (ie tackling the fire before the fire brigade arrives) and unreported fires are also examined.

BRE, IP17/91, 1991, 4pp
£9.00

Subterranean fires in the UK - the problem

FRS survey into the incidence of subterranean fires in all types of site in the UK and in a range of materials, but mainly tipped domestic waste and coal waste. Many of the fires were difficult to control and a few could not be extinguished.

BRE, IP3/89, 1989, 4pp
£9.00

Fire safety considerations in the design of structural sandwich panels

Lightweight sandwich panels are being increasingly used in buildings. They often employ combustible foamed plastic cores which can, without careful design, introduce a life hazard if fire occurs. This paper will be of use to building designers and architects, as well as approved authorities and includes a checklist of design guidance.

BRE, IP4/87, 1987, 4pp
£9.00

Passive fire precautions in LPS blocks of flats and maisonettes

General guidance on features which may need consideration when the conditions of large panel system dwellings are being examined for structural fire protection and means of escape.

BRE, IP18/86, 1986, 4pp
£9.00

Ignition and growth of fire in a room

Based on years of research both in the UK and abroad, this paper provides vital background information for the understanding of how fires start and spread.

BRE, IP4/86, 1986, 4pp
£9.00

Fires in dwellings - an investigation of actual fires. Fires in BISF houses

Describes the fire hazards which arose in BISF (British Iron and Steel Federation) houses, and compares them with those in more traditionally constructed houses.

BRE, IP3/82, 1982, 4pp
£9.00

Assessment of fire damaged structures

Provides some guidance and references on the effects of fire on building materials and structural components so that decisions as to reparability are not based wholly on superficial appearances.

BRE, IP24/81, 1981, 4pp
£9.00

Guidelines for the construction of fire-resisting structural elements

Establishes guidelines for the construction of fire resisting structural elements and includes tables of notional periods of fire resistance based on current test data; it also makes revisions to tables and text concerning concrete, masonry and timber included in the previous edition.

BRE, BR128, 1988, 48pp
ISBN: 978-0-85125-293-3 £22.50

Mathematical fire modelling and its applications to fire safety design

Presents a compilation of the overhead projection slides from a course describing fire modelling.

BRE, BR223, Slide set, 1992, 130pp
ISBN: 978-0-85125-530-9 £30.00

Design approaches for smoke control in atrium buildings

Gives general principles for the design of smoke control systems, with simplified design procedures for an ideal model and further guidance on frequently encountered problems. It offers a linked network of approaches that lend themselves to computer programming.

BRE, BR258, 1994, 66pp
ISBN: 978-0-85125-615-3 £32.50

Design principles for smoke ventilation in enclosed shopping centres

This report summarises the design advice from the Fire Research Station, drawing on the experience and ideas of a number of sources.

BRE, BR186, 1990, 42pp
ISBN: 978-0-85125-462-3 £35.00

BEST SELLER: External fire spread: building separation and boundary distances

Describes different methods for calculating adequate space separation between buildings. Prepared in support of Approved Document B4 to the Building Regulations for England and Wales.

BRE, BR187, 1991, 52pp
ISBN: 978-0-85125-465-4 £30.00

A short history of the Fire Research Station, Borehamwood

This book sets out the background to current knowledge of fire and its application to fire safety, as well as the culture and the people behind the research conducted by FRS from the opening of the fire testing station at Borehamwood in 1935 up to 1992, the 200th anniversary of the first organised research in the United Kingdom.

BRE, BR268, 1994, 172pp
ISBN: 978-0-85125-644-3 £25.00

A hydrocarbon fire standard

An assessment of existing information

Reports the Fire Research Station's findings of an assessment of structural fire resistance, commissioned by the Offshore Energy Technology Board.

BRE, BR65, 1985, 70pp
ISBN: 978-0-85125-322-0 £25.00

P H Thomas, Fire Research Station 1951–1986

Selected papers

Facsimile of 34 papers covering the author's work in fire research over 35 years. Topics include 'hot spot theory', and flashover compartment fires. Of enormous value to the fire science world as a reference document.

BRE, BR80, 1986, 498pp
ISBN: 978-0-85125-208-7 £50.00

Design for fire safety

fire safety engineering and Approved Document B

This guide has been developed to assist architects, building control officers and other professionals considering a fire safety engineering alternative to the precise requirements set out in the Approved Document to Part B of the Building Regulation.

EP36, 1995, 36pp
ISBN: 978-1-86081-062-6 £22.50

Reaction to fire of construction products

Area B. Fire modelling

This study aims to assess the potential of using scientific knowledge, physical models and software in 'fire engineering', and how this scientific knowledge can be used to classify construction products with respect to their hazards for people in fire situations. The first stage reviews the modelling methodology by presenting the following approaches to modelling: CFD-modelling, zone modelling and test-based modelling. Hazards from fire for people were also assessed. This study recommends research on reaction to fire of construction products.

BRE, EP38, 1996, 486pp
ISBN: 978-1-86081-109-8 £47.50

A model scale study of the effects of the location of a fire within a compartment.

A study has been carried out using a 1/10th scale model to examine the effect of different fire locations within a compartment, on the mass flow rate of gases toward a compartment have been studied. These included the back, centre, side and corner of the compartment.

BRE, FN1, 1997, 36pp
ISBN: 978-1-86081-177-7 £25.00

Smoke leakage through gaps in smoke curtains

A small scale study

Presents the results of research to study the characterisation of smoke leakage through vertical gaps in smoke curtains, from a smoky hot gas layer contained within a compartment formed by the smoke curtains. Such leakage could lead to dangerous conditions in areas adjoining a smoke compartment, with the possible formation of a hot gas layer, or even smoke logging, in designated safe areas.

BRE, FN2, 1997, 26pp
ISBN: 978-1-86081-178-4 £25.00

On the stratification of line plumes

The National Fire Protection Association code on smoke control includes the result obtained by Morton, Taylor and Turner in their classic paper for the height an axisymmetric plume will rise in an atmosphere with a density linearly varying with height. This Fire Note applies the work of Morton et al to a two-dimensional plume. Some comments are made concerning a non-linear temperature or density gradient in the surroundings. The theory gives a lower bound for this non-linear stratification.

BRE, FN5, 1998, 14pp
ISBN: 978-1-86081-207-1 £22.50

A note on flame length and upward flame spread

Recent engineering applications of theories of upward flame spread have used empirical data to describe the connection between the gas and solid phases. At its simplest this approach requires a mean net heat flux to be given over the length of the flame ahead of the pyrolysing zone. Over this distance an output of heat release per unit area is specified. This Fire Note comments on the difference between a linear law and the more conventional 2/3 power law. It explores some variations in the simple thermal model of upward flame spread, and uses it to examine the role of sideways spread.

BRE, FN6, 1998, 24pp
ISBN: 978-1-86081-208-8 £25.00

Fire modelling

This Digest explains the methodologies being used for the computer simulation of fire. It focuses on models of the fire itself - the essentially gas phase phenomenon at the heart of any fire simulation. It explains fire growth and spread, and the two basic types of computer simulation methodologies: zonal models, and the more universal field models that use the specialist discipline of computational fluid dynamics. Two types of field model are described which employ alternative approaches using Reynolds Averaged and Large Eddy methodologies to capture the influences of turbulence.

BRE, DG367, 2004, 8pp
ISBN: 978-1-86081-728-1 £15.00

Design Fires Database

The 'Characterisation of fire for design purposes' project was undertaken by BRE for DTLR. The aim was to obtain quantitative data on the growth rates of a number of realistic design fires; this data could then help fire safety engineers, designers and regulators design fire safety systems. The object was to establish a database of specific fire characteristics for at least 12 realistic fire scenarios; characteristics included heat release rates, smoke production rates, CO/CO₂ ratios and gas concentration levels, with sprinklers both in and out of operation.

BRE, AP156, Software, 2003
ISBN: 978-1-86081-777-9 £155.25

Structural fire engineering design

Structural fire engineering design: introduction

This is the first of a suite of Digests containing guidance on structural fire engineering design. The intention is to produce performance based guidance that brings together fire engineering and structural engineering and provides a framework within which designers are free to develop site specific solutions based on real performance criteria. The Digests contain information complementary to the existing and emerging fire engineering codes and standards. Each may be used in isolation or as part of the full suite. This Digest introduces the subject, provides essential background information and places the information in the context of the existing regulatory framework of the UK building regulations.

BRE, DG484, 2004, 6pp
ISBN: 978-1-86081-690-1 £9.00

Structural fire engineering design: fire development

This Digest provides information on methods to calculate the time-temperature response for building fires based on the physical characteristics of the fire compartment.

BRE, DG485, 2004, 6pp
ISBN: 978-1-86081-691-8 £9.00

Structural fire engineering design

Fire and thermal response

This Digest gives an overview of methods for predicting the thermal response of structures to fire. These methods provide the essential link between the description of the heating conditions due to the fire itself (see Digest 485) and the structural performance of building components (see Parts 1-4 of Digest 487).

BRE, DG488, 2004, 8pp
ISBN: 978-1-86081-703-8 £15.00

Structural fire engineering design

Aspects of life safety

This Digest covers life safety aspects of fire engineering design and, in particular, life safety implications for structural engineering design.

BRE, DG490, 2004, 16pp
ISBN: 978-1-86081-721-2 £20.00

Structural fire engineering design

Materials behaviour

A set of four Digests
 Part 1. Concrete
 Part 2. Steel
 Part 3. Masonry
 Part 4. Timber

BRE, DG487, 4 parts, 2004, 34pp
ISBN: 978-1-86081-826-4 £25.00

Concrete structures in fire

Performance, design and analysis

T Lennon, R Rupasinghe, N Waleed, G Canisius and S Matthews

This guide provides engineers with an overview of the structural fire engineering design process and the techniques available to ensure the safe and economical fire design of concrete structures. It is the result of a collaborative research project funded by the UK government and the concrete industry.

BRE, BR490, 2007, 80pp
ISBN: 978-1-86081-913-1 £40.00

Fire pack

BRE

DIGESTS

BR135: Annex B: Performance criteria and classification method of BS 8414-4:2005 (DG501)

Dust explosions (DG288)

Fire doors (DG320)

Fire modelling (DG367)

Fire risks from combustible cavity insulation (DG294)

Safe as houses? (DG458)

Steel structures supporting composite floor slabs: design for fire (DG462)

Structural fire engineering design (3-part set) (DG490, DG488, DG485)

Structural fire engineering design - Introduction (DG484)

Structural fire engineering design - Materials

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behaviour (4-part set) (DG487)

behaviour (4-part set) (DG487)

behaviour (4-part set) (DG487)

BRE, AP259, Ringbound set, 2007
ISBN: 978-1-86081-997-1 £50.00

Video: Anatomy of a fire

Investigation of the fire at the Stardust discotheque in Dublin in which 48 young people died. The video illustrates many of tests undertaken; culminating in a simulation on a full-scale reconstruction of part of the club. (20 minutes).

BRE, DV2, Video, 1982 £36.80

Video: Cardington, the biggest fire space in the world

A video showing the work of BRE's Fire Research Station facility at Cardington, Bedfordshire. It takes the viewer on a tour of the wide variety of rigs and experimental facilities available to clients. (14 minutes).

BRE, DV5, Video, 1989 £36.80

Video: Fire in store

Shows full-scale tests reproducing the fire in Manchester Woolworths store in 1979. Illustrates the effects of sprinkler systems on the size of the fire and amount of smoke produced. (15 minutes).

BRE, DV1, Video, 1981 £36.80

Video: The front room fire 2

This video reflects the many changes in legislation, the contents of a typical front room, furniture manufacture and firefighting techniques since the original 'Front Room Fire' was filmed more than ten years previously. (10 minutes)

BRE, DV7, Video, 2001 £40.25

DVD: The front room fire and Front room fire 2

Two of the most popular training aids used by fire brigades and fire safety trainers across the world. Now available in their original versions on the same DVD.

BRE, DV12, DVD, 2006 £92.00

Video: The front room fire

Shows what happens when a settee is ignited by a single match in a test to simulate fire in a furnished front room. The stages of the fire's rapid development, leading to flashover, are described together with basic fire safety measures. (9 minutes).

BRE, DV4, Video, 1989 £28.75

Video: Fire in the house

This video supports the Building Regulations by illustrating a series of demonstration fires set up to show how the different systems available for protecting people in a fire, behave in a real house fire. (16 minutes).

BRE, DV9, Video, 2002 £43.70

NEW: Fire engineering in tunnels**D Charters**

Pressure on the use of land and environmental protection increasingly mean that new road and rail transport infrastructure is being placed underground in tunnels, with all the inherent fire challenges that this presents. This Digest provides good practice guidance on the application of fire safety engineering principles to tunnels. It briefly covers a range of issues related to tunnel fire safety, fire safety engineering and consideration of some tunnel-specific issues related to the sub-systems of fire safety engineering. It also lists references for further reading and where to obtain further information. Helps identify safe and cost-effective design solutions for fire safety in tunnels

Explains fire safety engineering and particular issues for tunnel safety

Extensive references to the literature

BRE, DG509, 2009, 12pp

ISBN: 978-1-84806-076-0

£16.50

NEW: Fire modelling with computational fluid dynamics**S Kumar**

Fire modelling is used increasingly to enable fire safety engineering solutions to meet performance-based regulatory requirements. There are many fire models, but perhaps the most useful are those based on computational fluid dynamics (CFD). Such tools in competent or expert hands are extremely powerful, but can be misused by those with limited knowledge of fire science and numerical modelling. Presentation of CFD results (often using video animation) can be very convincing, but the results must be assessed with some knowledge of the principles and awareness of any shortcomings of the model. Currently, CFD models employ either Reynolds-averaged Navier–Stokes (RANS) or large eddy simulation (LES) methodologies for application to practical fire problems.

BRE, DG511, 2009, 12pp

ISBN: 978-1-84806-094-4

£16.50

**FIRE SAFETY,
SECURITY AND
CRIME PREVENTION****Wireless fire detection systems and European regulations**

This Information Paper provides an introduction to radio-based or 'wireless' fire detection systems.

BRE, IP6/08, 2008, 6pp

ISBN: 978-1-84806-048-7

£9.00

Safe and secure town centres at night

An introduction to the BRE toolkit

This Information Paper outlines a method of assessing the management of town centres at night. It introduces a tool that has been developed by BRE to provide a comprehensive coverage of all the issues involved in alcohol-related violence and disorder. The Paper summarises the categories contained in the toolkit and explains how they can be used by stakeholders in their decision-making processes to reduce crime and disorder in the night-time economy.

BRE, IP10/08, 2008, 12pp

ISBN: 978-1-84806-068-5

£12.50

The role of windows in domestic burglary

In at least half of all domestic burglaries entry is gained through ground-floor windows. This paper describes a study designed to test current thinking on how window design affects the way burglars operate.

BRE, IP18/94, 1994, 4pp

£9.00

Domestic burglaries: the police view

This paper, the second of two, provides a picture of current crime-prevention advice and describes how it relates to patterns of burglar behaviour. It suggests that a flexible risk model can be applied to specific buildings to reduce the risk of burglary and related crime.

BRE, IP20/93, 1993, 4pp

£9.00

Domestic burglaries: the burglar's view

This paper, the first of two, provides a picture of burglar behaviour. It summarises the results from a project in which burglars' methods were assessed in relation to police-approved crime-prevention measures. It offers a model of the burglar's decision-making process, which can play an important role in risk analysis for building-related crime.

BRE, IP19/93, 1993, 4pp

£9.00

False alarms from automatic fire detection systems

Outlines the conclusions of a study on the false alarms from AFDS. Stresses the importance of people and their behaviour as well as the design characteristics of the system. Presents quantitative data concerning the effects of electrical storms. Suggests measure to reduce the nuisance of fire alarms.

BRE, IP13/92, 1992, 4pp

£9.00

Locks on doors and flats: ergonomic requirements

Gives guidance on the design and selection of locks that most people, including the elderly, can open in 5 seconds or less and so escape quickly from a flat in the event of an emergency.

BRE, IP1/92, 1992, 4pp

£9.00

Photoluminescent markings for escape routes

Guidance on the use of photoluminescent markings as an alternative or supplement to traditional emergency escape lighting. Aimed at those responsible for safety in buildings and, in particular, for the design of escape routes.

BRE, IP17/89, 1989, 4pp

£9.00

Fire doors

This Digest describes the role played by fire doors, the methods of assessing their performance, and requirements made under regulations and codes of practice.

BRE, DG320, 1987, 8pp

ISBN: 978-0-85125-248-3

£15.00

Making crime our business

A crime audit guide for RSLs

This guide presents a proactive approach to crime prevention. It aims to persuade Registered Social Landlords and housing managers that crime and anti-social behaviour should be regarded as a business issue. The guide and accompanying spreadsheet present clear and concise information, which provide a structure for estimating the cost of crime to landlords and advice regarding the possible action to take. In effect this will help communication with tenants and other agencies such as local authorities and police.

BRE, BR383, 2000, 32pp

ISBN: 978-1-86081-350-4

£30.00

Sprinkler operation and the effect of venting

Studies using a zone model

Details the interaction between sprinklers and smoke venting.

BRE, BR213, 1992, 46pp

ISBN: 978-0-85125-512-5

£37.50

Experiments at the Multifunctioneel Trainingcentrum, Ghent, on the interaction between sprinklers and smoke venting

Describes a series of experiments to validate a mathematical model of the effect of roof venting on the operation of sprinklers, details of which are in BR 213.

BRE, BR224, 1992, 52pp
ISBN: 978-0-85125-532-3 **£32.50**

Aspects of fire precautions in buildings

An introduction to the passive aspects of fire precautions – the measures taken and protection provided in a building, for example, to minimise the risk to occupants, contents and structure from an outbreak of fire. It describes the nature of fire, structural fire protection techniques and means of escape.

BRE, BR225, 1993, 148pp
ISBN: 978-0-85125-533-0 **£32.50**

Quantifying the cost of meeting Building Regulations fire safety requirements in new buildings

This report shows that, as a percentage of building cost, the application of the Approved Document as a means of meeting the requirements of the Building Regulations is always less than 10%, ranging from less than 1% for single storey industrial sheds to over 8% for shopping complexes.

BRE, BR312, 1996, 116pp
ISBN: 978-1-86081-088-6 **£30.00**

British statutes relating to fire 1425–1963

Gives the background to present day statutory provisions appertaining to fire and contains extracts from both public and local acts.

BRE, BR87, 1986, 254pp
ISBN: 978-0-85125-230-8 **£40.00**

Fire safety in buildings

This is a view of how Building Regulations and fire protection measures relate to actual fires. The report makes a number of suggestions for the improvement of fire protection measures and legislation.

BRE, BR96, 1987, 292pp
ISBN: 978-0-85125-235-3 **£40.00**

Probabilistic evaluation of structural fire protection

Only a few fires in buildings grow into a fully-developed 'post-flashover' stage. The intense heat can cause progressive deterioration of the structural boundaries of a compartment which might 'fail' to prevent the spread of fire to adjacent compartments. Protection against such a rare event by providing sufficient fire resistance to a compartment has long been the core of fire safety codes and regulations. The object of structural fire design is to determine the level of fire resistance period which will minimise the possibility of failure by maximising the time taken by the compartment boundaries to reach the limiting states.

BRE, FN8, 1998, 60pp
ISBN: 978-1-86081-228-6 **£27.50**

Evaluation of Secured by Design in public sector housing

A summary of the results of a two-year PIT project assessing the Secured by Design (SBD) scheme in public sector housing. It provides analysis and interpretation of ten surveys of housing in the public sector which met the SBD criteria and one survey of housing which applied but did not receive the SBD award.

BRE, BR381, 1999, 126pp
ISBN: 978-1-86081-345-0 **£40.00**

Safe as houses?

Of the 2.7 million injuries from accidents in the home each year, over a million are from falls, of which half can be related to design or maintenance. This Digest highlights the potential for accidents in the home, and how to reduce this by good design. It is aimed at architects, designers, landlords and home owners. The main locations and building features in the home where building-related accidents are likely are considered. Design features that may reduce the likelihood of accidents are presented as design checklists. Some of this guidance is based on Building Regulations but extends the recommendations in the regulations to propose homes that are even safer by design.

BRE, DG458, 2001, 8pp
ISBN: 978-1-86081-499-0 **£15.00**

Fire safety engineering

A reference guide

This publication provides a guide for the novice and a useful reference source for experienced practitioners. It describes key topics in fire safety engineering and highlights the issues that must be considered at the design stage and by fire safety enforcers. It covers: fire growth, smoke spread and control, structural fire protection, detection and suppression, fire service intervention, human factors and risk assessment. For each topic pointers on where to find more detailed information are provided.

BRE, BR459, 2003, 112pp
ISBN: 978-1-86081-630-7 **£30.00**

Crime opportunity profiling of streets (COPS)

a quick crime analysis - rapid implementation approach

J Oxley, P Reijnhoudt, P van Soomeren, C Beckford, A Jongejan and J Jager

This report is an evaluated overview of European practices for Crime Prevention Through Environmental Design (CPTED), and focuses on exemplars formed into a toolkit of crime and anti-social behaviour prevention strategies. The following tools were identified for detailed analysis and to form part of the toolkit:

- * Crime Opportunity Profiling of Streets (COPS), UK
- * Kids & Space, the Netherlands
- * Virtual CPTED, the Netherlands
- * Visual Inspection/Stickers to Safety, the Netherlands
- * Police Label Secured Housing, the Netherlands
- * Criminological Regional Analysis (CRA), Germany
- * Integrated Audits (in crime prevention and traffic safety), Germany

The research demonstrated that the most effective approach across Europe combines: physical approaches, focusing on architecture, urban planning, target hardening, etc; social approaches focusing on victims, offenders, guardians, city management, maintenance, etc, and organisational approaches focusing on structuring the partnership process of implementing measures.

Sixteen Annexes included on a CD Rom, provide case studies, supporting papers and presentations on the individual tools from the project partners, with numerous colour illustrations.

BRE Trust, FB12, 2005, 48pp
ISBN: 978-1-86081-886-8 **£47.50**

Securing your hotel

A practical guide for hotel owners and managers

This guide provides the hotel owner and manager with straightforward, practical information on how to make existing hotels secure for customers and staff. It encourages an overall view of security in the hotel and a coordinated approach which embraces best practice in hotel security management. It introduces the types of crime that may be experienced, identifies the ways a hotel can deter a criminal and summarises the management of security. A walk-through is crucial in building an understanding of the current level of security. The guide reviews actions that may be taken in the light of the walk-through. It includes a section on the wider processes of security management and what needs to be done to keep a hotel secure, and a checklist for assessing security and keeping priority actions under review.

BRE, AP249, 2006, 42pp
ISBN: 978-0-9550094-1-9 **£9.99**

Security fog generators

J Holden

Security fog generators are designed to protect premises and contents during the vulnerable period between the activation of an intruder alarm and the arrival of security personnel. This Digest provides an overview of security fog generators and discusses aspects of their operation and performance that should be taken into account when considering their use.

BRE, DG506, 2008, 6pp
ISBN: 978-1-84806-035-7 **£9.00**

NEW: Fire safety and security in places of worship

BRE Global

This guide provides practical information on assessing the risk of fire and enhancing the security of places of worship of all faiths. It is aimed at everyone who is responsible for the care and safety of those who worship and those who visit, whether they are employed or volunteers, as well as their property and the place of worship's assets. It identifies the important issues, and encourages an approach in which good fire safety and security practice become familiar and normal to the team.

BRE, BR499, 2009, 96pp
ISBN: 978-1-84806-063-0 **£25.00**

Video: It happens every day: how to use fire extinguishers in your office

This video follows the experiences of two trainees in dealing with recreated but real fire situations. It shows how to successfully and safely deal with a small fire in an office. (8 minutes).

BRE, DV11, Video, 2003
£43.70

DVD: The fire at Valley Parade, Bradford

Analyses the fire at Bradford City Football Stadium in May 1985. This DVD includes most (3-4 minutes in total) of the TV coverage of the fire. It excludes images of people on fire. (32 minutes)

BRE, DV14, DVD, 2008
£80.50

DVD: Your office fire and It happens every day

Together these two videos show the importance of fire safety in an office environment and how to tackle a fire should one start. A valuable training aid used by fire brigades and fire trainers across the world.

DV13, DVD, 2007
£92.00

Video: Your office fire

This video shows what a fire in your office might look like. The fire involves materials typical of many offices and is shown in real time reaching flashover in about 4.5 minutes. You'll see why fires like this happen and hear advice on how you can prevent them. (12 minutes)

BRE, DV8, Video, 2002
£55.20

Video: The fire at Valley Parade, Bradford

Analyses the fire at Bradford City Football Stadium in May 1985. This DVD includes most (3-4 minutes in total) of the TV coverage of the fire. It excludes images of people on fire. (32 minutes)

BRE, DV3, Video, 1985
£43.13

NEW: Sprinkler systems explained

A guide to sprinkler installation standards and rules

BRE Global

Sprinkler systems are designed and installed to prevent the unexpected. This report is intended as an aid to understanding fire sprinkler installations and the LPC Rules to which they are designed. It explains the engineering behind the rules and regulations and some common misunderstandings about sprinkler systems. The exacting standards for designing and installing sprinklers are sometimes seen as excessive and inflexible, but the history of real fire events upon which the standards are based should never be ignored.

BRE, BR503, 2009, 48pp
ISBN: 978-1-84806-086-9

NEW: Automatic fire sprinkler systems

A good practice guide

C Williams

Automatic sprinkler systems are a well established technology and have demonstrated their reliability and effectiveness in protecting life and property in industrial and commercial buildings over many years. This guide provides good practice guidance on designing, installing, commissioning and maintaining sprinkler systems so they fulfil their purpose in the event of a fire. It covers a range of issues related to automatic sprinkler systems including UK standards, design, installation and maintenance of existing and novel products. Appendices provide valuable statistics about the incidence of real fires and the role of sprinklers in controlling them.

BRE Trust, FB19, 2009, 46pp
ISBN: 978-1-84806-082-1

HUMAN BEHAVIOUR IN FIRE**Assisted means of escape of disabled people from fires in tall buildings**

Describes the background to recent UK regulations and codes concerning improved access and fire escape facilities for disabled people. Shows how the concept of safe refuges associated with escape stairways or evacuation lifts can be employed as part of the evacuation strategy.

BRE, IP16/91, 1991, 4pp
£9.00

The behaviour of people in fire

This paper suggests how the range of people's reactions must be considered along with the relevant fire legislation when buildings are designed if the effects of smoke and heat are to be reduced for the occupants of a building. Aimed at architects and designers as well as fire prevention officers and safety officers.

BRE, IP20/85, 1985, 4pp
£9.00

Domestic fire deaths

Gives a simplified analysis of every domestic fire fatality in England during 1980 developed from the UK Fire Statistics published by the Home Office. Provides details within a regional and nationwide context of the age group of the victim as well as linking this to the tenure, age and type of accommodation involved.

BRE, IP23/84, 1984, 4pp
£9.00

Psychological aspects of informative fire warning systems

Summarises research using simulations of informative fire warning systems in a number of buildings, and how the information they carried, and training procedures, can most effectively promote rapid, safe evacuation.

BRE, BR127, 1988, 28pp
ISBN: 978-0-85125-284-1 **£22.50**

Experimental programme to investigate informative fire warning characteristics for motivating fast evacuation

Evaluates the effectiveness of the display and message components of informative fire warning systems in motivating fast evacuation of the public from buildings.

BRE, BR172, 1990, 100pp
ISBN: 978-0-85125-440-1 **£35.00**

Fire and disabled people in buildings

A treatise on disabled people with respect to fire. Provides a convenient summary of international work in the field and augments it from the viewpoint of the fire safety engineer.

BRE, BR231, 1993, 82pp
ISBN: 978-0-85125-546-0 **£42.50**

Escape of disabled people from fire

A measurement and classification of capability for assessing escape risk

Analyses the nature and severity of disabilities in people in the UK, and considers areas of disability relevant to emergency egress from buildings on fire. Gives results of studies of egress of disabled people and analyses them for use in risk assessment engineering. Develops a strategy for classifying disabled people and estimating the likelihood of each category being present in building groups used in Building Regulations.

BRE, BR301, 1996, 174pp
ISBN: 978-1-86081-067-1 **£40.00**

Studies of human behaviour in fire

Empirical results and their implications for education and design

Summarises the work done at the University of Surrey for the Fire Research Station as well as giving an overview of studies in the United States at the National Bureau of Standards and the National Fire Protection Association. This has led to a model of human behaviour in fires. The implications of the model and the findings of the various studies are discussed in relation to training, education, publicity, design and legislation.

BRE, BR61, 1985, 36pp
ISBN: 978-0-85125-343-5 **£22.50**

Factors determining life hazards from fires in residential buildings

Part 1. Hotels and boarding houses

First of a two-part report on the effectiveness of fire precautions in practice. It finds that initial detection, the actions of hotel guests and staff and the quality of workmanship and maintenance of the fabric are among the most important influences.

BRE, BR82, 1986, 28pp
ISBN: 978-0-85125-223-0 **£22.50**

Factors determining life hazards from fires in residential buildings

Part 2. Health Care residential premises and halls of residence

Second part of the two-part report. In common with hotels the conditioning and action of patients or residents which are the major factors. As would be expected, evacuation is slowed down and made difficult by disablement or illness – a situation which is alleviated by staff availability and well-drilled response.

BRE, BR83, 1986, 28pp
ISBN: 978-0-85125-224-7 **£22.50**

British fire legislation on means of escape 1774–1974

Looks at the development of legislation relating to the provision of means of escape in case of fire prior to the publication of BS Code of Practice CP3: Chapter IV: Parts 1–3 and the guides issued for premises requiring a certificate under the Fire Precautions Act 1971.

BRE, BR88, 1986, 72pp
ISBN: 978-0-85125-225-4 **£22.50**

PERFORMANCE IN FIRE

Precast Hollowcore slabs in fire

Following concerns about the performance of hollow core slabs in fire, two full-scale fire tests were carried out at BRE's Large Building Test Facility at Cardington. The objectives were to assess the adequacy of this form of construction in terms of the functional requirements of Approved Document B of the Building Regulations. This paper explains the background to the work, describes the test parameters in detail and summarises the test results and conclusions.

BRE, IP5/03, 2003, 4pp
ISBN: 978-1-86081-625-3 **£9.00**

Spillage of flue gases from open-flued combustion appliances

Spillage of burnt gases into a room can be hazardous as some of them are toxic and combustion appliances are generally installed in habitable rooms. This paper explains the cause of spillage and gives advice on how to ensure that open-flued appliances will not give rise to spillage.

BRE, IP21/92, 1992, 4pp
£9.00

Fire spread between caravans

Describes work carried out to examine the spacing difference between park homes (mobile homes) and holiday caravans. Ignitability tests were conducted on samples of caravan material and two complete caravans were fire tested. Construction materials, combustible items kept near the caravans and fire screens were factors considered.

BRE, IP15/91, 1991, 4pp
£9.00

Thermal bowing in fire and how it affects building design

During a fire, heat can affect one side of a wall or floor leading to differential thermal expansion and bowing. Data from experimental and theoretical work can be used in the design of buildings to reduce the detrimental effect of thermal bowing in, for example, tall walls.

BRE, IP21/88, 1988, 4pp
£9.00

Selection of sprinklers for high-rack storage in warehouses

This paper considers the likely benefits of a fast-response solder-link sprinkler head in in-rack sprinkler systems and its ability to provide protection against fires in high-rack storage.

BRE, IP5/88, 1988, 4pp
£9.00

Assessing the life hazard from burning sandwich panels

The Fire Research Station has developed a method of quantifying the extent of risk from lightweight sandwich panels and hence of providing a basis for improving the design of such components. This method is described here.

BRE, IP18/87, 1987, 4pp
£9.00

Fire behaviour of breather membranes

FRS has examined the fire behaviour of three types of breather membrane for use in timber-framed houses to find out if a serious fire could result from their ignition. The author establishes implications from the results of the research.

BRE, IP6/87, 1987, 4pp
£9.00

Incidence and nature of fires in traditional and framed housing

Summarises the current research findings on dwelling fires borne out by field experience and related to a statistical base. Places hazards in their true context for the information of those concerned with the design, construction and management of buildings.

BRE, IP9/85, 1985, 4pp
£9.00

Smoke spread within a building

Based on fire studies conducted by the Fire Investigation Section at the Fire Research Station, this paper is concerned with the spread of smoke to areas beyond the source, its implications for life safety and, to a lesser extent, property damage.

BRE, IP22/84, 1984, 4pp
£9.00

Fire spread in buildings

Based on fire studies conducted by the Fire Research Station (FRS), this paper highlights the manner in which fire and flame spread occurred, makes suggestions on how the problems could have been avoided and makes reference to guidance which more fully describes the problems or their avoidance.

BRE, IP21/84, 1984, 4pp
£9.00

Important factors in real fires

Summarises the more commonly recurring and significant aspects of actual fires and serves as a prelude to a series of Information Papers in which specific items are discussed in detail.

BRE, IP20/84, 1984, 4pp £9.00

Increasing the fire resistance of existing timber doors

Discusses the problems associated with the upgrading of timber doors to half-hour standard of fire resistance.

BRE, IP8/82, 1982, 4pp £9.00

Roofs as barriers to fire

Discusses how roofs may be required to satisfy various needs with regard to structural fire precautions which may arise because of: possible ignition and extensive flame spread over the external surface caused by heat radiated by a fire in an adjacent building, and the need to prevent a fire inside a building spreading to a nearby building or an upper part of the same building.

BRE, IP2/80, 1980, 4pp £9.00

The effect of a roof on a fire within a building

Discusses how roofs may be required to satisfy various needs with regard to structural fire precautions which may arise because of the possible effects of the roof on the fire spread within the building.

BRE, IP3/80, 1980, 4pp £9.00

Fire performance of loft insulating materials

Outlines fire behaviour and required performance of various loft insulating materials.

BRE, IP25/80, 1980, 4pp £9.00

Fire performance of external thermal insulation for walls of multi-storey buildings

Provides information on the design and application of external thermal insulation used in external cladding systems for multi-storey buildings. This revised edition updates and builds upon the previous advice by providing a method of assessing the fire performance of such cladding systems from full-scale fire test data and offering design principles that reflect the changes in the type of products and systems now in use.

BRE, BR135, 2003, 24pp £32.50
ISBN: 978-1-86081-622-2

Fire grading of buildings

Post-war Building Studies No 20: Part I. General principles and structural precautions

Together with BR237, this Report is still pertinent in many respects and underpins much of the current thinking on fire safety regulations. Facsimile reprint 1992.

BRE, BR236, 1992 £22.50
ISBN: 978-1-86081-847-9

Fire grading of buildings

Post-war Building Studies No 20: Part II Fire-fighting equipment; Part III Personal safety; Part IV Chimneys and flues

These publications, though old, are still pertinent in many respects and underpin much of the current thinking on fire safety regulations. They are of considerable interest to fire and building professionals. Originally produced by a Joint Committee of the Building Research Board of the Department of Scientific and Industrial Research and of the Fire Offices' Committee. Facsimile reprint 1992.

BRE, BR237, 1992 £22.50
ISBN: 978-1-86081-848-6

Fire safety of PTFE-based materials used in building

This report gives guidance on fire safety aspects of the use of polytetrafluoroethylene (PTFE) and similar fluoropolymers in buildings, particularly for roofing. The guidance is based primarily on results of a research project to establish the potential hazards to fire fighters and the public from fires involving structures containing PTFE-based materials.

BRE, BR274, 1994, 24pp £25.00
ISBN: 978-0-85125-653-5

Reaction to fire of construction products

Area A. Test methods

This sets a framework for a classification system for reaction to fire, based on characteristic material parameters. Proposed reference situations are reviewed and related to hazards. Subsequently the major fire phenomena are identified, and their relevance for each fire scenario discussed. A review of large-scale test data is given for each scenario. ISO and national test methods used in the EU are discussed and assessed. The study recommends research to develop a classification scheme for the reaction to fire behaviour of construction products subjected to different fire scenarios.

BRE, EP37, 1996, 156pp £30.00
ISBN: 978-1-86081-108-1

Dust explosions – flame and pressure effects outside vents

Guidance for industry

Explosion relief venting is a common form of explosion protection. As well as the pressure developed inside a vented vessel, a vented explosion generates secondary effects, due to blast and fire, outside the vented vessel. These effects need to be considered so appropriate protection can be provided for people or nearby installations and buildings. This report provides practical guidance on the external effects of vented dust explosions and is based on the results of explosion studies undertaken across Europe.

BRE, FN7, 1998, 20pp £27.50
ISBN: 978-1-86081-222-4

Dust explosions

Explosions involving seemingly innocuous dust can seriously damage buildings. Industries at risk need to assess the explosibility of the dust they handle and incorporate appropriate levels of explosion protection. This Digest identifies the hazards and considers methods of explosion protection.

BRE, DG288, 1984, 8pp £15.00
ISBN: 978-0-11727-210-1

Fire risks from combustible cavity insulation

Reviews tests by FRS on masonry walls filled with combustible insulation materials, describes the performance of different insulating materials, and offers a guide to selection.

BRE, DG294, 1985, 4pp £9.00
ISBN: 978-0-85125-086-1

Performance of high grade concrete containing polypropylene fibres for fire resistance

The effect on strength

This study into the effect of polypropylene fibres on concrete strength accompanies research into the enhancement of fire resistance of high grade concrete from polypropylene fibres. Adding polypropylene fibres to concrete reduces its compressive strength, due to the reduction in density. It may directly affect the design of structural elements. There is no significant loss of flexural strength nor cylinder splitting strength from the fibres. (CD ROM 16/00)

BRE, BR384, 2000, 16pp £30.00
ISBN: 978-1-86081-353-5

Effect of polypropylene fibres on performance in fire of high grade concrete

The use of high grade concrete in buildings can reduce the size of structural elements, but there is concern about its susceptibility to spalling in fire. Based on fire tests of columns, this report gives information and recommendations on the use of polypropylene fibres to improve the performance of high grade concrete in fire.

BRE, BR395, 2000, 32pp
ISBN: 978-1-86081-399-3 £35.00

Smoke shafts protecting fire-fighting shafts

Their performance and design

This report presents the findings of research carried out on natural smoke ventilation of fire-fighting shafts to develop practical information on the design of smoke ventilation of fire-fighting shafts. It provides information that significantly improves and clarifies aspects of the current guidance and may bring a more flexible innovative approach to the design of large footprint and/or tall buildings.

BRE, AP154, CD ROM, 2002
ISBN: 978-1-86081-775-5 £86.25

New fire design method for steel frames with composite floor slabs

BRE has carried out research on a new fire design method to assess steel-framed structures without passive fire protection. The results were disseminated at 16 workshops during 2000 and 2001. This publication presents the report which was given to delegates explaining the new fire design method for steel frames with composite floor slabs. BRE Digest 462 'Steel structures supporting composite floor slabs: design for fire' is based on the work described here.

FBE, FB5, 2003, 46pp
ISBN: 978-1-86081-608-6 £40.00

BR135: Annex B

Performance criteria and classification method of BS 8414-2:2005

S Colwell

This Digest presents a new classification system for fire performance of cladding on multi-storey buildings. It extends the coverage in Annex A of BRE Report BR135 to cover cladding systems supported by a structural steel frame, in line with BS 8414-2:2002.

Illustrated with detailed schematics and graphs to show a typical test facility and the location of thermocouples, it provides a concise outline of the test methodology and performance criteria for assessing the systems which use framed structures.

BRE, DG501, 2007, 4pp
ISBN: 978-1-86081-959-9 £9.00

Video: Fire at Seven Dials

Highlights the work of a London Fire Brigade, Fire Investigation Officer, in identifying the cause and spread of fire at a London video editing company in 1999. His work brings him into contact with BRE's, Fire & Risk Sciences Division who were, at the time, carrying out research into the fire properties of local area network cables installed within ceiling voids. (14 minutes)

BRE, DV10, Video, 2002
£46.00

MATERIALS

Naturally innovative

Biomimetics in construction

This Information Paper illustrates how biomimetics has been used in construction and explores its potential to provide the industry with innovative materials, processes and structures of all kinds.

BRE, IP11/07, 2007, 6pp
ISBN: 978-1-84806-017-3 £9.00

BRICKS AND BLOCKS

Difficulties in painting Fletton Bricks

Good paint performance on Fletton brick is difficult to achieve. This Information Paper suggests possible alternative types of brick that may provide a more suitable surface for painting. It also recommends ways of remedying failed painted surfaces.

BRE, IP22/79, 1979, 4pp
£9.00

Perforated clay bricks

A review of the production, performance and economic advantages of perforated clay bricks over wholly solid units.

BRE, DG273, 1983, 8pp
ISBN: 978-0-85125-313-8 £15.00

Clay bricks and clay brick masonry

Digests 164 and 165, published in the 1970s, covered performance, specification and general design issues for clay bricks and mortars for a wide range of building elements. Markets, products, codes and standards have since changed and will change further. Sustainability and green issues are becoming key criteria in selecting building materials. Part 1 covers the technical issues, especially the specifications and testing of key performance criteria: strength, size, shape and durability in relation to current and future codes and standards. Part 2 covers appearance, environmental issues, and in-service performance of composite brickwork.

BRE, DG441, 2 parts, 1998, 12pp
ISBN: 978-1-86081-819-6 £20.00

Bricks, blocks and masonry made from aggregate concrete

This Digest covers the main technical issues on aggregate concrete blocks and answers the frequently asked questions on their specification, performance and problems in the light of current regulations and guidance. It also looks forward to the expected future position. The green credentials are evaluated on the basis of the available data on energy and resource usage published by the manufacturing industry.

BRE, DG460, 2 parts, 2001, 20pp
ISBN: 978-1-86081-824-0 £22.50

Bricks, mortar, render, plaster and stone pack

BRE

DIGESTS

Bricks, blocks and masonry made from aggregate concrete (2-part set) (DG460)
Building mortar (DG362)
Clay bricks and clay brick masonry (3-part set) (DG441)
Perforated clay bricks (DG273)
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Replacing failed plaster (GG7)

GOOD REPAIR GUIDES

Replacing plasterwork (GR18)

INFORMATION PAPERS

Cleaning exterior masonry (2-part set) (IP10/94 and 9/99)
Lightweight veneer stone cladding panels (IP10/01)
Proprietary renders (IP16/03)

BRE, AP251, Ringbound set, 2007
ISBN: 978-1-86081-989-6 £70.00

COMPOSITES, FIBRE REINFORCED MATERIALS AND METALS

Wood plastic composites: market drivers and opportunities in Europe

Wood and polymer composites can achieve performance properties previously unavailable. Composites of wood and polyethylene, polypropylene, or PVC and plastic lumber are a hot topic in building products and industrial and consumer uses are emerging for wood composites, with heightened demand driven by their greater durability, lower maintenance, lighter weight, and lower cost. New compounding technologies enable thinner profiles for such uses as window profiles, and expand the use of composites beyond the thick profiles for decking.

BRE, IP2/04, 2004, 6pp
ISBN: 978-1-86081-673-4 £9.00

Fibre reinforced polymer materials in construction

This paper provides information which will enable the effective specification and application of fibre reinforced polymers (FRPs) in construction. It reviews design and specification considerations which may lead to the choice of FRPs, and outlines the key benefits. The paper will be of particular interest to those with little previous knowledge of fibre reinforced materials, or their application in construction.

BRE, IP5/04, 2004, 8pp
ISBN: 978-1-86081-688-8 £9.00

Fibre reinforced polymers in construction: durability

This paper provides information on the performance in service of fibre reinforced polymers (FRPs). It gives the background to FRP application in construction, along with key issues relating to durability and performance in service.

BRE, IP10/03, 2003, 8pp
ISBN: 978-1-86081-635-2 £9.00

Fibre reinforced polymers in construction: predicting weathering

This paper summarises the options available for predicting the weathering properties of fibre reinforced polymer (FRP) components for use in construction. It outlines the key test methods and standards governing their use. The suitability and limitations of the methods are explained. The paper will be of benefit to those wanting to specify FRP components for construction applications and those involved in their manufacture.

BRE, IP11/03, 2003, 6pp
ISBN: 978-1-86081-636-9 £9.00

The performance of fibre cement slates: effects of condensation

Changes in construction methods and materials, such as breathable membranes and high performance thermal insulation, introduce new issues for the integrity of buildings. One of these is cyclic condensation in the batten void of roofs and possible adverse effects on fibre cement slates. This Information Paper describes tests to determine whether fibre cement slates deform or lose strength following two months of cyclic condensation.

BRE, IP19/01, 2001, 4pp
ISBN: 978-1-86081-519-5 £9.00

Advanced polymer composites in construction

Fibre-reinforced plastics (FRP) have been used in construction for several decades, mainly for non-structural architectural applications such as cladding. Advanced polymer composites have superior properties and offer benefits in a range of applications such as sandwich panels, modular units, structural components, reinforcing bars, and structural repair and strengthening. This Paper focuses on the properties of the materials and their uses. Polymer composites offer the architect, designer, structural engineer and building owner many advantages over traditional construction materials.

BRE, IP7/99, 1999, 8pp
ISBN: 978-1-86081-337-5 £9.00

Moisture resistance of laminated veneer lumber (LVL)

This paper describes assessments of methods of establishing the suitability of laminated veneer lumber (LVL) for use in moisture-hazardous environments.

BRE, IP8/96, 1996, 4pp
ISBN: 978-1-86081-114-2 £9.00

Cement-bonded particleboard

Describes the physical and mechanical properties of cement-bonded particleboard and summarises existing guidance on how it can be used successfully.

BRE, IP14/92, 1992, 4pp
£9.00

Fibre building board: types and uses

The term 'fibre building board' encompasses a range of panel products with different properties and appearance. This paper describes the types currently available and outlines existing guidance on how they can be used successfully.

BRE, IP12/91, 1991, 4pp
£9.00

Durability of non-asbestos fibre-reinforced cement

Samples of commercial non-asbestos products have been exposed to natural weathering for several years and their durability assessed by measuring their mechanical properties. This paper presents the results to date.

BRE, IP1/91, 1991, 4pp
£9.00

Polymer modified grc

Describes the mechanical properties of polymer-modified grc made by using CemFIL alkali-resistant glass fibres as the reinforcement and OPC or OPC and pfa as the matrix.

BRE, IP10/87, 1987, 4pp
£9.00

Properties of grc containing pfa

Reviews the long-term strength properties of grc made from OPC and CemFIL alkali-resistant glass fibres with pfa. Results of research on similar grc composites reinforced by the improved CemFIL2 fibre shows the benefits obtained through the use of this material.

BRE, IP11/86, 1986, 4pp
£9.00

Weathering performance of building materials in the Middle East

Reports on the performance of samples of a number of building materials exposed for three to four years at a weathering site in the hot dry climate of Dubai in the Middle East. The materials studied included plastics sheets and extrusions, cement sheets reinforced with inorganic-fibres, flexible synthetic sealants, surface coatings on rendered blockwork and on wood composite boards, and coated and uncoated metals.

BRE, IP7/86, 1986, 4pp
£9.00

Wood cement particle board - a technical assessment

Assesses the physical and mechanical properties of a representative selection of boards in three different thickness classes. Also discusses present and future uses of the boards.

BRE, IP4/83, 1983, 4pp
£9.00

Non-Portland cement grc

Summarises the main findings of the investigations of long-term properties of grc made from HAC, SSC and Portland Blast Furnace cement (PBFC) and indicates possible applications.

BRE, IP7/82, 1982, 4pp
£9.00

The effect of weathering on the properties of fibre building board

Unprotected fibre building board deteriorates when exposed to the weather. This leaflet shows how surface coatings can improve the performance of boards used outside.

BRE, IP20/81, 1981, 4pp
£9.00

Fibre-reinforced lightweight inorganic materials

Discusses the potential of alkali-resistant and other glass fibres as substitutes for asbestos in low density products.

BRE, IP29/81, 1981, 4pp
£9.00

Fibre reinforced plastics for concrete reinforcement

Position document

This report takes account of the views expressed at an industry meeting held in September 1996. It sets out the current position of fibre reinforced plastics materials as reinforcement for concrete, summarising structural design considerations including the Eurocrete programme, material aspects, manufacturing techniques, and current limitations.

BRE, BR322, 1997, 22pp
ISBN: 978-1-86081-127-2 £22.50

The use of glass-reinforced cement in cladding panels

Reports a survey of the incidence of cracking in service of grc cladding panels at 35 sites. Makes recommendations which should result in improved applications of grc cladding.

BRE, BR49, 1984, 14pp
ISBN: 978-0-85125-068-7 £25.00

GRC

A description of the properties of typical examples of glass fibre-reinforced cement. The Digest also outlines factors of importance for some of the more common applications of grc in construction such as cladding, formwork and a range of stock products.

BRE, DG331, 1988, 8pp
ISBN: 978-0-85125-288-9 £15.00

Corrosion of metals in swimming pool buildings

This report provides guidance for inspection and remedial measures, and recommendations for materials more suitable than the austenitic stainless steels commonly used.

BRE, BR165, 1989, 14pp
ISBN: 978-0-85125-427-2 £22.50

Corrosion of metals by wood

This Digest summarises the present state of knowledge and gives advice on good practice for the protection of metal in contact with wood.

BRE, DG301, 1985, 4pp
ISBN: 978-0-85125-355-8 £9.00

Zinc-coated steel

Zinc corrodes slowly relative to steel; in most atmospheres and many waters, the average rate of attack is about one twenty-fifth that of steel. This Digest explains how zinc coating protects steel galvanically and provides sacrificial protection.

BRE, DG305, 1986, 4pp
ISBN: 978-0-85125-188-2 £9.00

Stainless steel as a building material

A review of the three basic classes of stainless steel with indications of the alloys currently most suitable for different building applications.

BRE, DG349, 1989, 4pp
ISBN: 978-0-85125-437-1 £9.00

Architectural use of polymer composites

This Digest deals with various aspects of polymer composites from the point of view of the properties of the materials and the architectural uses to which they are put, the design of the composites, the in-service properties of the materials and the construction and erection of the components. It primarily discusses glass-reinforced plastics but also highlights uses and potential uses of other polymer composite systems.

BRE, DG442, 1999, 12pp
ISBN: 978-1-86081-336-8 £15.00

Polymer composites in construction

Advanced composite materials have superior properties that offer real benefits to the construction industry and are becoming established as important materials in all forms of structures. As their properties are better understood and appreciated, their use in construction will increase. This publication deals with the properties, manufacturing techniques, design, performance and use of these materials in the UK and overseas; it includes examples, lists of consultants, manufacturers and materials suppliers. It is fully referenced and gives useful further reading.

BRE, BR405, 2000, 82pp
ISBN: 978-1-86081-429-7 £42.50

Fibre reinforced polymers in construction

Long term performance in service

The use of fibre reinforced polymers (FRPs) in construction is likely to expand rapidly as construction demands improved performance and cleaner processes. This book gives the background to the application of FRPs in construction, along with issues relating to durability and performance in service. Twenty-seven case studies highlight actual performance in the field – both successes and failures. The case study reviews show that, where appropriately designed, polymer composite structures perform well.

BRE, BR461, 2003, 52pp
ISBN: 978-1-86081-637-6 £40.00

Repair and maintenance of FRP structures

This Good Repair Guide sets out recommendations for the routine inspection and management of FRP structures. Details of repair techniques are also given together with their limitations.

BRE, GR34, 2003, 6pp
ISBN: 978-1-86081-659-8 £9.00

Recycling fibre reinforced polymers in construction

A guide to best practicable environmental option

A Conroy, S Halliwell, T Reynolds and A Wateman

Provides information on the disposal and recycling options for FRP waste, uses of FRP recyclate, eco-composites, and composite recycling facilities. It enables you to make informed decisions about material choices at the specification stage, consider factors to enable easier deconstruction at the design stage and assess the disposal options at the end of the service life. Details legislation which will impact on choices for material re-use, recycling or disposal, discusses research into recyclability, describes products that can be manufactured from FRP recyclate, and presents a financial assessment for disposal and recycling options.

BRE, BR467, 2004, 48pp
ISBN: 978-1-86081-689-5 £40.00

Effective use of fibre reinforced polymer materials in construction

This state-of-the-art report presents information to enable the effective specification and application of fibre reinforced polymers (FRPs) in construction. It will be of interest to those with little knowledge of fibre reinforced materials, or their application in construction. The report reviews design and specification considerations which may lead to the choice of FRPs, outlines the benefits of using FRPs for certain applications, and details case studies illustrating best practice in the use of FRP components. A comprehensive reference and further reading list are given.

FBE, FB8, 2004, 76pp
ISBN: 978-1-86081-683-3 £37.50

Wood plastic composites and plastic lumber

T N Reynolds

Wood plastic composite (WPC) is a term which refers to a composite containing wood in any form, combined with thermoplastics or thermoset plastics. Thermoplastics include polyethylene and polypropylene which are used in numerous non-structural applications, such as bottles and containers. Thermoset plastics are formed from resins such as polyester and epoxy. Solid recycled plastic lumber (RPL), which is usually made from waste plastics without any wood or fibre element, also competes in this non-structural role.

BRE, DG480, 2004, 4pp
ISBN: 978-1-86081-675-8 **£9.00**

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The performance of fibre cement slates: effects of condensation (IP19/01)
Wood plastic composites: market drivers and opportunities in Europe (IP2/04)

BRE, AP253, Ringbound set, 2007
ISBN: 978-1-86081-991-9 **£70.00**

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Water reducing admixtures in concrete (IP15/00)

BRE, AP254, Ringbound set, 2007
ISBN: 978-1-86081-992-6 **£95.00**

Precast concrete: towards lean construction

R K Dhir, M D Newlands, M R Jones and J E Halliday (Editors)

This book (Volume 2 of the six-volume set) brings together contributions that explore issues where precasting is making a key difference in masonry, housing, infrastructure, offsite - against the background of the move to European codes and standards. 42 papers under four themes: Masonry construction; Offsite and on-site manufacture; Housing; Infrastructure and other buildings.

EP87, 2008, 496pp
ISBN: 978-1-84806-038-8 **£85.00**

Concrete durability: achievement and enhancement

R K Dhir, T A Harrison, L Zheng and S Kandasami (Editors)

Volume 3 of the six-volume set presents 92 papers grouped into four themes: Retaining and extending performance; Fundamental mechanisms; Replace, repair and retain; Extreme exposure conditions. For the full set see EP92

EP88, 2008, 1000pp
ISBN: 978-1-84806-039-5 **£120.00**

Designing concrete for the visual environment

R K Dhir, M D Newlands, T D Dyer and M C Tang (Editors)

Volume 4 of the six-volume set explores the flexibility in use of concrete as a material and the issues raised under two themes: The urban environment, and Radical design and form. For the full set see EP92, ISBN 978-1-84806-043-2.

EP89, 2008, 232pp
ISBN: 978-1-84806-040-1 **£45.00**

Harnessing fibres for concrete construction

R K Dhir, M D Newlands, M J McCarthy and K Paine (Editors)

Volume 6 of the six-volume set deals with how fibres have an important role to play in achieving required properties and discusses the latest developments in this field. A total of 39 papers are included. For the full set see EP92

EP91, 2008, 458pp
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Concrete: construction's sustainable option

R K Dhir et al (Editors)

This important set of six volumes presenting more than 300 papers brings together current international thinking and experience on a wide range of concrete construction topics – global development, precast concrete, durability, visual concrete, fire engineering and fibres.

EP92, Collated set, 2008, 3484pp
ISBN: 978-1-84806-043-2 **£400.00**

Concrete for fire engineering

R K Dhir, P Chana, S Caliskan and R Lavingia (Editors)

The book includes technical developments in materials and design, and case studies on the performance of concrete structures in fire conditions, grouped under the themes: Design and performance, and Assessing and rectifying damage. Volume 5 of 6 - for the full set see EP92

EP90, 2008, 354pp
ISBN: 978-1-84806-041-8 **£65.00**

Proceedings of the International Conference, Dundee, July 2008

Role for concrete in global development

R K Dhir, P C Hewlett, L Csetenyi and M D Newlands (Editors)

Volume 1 of the six-volume set presents a series of responses to the implications of climate change. 90 papers are grouped under four themes: Cements and admixtures: future directions and performance; Energy and resources: where next?; Architecture and engineering: appropriate design; Developing world: responsibilities in changing environments and demands. For the full set see EP92

EP86, 2008, 944pp
ISBN: 978-1-84806-037-1 £120.00

Concrete durability and repair

Performance-based intervention for durable concrete repairs

This Information Paper introduces the concept of performance-based intervention for durable concrete repairs. It summarises one of the main outputs of CONREPNET, the EC thematic network on the performance-based remediation of reinforced concrete structures. The network facilitated the transfer of information from research to practice, promoted a performance-based approach to remediation of concrete structures and established research and development needs.

BRE, IP9/07, 2007, 8pp
ISBN: 978-1-84806-006-7 £9.00

Reinforced concrete service life design

A 3 part set

This set of 3 papers describes a system that can be used to assist structural designers in meeting client's requirements for service life, functionality and maintenance. It includes best practice guidance for undertaking a client brief, designing for durability and effective execution and maintenance. The guidance is combined with the output from specialised models for concrete deterioration to provide a holistic service life design system. Part 1 gives an overview of the service life design system, Part 2 focuses on optimising the durability design for a structure and Part 3 covers service life forecasting and enhancement.

BRE, IP3/06, 3 parts, 2006, 22pp
£15.00

Concretes with high ggbs contents for use in hard/firm secant piling

This Information Paper provides guidance on the design of low-strength concrete mixes for use in firm secant piles. Concretes made using very high levels of ground granulated blastfurnace slag (ggbs) have a successful track record for constructing firm secant piles, and provide early-age properties that allow the piling operations to be carried out. However, mixes containing more than 80% ggbs are not covered in BRE Special Digest 1:2005. This Paper builds on laboratory and field data to provide guidance on concrete mixes with 80-95% ggbs for use in the different chemical environments classified in SD1:2005.

BRE, IP17/05, 2005, 6pp
ISBN: 978-1-86081-894-3 £9.00

Deterioration of cement-based building materials: lessons learnt

This is an overview of the lessons learnt from BRE technical consultancy case studies involving the deterioration of cement-based building materials and components. The wide ranges of damaging reactions included are: sulfate reactions (thaumasite and delayed ettringite formation), steel-slag expansive reactions (in fill and industrial waste deposits), and acid attack on concrete. Recommendations on how to avoid damage are given. A common characteristic of many of the cases was the build-up of moisture, which was necessary for the damaging reactions to occur.

BRE, IP4/03, 2003, 6pp
ISBN: 978-1-86081-619-2 £9.00

Minimising the risk of alkali-silica reaction: alternative methods

This Information Paper supplements the guidance in BS 5328: Part 2, Digest 330, and CS TR 30. It provides guidance on alternative methods for minimising the risk of ASR in concrete, including the use of Type II additions (silica fume, fly ash and metakaolin) and one type of admixture (lithium salts). It also recommends that air-entrainment is not adequately effective for minimising the risk of ASR. The recommendations are applicable to concrete mixes with higher alkali content limits than currently specified.

BRE, IP1/02, 2001, 8pp
ISBN: 978-1-86081-529-4 £15.00

Delayed ettringite formation: in-situ concrete

Ettringite is commonly formed at early ages in concrete cured under ambient conditions; this is not damaging. But in concrete subjected to high temperatures during curing, ettringite formation may be delayed. Its gradual formation in the cooled, set concrete can lead to expansion and cracking by 'delayed ettringite formation' (DEF). It can take up to 20 years for cracking to become apparent. This Paper, which is mainly concerned with in-situ concrete, identifies circumstances in which DEF may cause problems.

BRE, IP11/01, 2001, 8pp
ISBN: 978-1-86081-485-3 £9.00

Durability of precast HAC concrete in buildings

This Paper gives guidance on long-term durability issues relating to precast high alumina cement (HAC) concrete components in UK buildings and the implications for structural adequacy. It is aimed at engineers and surveyors concerned with the inspection, assessment and remediation of structures but will also interest building owners.

BRE, IP8/00, 2000, 8pp
ISBN: 978-1-86081-368-9 £9.00

Accelerated carbonation testing of concrete

This Paper provides guidance on accelerated carbonation tests and sources of variability, and makes recommendations on test conditions. The data shows that accelerated carbonation can be used successfully to rank concretes in order of carbonation resistance and to estimate carbonation depths under natural indoor conditions. However, particular attention is required by the user to the accelerated test conditions to ensure consistent results.

BRE, IP20/00, 2000, 12pp
ISBN: 978-1-86081-454-9 £9.00

Assessing carbonation depth in ageing high alumina cement concrete

This paper describes sampling techniques and methods of carbonation assessment based on petrography (optical microscopy) and pH indicators. Attention is drawn to aspects of these assessment methods in which special care may be needed, such as in assessing concrete which is damp or partially carbonated. This paper is intended for engineers and materials testing professionals.

BRE, IP11/98, 1998, 4pp
ISBN: 978-1-86081-217-0 £9.00

Progress in European standardisation for the protection and repair of concrete

This paper describes the latest developments in European Standards for the protection and repair of concrete. The standards include materials specifications and test methods for coatings, mortars and other repair materials.

BRE, IP11/97, 1997, 4pp
ISBN: 978-1-86081-185-2 **£9.00**

Testing anti-carbonation coatings for concrete

Anti-carbonation coatings are surface treatments that have a high resistance to carbon dioxide, and protect concrete from carbonation by acting as a carbon dioxide barrier. As there were insufficient data on the long-term durability of these coatings, natural and artificial weathering programmes were set up at BRE. This paper summarises those data and the findings of the programme.

BRE, IP7/96, 1996, 4pp
ISBN: 978-1-86081-093-0 **£9.00**

Effects of alkali-silica reaction on concrete foundations

Alkali-silica reaction (ASR) is known to cause harmful changes in concrete. This paper describes its effects on concrete foundations, and gives examples of the structural problems caused by ASR.

BRE, IP16/93, 1993, 4pp
£9.00

Assessing the risk of sulfate attack on concrete in the ground

Links the data given in the 15-year report BR 164 on a study of the sulfate resistance of concrete with recommendations in the revised BRE Digest 363 on the use of concrete in sulfate soils and groundwaters.

BRE, IP15/92, 1992, 4pp
£9.00

Durability of blastfurnace slag cement concretes

Summarises results of studies of the performance and long-term durability. Gives recommendations for the effective use of blastfurnace slag in concrete.

BRE, IP6/92, 1992, 4pp
£9.00

Durability studies of pfa concrete structures

Describes the findings of an investigation of structures built within the last 33 years using pulverised-fuel ash (pfa) and ordinary Portland cement concrete. A range of properties was measured on concrete cores taken from these structures.

BRE, IP11/91, 1991, 4pp
£9.00

Results of exposure tests to evaluate repairs to reinforced concrete in marine conditions

Discusses the results of the BRE test (to evaluate repairs to reinforced concrete in marine conditions) applied to seven patch repair formulations.

BRE, IP18/89, 1989, 4pp
£9.00

Corrosion-protected and corrosion-resistant reinforcement in concrete

A description of the results and potential benefits of using corrosion-protected and corrosion-resistant reinforcement under various conditions, including chloride contamination.

BRE, IP14/88, 1988, 4pp
£9.00

Update on assessment of high alumina cement concrete

A summary, for structural engineers, of the current guidelines for assessing the condition of buildings containing high alumina cement (HAC) concrete and the use of in-situ strength tests for wet HAC concrete.

BRE, IP8/88, 1988, 4pp
£9.00

Deterioration due to corrosion in reinforced concrete

Discusses ways of assessing the deterioration caused by corrosion in reinforced concrete: methods of repairing the concrete and the implications for future design and construction.

BRE, IP12/80, 1980, 4pp
£9.00

Internal fracture testing of in-situ concrete: a method of assessing compressive strength

Describes a simple test technique for assessing the compressive strength of concrete in existing construction. Advises on choice of test locations, number of tests required and interpretation of tests.

BRE, IP22/80, 1980, 4pp
£9.00

Sulphate resistance of buried concrete

The third report on a long-term (15 years) investigation into the sulfate resistance of a wide range of concretes at Northwick Park and in sulfate solutions.

BRE, BR164, 1992, 74pp
ISBN: 978-0-85125-426-5 **£47.50**

Durability of pfa concrete

A detailed presentation of the results of a long-term study of the strength and durability of concretes made with pulverised fuel ash and ordinary Portland cement under a range of curing conditions.

BRE, BR216, 1994, 118pp
ISBN: 978-0-85125-520-0 **£57.50**

High alumina cement concrete in existing building superstructures

This report presents the results and confirms the earlier BRE recommendations with minor amendments. It includes extensive additional information useful for engineers appraising buildings containing high alumina cement concrete. Describes the work on high alumina cement confirming recommendations made in a 1975 report.

BRE, BR235, 1993, 112pp
ISBN: 978-0-85125-555-2 **£25.00**

Sulphate and acid attack on concrete in the ground

Recommended procedure for soil analysis

It has long been recognised that concrete placed in soil can be damaged by sulfate species in the soil. For over 40 years, BRE has advocated classifying sites according to the concentration of sulfate in the soil or the groundwater. This report takes into account progress in analytical methods and techniques.

BRE, BR279, 1995, 18pp
ISBN: 978-1-86081-003-9 **£22.50**

The thaumasite form of sulfate attack in laboratory-prepared concretes

Describes results of site investigations of problems of sulfate attack, showing that the mineral thaumasite has been responsible for the deterioration of concretes and mortars, even in some specifically designed to provide good sulfate resistance.

BRE, BR306, 1996, 62pp
ISBN: 978-1-86081-076-3 **£30.00**

The thaumasite form of sulfate attack in limestone-filled cement mortars

This report summarises the results of a substantial screening programme set up at BRE to investigate the susceptibility of five series of mortars to the thaumasite form of attack. The report recommends that Portland limestone cements manufactured to BS 7583 should not be used in sulfate conditions above class 1.

BRE, BR307, 1996, 52pp
ISBN: 978-1-86081-077-0 **£30.00**

Review of the effect of fly ash and slag on alkali-aggregate reaction in concrete

Critical review of technical literature published up to May 1994, with bibliography.

BRE, BR314, 1996, 124pp
ISBN: 978-1-86081-092-3 **£30.00**

Sulfide-related degradation of concrete in Southwest England ('the mundic problem')

This substantial report is based on the petrographic study by stereomicroscopy and conventional transmitted and reflected light polarising microscopy of about 30,000 samples of concrete from 2700 domestic and commercial properties in Cornwall and South Devon. This is supplemented by chemical analysis and density determinations on several hundred specimens, in conjunction with routine screening in accordance with the RICS Guidelines.

BRE, BR325, 1997, 226pp
ISBN: 978-1-86081-137-1 **£42.50**

The performance of ageing CAC concrete

Lessons from case studies

This report describes eight case studies of ageing Calcium Aluminate Cement (CAC) concrete structures, ranging from a school building built in the UK in the 1960s containing precast CAC concrete beams, to a cast in-situ marine structure in Canada which is more than 50 years old.

BRE, BR353, 1998, 30pp
ISBN: 978-1-86081-247-7 **£27.50**

Durability of reinforced concrete

Effects of concrete composition and curing on carbonation under different exposure conditions

This report describes the results of two projects studying the long-term carbonation of reinforced concrete. The first was a joint project between the British Cement Association and BRE to examine the influence of materials and workmanship factors and types of element on carbonation rates under site exposure conditions. The second assesses the effects of practical site curing methods on the long-term carbonation rates of concrete made with different cements.

BRE, BR360, 1998, 60pp
ISBN: 978-1-86081-262-0 **£40.00**

Structural implications of alkali-silica reaction

Effect of natural exposure and freeze-thaw

This report describes research into the structural performance of concrete suffering from alkali-silica reaction (ASR). The first part covers tests on concrete specimens and prestressed beams undergoing ASR on the BRE exposure site. The results indicate that research using accelerated conditioning can be applicable to real structures. The second part covers freeze-thaw tests which show that concrete with ASR may be further affected by the secondary effect of freeze-thaw.

BRE, BR365, 1999, 46pp
ISBN: 978-1-86081-276-7 **£30.00**

Carbonation depths in structural-quality concrete

An assessment of evidence from investigation of structures and from other sources

Examines evidence on the performance of concrete in existing buildings and structures in respect of resistance to carbonation and its implications for existing structures, future constructions and research needs. Considers the results of studies of structures in Germany and of concrete cylinders, some stored for over 50 years at BRE.

BRE, BR75, 1986, 24pp
ISBN: 978-0-85125-185-1 **£30.00**

Carbonation of concrete and its effect on durability

This Digest discusses the carbonation of normal dense concrete which results from the reaction of atmospheric carbon dioxide gas with hydrated cement compounds. It relates particularly to the assessment of the risk of corrosion to embedded steel. The Digest describes the carbonation process and how the depth of carbonation can be measured.

BRE, DG405, 1995, 8pp
ISBN: 978-1-86081-015-2 **£15.00**

Corrosion of reinforcement in concrete: electrochemical monitoring

This Digest, which is aimed at building owners, lessors and engineers, describes three techniques for assessing reinforcement corrosion using electrochemical methods: resistivity, half-cell potential and corrosion current. Their advantages and disadvantages are discussed together with criteria for the interpretation of collected data. Three examples of the practical application of embedded and retrofitted corrosion probes are briefly described.

BRE, DG434, 1998, 12pp
ISBN: 978-1-86081-263-7 **£15.00**

Durability monitoring of concrete structures

Proceedings of a BRE workshop held on 30 April 1996 at BRE Garston.

BRE, BR326, 1997, 96pp
ISBN: 978-1-86081-155-5 **£22.50**

A review of service life design of concrete structures

A review of published literature on service life design of concrete structures, concentrating on what has been published since 1991. It concludes that the setting of a standard for service life design is a worthwhile goal in spite of various limitations which have been identified, and encourages greater coordination between European bodies working in this field and the development of a strategy to tackle the research that needs to be done to set a Standard.

BRE, BR316, 1996, 40pp
ISBN: 978-1-86081-106-7 **£22.50**

Durability of ageing high alumina cement (HAC) concrete

A literature review and summary of BRE research findings

This report provides a literature review of existing research and summary of BRE work; identifies UK codes relating to HAC concrete; assesses deterioration mechanisms in critical environments; provides information on long-term durability issues; and assesses the implications for structural adequacy.

BRE, BR386, 2000, 56pp
ISBN: 978-1-86081-370-2 **£40.00**

Avoiding the thaumasite form of sulfate attack: two year report

Recent site and lab investigations by BRE on problems of sulfate attack have shown that the mineral thaumasite has been responsible for the deterioration of concretes and mortars specifically designed to give good sulfate resistance. The results of further work presented in this report were used by the Thaumasite Expert Group to establish interim recommendations for concrete mixes designed to minimise deterioration due to the thaumasite form of sulfate attack.

BRE, BR385, 2000, 40pp
ISBN: 978-1-86081-358-0 **£40.00**

Corrosion of steel in concrete: service life design and prediction

Techniques in the design of new concrete structures, and in the planned maintenance and refurbishment of existing structures, have advanced in recent years. This Digest, complementing Digest 444 Parts 1 to 3, discusses issues relevant to the service life design of new concrete structures and prediction of residual service life of existing structures. It also provides an overview of service life design and whole life costing, and gives references to more detailed guidance and tools for carrying out service life design and prediction.

BRE, DG455, 2001, 12pp
ISBN: 978-1-86081-471-6 **£15.00**

Avoiding deterioration of cement-based building materials and components

Lessons from case studies - a five part series

A series of five technical intelligence reports whose purpose is to ensure that those involved at the sharp end of designing, building and maintaining structures are more aware of potential durability problems in cement-based materials. The reports include a number of case studies concerned with the deterioration of cement-based materials. Each report is available separately.

BRE, BR449, 2002, 28pp
ISBN: 978-1-86081-579-9 **£75.00**

An overview of the BRAC guidance in relation to current guidance on high alumina cement concrete

Detailed guidance and recommendations on design-check procedures were published in 1975. This guidance ('the BRAC rules') is still used to assess the structural performance of the many tens of thousands of buildings in the UK containing precast HAC concrete beams. This electronic document makes the BRAC guidance and addenda available in full in their original form. An overview sets the documents in context with current thinking and guidance.

BRE, BR429, CD ROM, 2002, 140pp
ISBN: 978-1-86081-518-8 £57.50

Behaviour of concrete repair patches under propped and unpropped conditions

A repaired structure has to fulfil the strength and durability criteria so that it can achieve a specified design life with the expected levels of maintenance. However, 'repair of repairs' are sometimes needed as the original repair does not restore a structure to the desired level of performance. Little guidance is available on the redistribution of stresses within a reinforced concrete structure during and after repair. This literature review assesses the available information and the sometime inconsistent views among engineers on whether a structure should be propped during the repairs or left unpropped.

FBE, FB3, 2002, 32pp
ISBN: 978-1-86081-558-4 £45.00

Thaumasite in cementitious materials

Proceedings of the first international conference BRE 19-21 June 2002

This conference brought together 62 papers from leading international specialists. The papers are grouped into themes: mechanistic/fundamental studies, analytical techniques, laboratory-scale studies of cement replacement materials, limestone filler cements, and general studies, UK and overseas field case studies, geotechnical issues, UK guidance. Papers in PDF format.

BRE, AP147, CD ROM, 2002
ISBN: 978-1-86081-557-7 £172.50

Modelling degradation processes affecting concrete

This report considers current approaches to modelling degradation mechanisms that can affect concrete and how these can be used in service life design. Models based on BRE data have been developed for carbonation and chloride ingress and are compared with those given in the literature.

BRE, BR434, 2001, 84pp
ISBN: 978-1-86081-531-7 £47.50

High alumina cement concrete BRAC rules

Extensive research into the structural performance of HAC concrete led, in 1975, to publication of detailed guidance and recommendations on design-check procedures. This guidance ('the BRAC rules') is the best advice available and is still used to assess the structural performance of the many tens of thousands of buildings in the UK containing such precast HAC concrete beams. This report incorporates the original documents, leaving out redundant information, with additional and revised information where relevant. Revised 2002

BRE, BR451, 2002, 98pp
ISBN: 978-1-86081-600-0 £45.00

Concrete Repair Manual

The Concrete Repair Manual combines more than 70 separate publications in over 2000 pages covering every step of the repair process, from evaluation to quality control. This massive two-volume set includes guidance, specifications and research from US and European groups – many of them worldwide leaders in the repair industry. Published jointly by ACI, BRE, Concrete Society, ICRI.

EP61, 2003, 2100pp
£75.00

Corrosion of steel in concrete: a review of the effect of humidity

The prescriptive nature of the exposure classes for concrete susceptible to reinforcement corrosion in EN 206 does not adequately describe the enhanced risks of possible changing ambient environments in the lifetime of the steel reinforcement, nor does it quantify the risk of reinforcement corrosion for more constant environments. A more robust environmental classification is needed based on a better understanding of the variation of moisture with depth under changing external conditions and of the resulting rate of corrosion of the steel reinforcement. This Digest reviews recent models and data and presents supplementary information to EN 206 for the UK, based on industry practices and environmental data.

BRE, DG491, 2004, 8pp
ISBN: 978-1-86081-730-4 £15.00

BEST SELLER: Concrete in aggressive ground

The effects of sulfates and acids naturally occurring in soil and groundwater can be serious leading to expansion and softening of concrete. This new edition of BRE Special Digest 1 updates and consolidates The previous edition (published in 4 parts) in 2003. The main changes are:

- * new ranking of cements with respect to sulfate resistance
- * removal of the aggregate carbonate range
- * revision of sulfate class limits
- * simpler requirements for additional protective measures

It provides practical guidance on the specification of concrete for installation in natural ground and in brownfield locations. The procedures given for ground assessment and concrete specification cover the common occurrence of sulfates, sulfides and acids. They also cover the more rarely occurring aggressive carbon dioxide found in some ground and surface waters.

BRE, SD1, 2005, 68pp
ISBN: 978-1-86081-754-0 £62.50

Achieving durable repaired concrete structures

Adopting a performance-based intervention strategy

A methodology for protecting and repairing concrete structures using a performance-based intervention approach is presented in this major report, which has been prepared by the CONREPNET network of European research and representative bodies sponsored by the European Commission.

EP77, 2007, 190pp
ISBN: 978-1-86081-970-4 £60.00

Concrete repairs

Performance in service and current practice

Around 50% of Europe's annual construction budget is spent on refurbishment and repair of existing structures. This report is the culmination of a wide-ranging survey into the performance of both current European concrete repair techniques and inspection practice, and current research projects.

EP79, 2007, 56pp
ISBN: 978-1-86081-974-2 £30.00

Concrete repairs

Combined set of two CONREPNET reports

CONREPNET network

The first assesses case histories gathered from owners of concrete structures, repairers and research institutes, and presents its findings using charts, graphs, tables and photographs. The second report offers a new way forward for achieving durable and long-lasting concrete repairs.

EP81, 2 parts, 2007, 246pp
ISBN: 978-1-84806-016-6 £75.00

Concrete Solutions

Proceedings of the Second International Conference, June 2006

M G Grantham, R Jaubertie and C Lanos (Editors)

This important volume brings together the latest in research, practical application and theory relating to concrete repair. Ninety papers from 28 countries are included. As well as a wide range of papers on general aspects of concrete repair, such as patch repair, testing and inspection, emphasis is given to the increasingly important topics of fire damage assessment, prevention and repair, electrochemical repair, repair with composites and risk management. A special session on ConRepNet – the EC-sponsored thematic network on the performance-based rehabilitation of reinforced concrete structures – is included

EP71, Hardback, 2006, 824pp
ISBN: 978-1-86081-915-5 £95.00

Pfa concrete

Set of four reports (BR294 to BR297)

This set of four reports describes a different aspect of a comprehensive study of the durability of concrete made with pulverised-fuel ash (pfa). The concrete was subjected to various aggressive media for up to ten years. 1 Sulphate resistance, 2 Marine conditions, 3 Acidic groundwaters, 4 Carbonation.

BRE, AP100, 4 parts, 1995
ISBN: 978-1-86081-768-7 £40.00

Corrosion of steel in concrete

This three-part Digest sets out the basic principles of corrosion of reinforcement in concrete for all concerned with design, inspection, maintenance, remediation and protection of concrete structures. Part 1 explains the physical, chemical and electrochemical processes involved in the deterioration of reinforced concrete by corrosion. Part 2 provides concise guidance on investigations of corrosion of steel in concrete, the techniques employed and how this can lead to a prognosis for the future performance. Part 3 describes the protection and repair of concrete structures subject to corrosion, or which are expected to need such measures to minimise future damage or deterioration.

BRE, DG444, 3 parts, 2000, 40pp
ISBN: 978-1-86081-821-9 £25.00

Alkali-silica reaction in concrete

Concrete can deteriorate as a result of an interaction between alkaline pore fluids and reactive minerals in certain types of aggregates. The commonest mechanism is alkali-silica reaction. Part 1 Background to the guidance notes. Part 2 Detailed guidance for new construction. Part 3 Worked examples. Part 4 Simplified guidance for new construction using aggregates of normal reactivity.

BRE, DG330, 4 parts, 2004, 32pp
ISBN: 978-0-85125-930-7 £25.00

Concrete materials and applications

Cements with lower environmental impact

Manufacturing calcium sulfoaluminate (CSA) cement uses less energy and produces less carbon dioxide than conventional Portland cement. A recent BRE research programme has shown that CSA cements blended with materials such as ground granulated blastfurnace slag and anhydrite, and belite-CSA cements with a higher iron content, can be used to produce durable concrete with physical properties comparable to equivalent Portland cement concrete. This Paper presents the background to the drive to reduce the environmental impact of cements by developing CSA cements.

BRE, IP7/08, 2008, 4pp
ISBN: 978-1-84806-052-4 £9.00

Non-ferrous metal wastes as aggregates in highway construction

This Information Paper discusses general considerations associated with the use of industrial by-products in construction and describes the use of by-products from non-ferrous metals production as bound aggregate. Slag derived from the production of zinc has been used for demonstration roadways made from concrete and asphalt. Concrete containing crushed refractory bricks from aluminium smelters has also been produced and assessed. In situ performance of the roads and leaching capacity of the materials has also been evaluated.

BRE, IP8/06, 2006, 8pp
ISBN: 978-1-86081-935-3 £9.00

Innovation in concrete frame construction

This Information Paper reviews innovation in concrete frame construction over the past 10 years and identifies future trends. Many innovations trialled at the European Concrete Building Project at Cardington are being used and are regarded as important by industry. Among other innovations, lightweight formwork and computer-based technology are seen to be the most influential. Green issues, efficiency of production and aspects of training and labour are expected to be main drivers for innovation in the concrete frame industry in the coming decade. This Information Paper is a summary of a detailed report Innovation in concrete frame construction 1995-2015[1], BR483, details of which are given on page 6.

BRE, IP11/05, 2005, 6pp
ISBN: 978-1-86081-867-7 £9.00

Porous aggregates in concrete

Sandstones from NW England

Long-term durability studies have been undertaken on concrete made from crushed rock at present little used in concrete, in order to assess the resource potential of these materials and to give specifiers and clients confidence of lifetime performance in structures. Concretes made with porous sandstone aggregates have mostly performed well in resisting frost damage and protecting embedded metal. Aggregates producing poorer performance had high shrinkage and were uneconomic to use because of poor strength development of concrete. However, it is concluded that a significant proportion of sandstones from NW England constitute a valuable resource and no special testing is needed.

BRE, IP6/04, 2004, 6pp
ISBN: 978-1-86081-694-9 £9.00

Self-compacting concrete

This Information Paper provides an introduction to the use of self-compacting concrete, which was originally developed in Japan to bring improved quality and durability to the concrete construction process. Over the last 10 years it has become increasingly used in Europe and other parts of the world for both precast and cast in situ concrete, where its benefits also include reduced health and safety risks, increased productivity, and cost and labour savings.

BRE, IP3/04, 2004, 8pp
ISBN: 978-1-86081-680-2 £9.00

Concrete with minimal or no primary aggregate content

The MAGCON pilot study

This Paper describes the results of a pilot study to investigate ways of reducing the volume of primary aggregates in concrete. The study encompassed a number of alternative technologies in the design of concrete mixes. Three technologies were evaluated in the laboratory: foamed concrete, high volume fly ash concrete and dry-pressed concrete. An environmental assessment was also undertaken. Possible applications were assessed to evaluate possible savings in primary aggregate consumption.

BRE, IP12/04, 2004, 8pp
ISBN: 978-1-86081-725-0 £9.00

Reinforced autoclaved aerated concrete panels

Test results, assessment and design

Reinforced autoclaved aerated concrete (RAAC) panels are widely used in mainland Europe but in the UK some serviceability problems have been encountered with pre-1980 panels. This paper describes the concerns about performance of RAAC panels designed before 1980, laboratory testing of panels after 20 years service, and newly fabricated panels, mechanisms that may influence the in-service behaviour, new design guidance in prEN 12602, and testing RAAC panels fabricated to the new design guidance.

BRE, IP7/02, 2002, 8pp
ISBN: 978-1-86081-564-5 £9.00

Volumetric strain of concrete under uniaxial compression

Sustained loading and high grade concrete

Uniaxial compression tests were carried out on concrete prisms made from concrete grades ranging from normal to very high grade. Axial and lateral strains were measured, giving the volumetric strain. The applied stress carried at minimum volume was compared with the long-term strength of concrete under sustained loading, and the effect of concrete grade was studied. The results were used to investigate the power curve for stress-strain relationships, and simple formulae for initial stiffness and Poisson's ratio were obtained.

BRE, IP15/02, 2002, 6pp
ISBN: 978-1-86081-593-5 £9.00

Porous aggregates in concrete: Jurassic limestones

This Information Paper reports on long-term BRE studies of the durability of concrete made from crushed rock sources that at present are little used in concrete. Such information is needed to assess the resource potential of these materials and to give confidence of lifetime performance in structures. After 20 years of unsheltered outdoor exposure, concretes made with crushed Jurassic limestone aggregates have performed well in resisting frost damage and protecting embedded metal. Also, the porosity of the aggregate reduces the expansive effect of alkali silica reactions.

BRE, IP9/01, 2001, 8pp
ISBN: 978-1-86081-481-5 £9.00

Blastfurnace slag and steel slag: their use as aggregates

This Information Paper provides specifiers and users with information on the types of slag products available and their recommended uses. This information is of particular interest to engineers involved in the construction and maintenance of highways, docks and similar paved areas. It includes some frequently asked questions, together with sources of further help and information, and codes and standards relevant to the production, testing and use of slag products.

BRE, IP18/01, 2001, 8pp
ISBN: 978-1-86081-510-2 £9.00

Concrete strength: the effect of ocean-depth water pressure

Describes a laboratory study of the effect of immersion in water at pressure on the strength of concrete specimens. Compression and flexure tests were carried out under water pressure and after depressurisation. The facility described is available for commercial tests.

BRE, IP6/00, 2000, 6pp
ISBN: 978-1-86081-366-5 £9.00

Water reducing admixtures in concrete

This Paper introduces the benefits of water reducing admixtures for concrete production and the construction process. Admixtures are widely used in concrete throughout continental Europe to achieve higher workability leading to easier placing and compaction. The benefits include improved durability, quality and consistency of concrete, cost savings both in terms of economical mix design, and speeding the construction process.

BRE, IP15/00, 2000, 6pp
ISBN: 978-1-86081-397-9 £9.00

Magnesian limestone aggregate in concrete: performance; durability; testing; European standards

A testing programme on Magnesian limestones from 30 sources has been used to demonstrate that the performance of these materials in concrete compares favourably with that of harder and more consistent materials such as Carboniferous limestones. Research has also shown a good correlation between durability and the size of pores within the aggregates. Both strength and frost resistance are discussed in relation to new specification guidance for aggregates drafted for inclusion in European Standards. This paper will help those responsible for the design and specification of concrete and for the planning of aggregate supply. It replaces IP2/91 which is now withdrawn.

BRE, IP1/98, 1998, 4pp
ISBN: 978-1-86081-193-7 £9.00

Energy efficient concrete walls using EPS permanent formwork

Discusses the buildability aspects of, and the adequacy of the structural fabric provided by, EPS permanent formwork systems.

BRE, IP9/98, 1998, 4pp
ISBN: 978-1-86081-214-9 £9.00

Use of recycled aggregates in concrete

In some countries crushed concrete and masonry waste are successfully recycled for use as aggregates in concrete. This paper discusses the latest developments in the use and specification of recycled aggregates.

BRE, IP5/94, 1994, 4pp £9.00

European concreting practice: a summary

Many freestanding walls have been in service for decades or even centuries and are still an attractive and practical feature of town and country landscapes. But if these walls are not well built to start with, they can fail early in their life. And if the local conditions change (eg the exposure is increased when neighbouring buildings are demolished or a nearby tree grows too big) a well established, soundly built wall can be damaged or can even collapse completely. Before starting on any repair, whether a minor patching up or a major rebuilding, it is important to find out what caused the problem. Failure to do that can easily lead to a recurrence.

This Guide aims to help in assessing the damage in freestanding masonry walls, establishing the cause, and carrying out an effective repair. It does not cover parapets or walls built as retaining walls.

BRE, IP6/93, 1993, 4pp £9.00

European concreting practice: France

Contains a brief review of the French approach to the production of durable concrete construction. It is intended to provide useful background information, for contractors, consultants and other construction professionals, in the movement towards harmonised European Standards.

BRE, IP5/93, 1993, 4pp £9.00

European concreting practice: Italy

Provides a brief review of the Italian approach to the construction of concrete structures. It is intended to provide background information that will help UK construction professionals understand the requirements for harmonised European Standards and Codes.

BRE, IP17/92, 1992, 4pp £9.00

European concreting practice: Sweden

These papers review the various approaches to the construction of concrete structures. They provide the background information that will help UK construction professionals understand the requirements for harmonised European Standards and Codes.

BRE, IP16/92, 1992, 4pp £9.00

European concreting practice: West Germany

Contains a brief review of the West German approach to the production of durable concrete construction. It is intended to provide useful background information, for contractors, consultants and other construction professionals, in the movement towards harmonised European Standards and Codes of Practice.

BRE, IP3/91, 1991, 4pp £9.00

Porous aggregates in concrete: sandstones from NW England

Carboniferous sandstones are a largely untapped resource of aggregates for concrete. This paper, addressed to all concerned with the planning and specification of aggregates, surveys the range of materials available and their suitability for various purposes.

BRE, IP16/89, 1989, 4pp £9.00

Sea-dredged aggregates in concrete

Discusses the basic facts about marine aggregates in relation to BS 8110. Also discusses the structural use of concrete, the latest guidelines to prevent ASR, and BS 882 which all aggregates must pass to be acceptable for structural reinforced concrete.

BRE, IP7/87, 1987, 4pp £9.00

Determination of the chloride and cement contents of hardened concrete

Gives guidance on the locations and frequency of sampling, on the removal of samples from the concrete structure, on simplified on-site methods for determining the chloride and cement content of samples and on presentation of the results.

BRE, IP21/86, 1986, 4pp £9.00

Changes in Portland cement properties and their effect on concrete

Discusses how historical changes in OPC have resulted in significant increases in strength and Codes of Practice have increased permissible stresses in line with these enabling design for higher strengths at earlier stages. This could lead to less cement being used in design mixes. Advises that specifications need to make allowances for the changes to avoid any adverse effects on durability.

BRE, IP3/86, 1986, 4pp £9.00

Porous aggregate in concrete: Jurassic limestones

Planning for future resource utilisation requires a knowledge of the performance of materials available, whether or not they are currently in general use. Similarly, specifiers and their clients need to have confidence in the long-term durability of previously untried materials. This paper summarises a study carried out with these objectives in mind, and shows that plain concrete containing crushed Jurassic limestone aggregate can be strong and frost-resistant but gains little from air entrainment.

BRE, IP2/86, 1986, 4pp £9.00

The manufacture of synthetic aggregates from colliery spoil

Describes the investigation of the manufacture of synthetic aggregates from colliery spoil. Samples were tested for strength and durability and various processing routes are considered and costed.

BRE, IP30/81, 1981, 4pp £9.00

The use of crushed rock aggregates in concrete

Describes an investigation by BRE in which mechanical properties were measured on 550 mixes from coarse and fine samples from 24 UK quarries. Durability was assessed on a further 52 mixes.

BRE, BR18, 1978, 82pp
ISBN: 978-1-86081-842-4 £25.00

Efficient use of aggregates and bulk construction materials

Volume 1. An overview

This report summarises a study undertaken to identify how to increase the efficient use of aggregates and bulk construction materials. It reviews standards and specifications, assesses the reasons and extent of overspecification and recommends how overspecification can be overcome.

BRE, BR243, 1993, 52pp
ISBN: 978-0-85125-565-1 £37.50

Efficient use of aggregates and bulk construction materials

Volume 2. Technical data and results of surveys

This report summarises a study undertaken to identify how to increase the efficient use of aggregates and bulk construction materials. It reviews standards and specifications, assesses the reasons and extent of overspecification and recommends how overspecification can be overcome.

BRE, BR244, 1993, 154pp
ISBN: 978-0-85125-566-8 £22.50

Performance of limestone-filled cements

Brings together the papers presented at a seminar of the BRE/BCA/Cement Industry Working Party. Includes results of tests to determine the performance of cements containing additions of limestone, particularly the possible effects on concrete durability.

BRE, BR245, 1993, 358pp
ISBN: 978-0-85125-567-5 £42.50

Superplasticisers in concrete

A review

This report has been prepared to review existing information and knowledge on the use of superplasticisers. It considers their effect on long-term performance of concrete and recommends research work needed to obtain further information on their suitability for improving durability of structural concrete.

BRE, BR313, 1996, 46pp
ISBN: 978-1-86081-089-3 £22.50

Design of normal concrete mixes

The second edition of this best-selling book remains the standard guide on concrete mix design. Amendments have been made to allow for changes in the terminology and materials used.

BRE, BR331, 1997, 46pp
ISBN: 978-1-86081-172-2 £25.00

High grade concrete

Effect of microsilica on strength development

This is a report of a study to establish whether the deleterious effect on strength development of microsilica in very high grade concrete also occurs in lower grades.

BRE, BR372, 1999
ISBN: 978-1-86081-304-7 £30.00

High grade concrete**Stress–strain behaviour**

This publication deals with the results of a study to assess how stress-strain behaviour is affected by increasing the concrete grade. It is found that a power equation fits the stress-strain data for all grades of concrete, in both compression and tension. The main conclusions relating to the structural use of high grade concrete are presented in this report.

BRE, BR373, 1999
ISBN: 978-1-86081-305-4 **£30.00**

High grade concrete**Sustained loading capacity and shear performance**

This report deals with the sustained compressive loading capacity and the shear performance of high grade concrete. The particular focus of attention is how these two aspects of structural performance change as the concrete grade is increased.

BRE, BR374, 1999
ISBN: 978-1-86081-306-1 **£30.00**

Shrinkage of natural aggregates in concrete

Discusses the effects on concrete of using shrinkable natural aggregates, recommends suitable uses for concrete made with particular aggregates and offers guidance on the design precautions to be taken. It should be used in conjunction with BS 812-120 Method for testing and classifying drying shrinkage of aggregates in concrete.

BRE, DG357, 1991, 4pp
ISBN: 978-0-85125-476-0 **£9.00**

Recycled aggregates

Recycled aggregates (crushed concrete and brick masonry) have long been used in construction, mainly in lower grade applications. Due to a lack of suitable specifications, there has been little basis for applying quality control which would enable the materials of suitable quality to be used in higher grade applications such as structural concrete. Recent advances now enable this improved guidance to be given in the UK. It will be of interest to architects, structural engineers, specifiers, and professionals in the aggregates and recycling industries.

BRE, DG433, 1998, 6pp
ISBN: 978-1-86081-255-2 **£9.00**

Energy-efficient in-situ concrete housing using EPS formwork

This report describes the method of housing construction using expanded polystyrene (EPS) permanent insulating formwork. The EPS moulds are manufactured in 'panel' or 'block' forms and assembled to provide the formwork into which concrete is poured to construct the main walls. This innovative construction technique may have an important role to play in improving energy efficiency in UK housing.

BRE, BR347, 1998, 52pp
ISBN: 978-1-86081-231-6 **£30.00**

Early age acceptance of concrete**Improved quality management: Task 6**

A full-scale seven-storey in-situ advanced reinforced concrete building frame designed to Eurocode 2 was constructed in the BRE Cardington laboratory using a range of concrete mixes and construction techniques. This provided a focus for a number of construction-phase research investigations. The one described here (task 6) was concerned with early age acceptance of concrete.

BRE, BR387, 2000, 94pp
ISBN: 978-1-86081-371-9 **£32.50**

Tension tests for concrete

Although not used as often as compression tests for concrete, tension tests are needed in order to fully assess structural performance. Because axial tension tests are difficult, many alternative methods have been tried though only a few are specified in standards. This Digests covers the five principal categories of tension tests: axial, splitting, flexure, fluid pressure and torsion. Variations of these are described, discussed and compared. All the methods have their uses: the choice depends upon the application and the structural context, and the practical considerations of performing the test.

BRE, DG451, 2000, 16pp
ISBN: 978-1-86081-438-9 **£20.00**

Process efficient concreting**Improved speed and quality**

This report describes a study of the concreting processes within the construction of the European Concrete Building Project in-situ concrete frame at Cardington. The objective of that project was to re-engineer the business process of such buildings in order to reduce costs, increase speed and improve quality. Recommendations have been made which should improve the efficiency of the concreting process and construction as a whole without compromising the quality of the finished structure.

BRE, BR403, 2000, 124pp
ISBN: 978-1-86081-421-1 **£32.50**

Low energy cements

This report reviews the field of low energy cements and, in particular, belite-calcium sulfoaluminate cements. It includes a literature review and describes a testing programme at BRE to assess the performance of belite-based cements produced on a commercial scale in China. The results show that concretes made with these cements have good early strength development and excellent sulfate resistance. Their resistance to carbonation, however, may be lower than that of Portland cement concrete.

BRE, BR421, 2001, 50pp
ISBN: 978-1-86081-494-5 **£47.50**

HAC concrete in the UK**Assessment, durability management, maintenance and refurbishment**

This Special Digest explains current guidance for assessing HAC concrete construction, taking account of developments since 1975. Recent information comes mostly from site investigations of structures; the findings have a bearing on how HAC construction should be appraised. This Digest also describes testing regimes to identify HACC and check for chemical attack. It assesses the current level of protection afforded to the reinforcement and gives advice on durability management, maintenance and refurbishment.

BRE, SD3, 2002, 20pp
ISBN: 978-1-86081-591-1 **£27.50**

Innovation in concrete frame construction 1995-2015

E Nolan

Examines innovation in concrete frame construction over the past 10 years and looks into the future to predict likely drivers for future innovation. Drawing on the proceedings of a workshop held at BRE and detailed interviews with industry practitioners, the report finds that the research from the European Concrete Building Project at Cardington has had a positive impact on the concrete frame construction industry and that many of the innovations trialled there are regarded as important by industry. The major trends and issues likely to be the focus of innovation in the concrete frame construction industry over the coming decade are identified as being green issues, efficiency of production and aspects of labour and training.

BRE, BR483, 2005, 44pp
ISBN: 978-1-86081-762-5 **£37.50**

Formwork for modern, efficient concrete construction

R Rupasinghe and E Nolan

Modern formwork systems are designed for speed and efficiency. This publication describes generic types of modern formwork system that are widely available, and considers their applications, advantages and main features related to health and safety and sustainability performance. They are engineered to provide increased accuracy and minimize waste in construction and most have health and safety features built-in. The main systems in use are table form/flying form, system column formwork, horizontal and vertical panel systems, jump form, slip form, and tunnel form. This guide sets out their key features – process efficiency, safety, sustainability and other considerations – with numerous illustrations of the systems in use on-site.

BRE, BR495, 2007, 24pp
ISBN: 978-1-86081-975-9 **£20.00**

Calcium sulfoaluminate cements

CO2 reduction, concrete properties and applications

K Quillin

Manufacture of calcium sulfoaluminate (CSA) cements requires less energy than conventional Portland cements and produces lower carbon dioxide emissions. This report presents background information on these cements, and reports on practical work to assess their performance in concrete.

BRE, BR496, 2007, 80pp
ISBN: 978-1-86081-984-1 **£40.00**

Calcium aluminate cements

Proceedings of the Centenary Conference 2008

CH Fentiman, RJ Mangabhai and KL Scrivener

The first industrial process for the production of a cement based on calcium aluminates was patented in 1908 and since then these cements have become hugely important for a wide range of applications.

EP94, 2008, 608pp
ISBN: 978-1-84806-045-6 **£90.00**

Marine aggregates in concrete

A Dunster

Marine-dredged aggregates make a significant contribution to the supply of aggregates in the UK. In England and Wales, marine sand and gravel make up about 8% of the total primary aggregates and 20% of the total sand and gravel. This Digest considers marine aggregates in relation to the requirements in European Standards for concrete and aggregates and the latest guidelines for preventing alkali-silica reaction. It is intended to serve as a baseline document for specifiers but will also be of interest to clients and their advisors. It is a revised edition of DG473, which is now withdrawn.

BRE, DG507, 2008, 6pp
ISBN: 9781848060586 **£9.00**

MORTAR, RENDER AND PLASTER**Proprietary renders**

Proprietary render products offer benefits such as less waste, opportunities for machine application and fewer workmanship errors. Despite extensive use in continental Europe and their benefits on projects, use remains limited partly due to a lack of independent data on performance. This paper provides the results of laboratory tests on four products. Bond strength, resistance to water penetration and freeze/thaw durability were superior to traditional render; however, they showed reduced water vapour permeability.

BRE, IP16/03, 2003, 8pp
ISBN: 978-1-86081-653-6 **£9.00**

Mortars for blockwork: Improved thermal performance.

The introduction of more stringent thermal buildings regulations may increase the use of lightweight and thin layer mortar which reduce the thermal transmittance of walling (blockwork). Little experimental information is available, so data have been collected both from relevant literature and from testing mortar samples and blockwork wallettes. The use of lightweight and thin layer mortars seems unlikely to have a significantly adverse effect on the strength of autoclaved aerated concrete masonry, except that the flexural strength of lightweight blockwork is likely to be lower than that of traditional masonry.

BRE, IP2/98, 1998, 4pp
ISBN: 978-1-86081-196-8 **£9.00**

Avoiding latent mortar defects in masonry

Mortar defects in masonry fall into two categories: those that are visually obvious at the time of construction, and the latent and built-in defects that make their presence felt only later. This paper suggests various means of reducing latent defects so as to avoid problems if the masonry is subjected to unduly onerous conditions.

BRE, IP10/93, 1993, 4pp
£9.00

BREMORTEST: a rapid method of testing fresh mortars for cement content

This paper describes a test for the cement content of uncarbonated cement:sand mortar mixes (and, less accurately, for cement:lime:sand mixes). The test employs relatively simple apparatus - not yet developed beyond a prototype - and procedures which can be used on site with mortars up to seven days old.

BRE, IP8/89, 1989, 4pp
£9.00

The conformance of masonry mortars and their constituent sands with British Standards

Describes how ready-to-use mortars were found to have better strength and working properties than site-mixed mortars, but a disappointing lack of conformance with British Standards.

BRE, IP10/85, 1985, 4pp
£9.00

Choosing external rendering

This guide gives outline advice for buildings up to four storeys to assist specifiers and builders in choosing render for different backgrounds and exposure.

BRE, GG18, 1994, 6pp
ISBN: 978-1-86081-863-9 **£9.00**

Assessing external rendering for replacement or repair

Gives advice on the systematic inspection of failed underlying structures, and guidance on whether to repair or replace. With GG24, this guide gives advice on the systematic inspection of failed underlying structures, and guidance on whether to repair or replace. Aimed at building surveyors, contractors and site supervisors.

BRE, GG23, 1995, 4pp
ISBN: 978-1-86081-050-3 **£9.00**

Repairing external rendering

This guide gives advice on the possible causes of failed rendering and suggests remedial action to take. Aimed at building surveyors, contractors and site supervisors.

BRE, GG24, 1995, 8pp
ISBN: 978-1-86081-037-4 **£15.00**

Replacing failed plaster

Shows how to select wet plaster for different background materials and describes how it may contribute towards the fire, thermal and acoustic properties of the structure.

BRE, GG7, 1991, 8pp
ISBN: 978-1-86081-852-3 **£15.00**

Replacing plasterwork

Replacement of old or damaged internal plasterwork is expensive. It can be more complicated than new work because the plaster often has to be applied to a mix of backgrounds which may be damaged or contaminated. It is one of the few parts of a job where the quality is obvious to the client – if the plasterwork is poor, he is likely to question the workmanship of the parts he can't see. This Good Repair Guide gives guidance on common reasons for failure in plasterwork, how to prepare different background surfaces for wet replastering, and how to select a suitable plaster system.

BRE, GR18, 1998, 4pp
ISBN: 978-1-86081-234-7 **£9.00**

Building mortar

Recommends the composition and use of a general purpose mortar and other specialised types of mortars, including those for resisting sulfate attack, in the light of changes to British Standards and impending changes from British to European standards. The increasing use of ready-mixed mortars is recognised. Describes sulfate and frost attack on mortar, their cause and effect, diagnosis and remedial measures.

BRE, DG362, 1991, 8pp
ISBN: 978-0-85125-499-9 **£15.00**

Plastering and internal rendering

The acceptability of the wall and ceiling plastered finish can be a significant item in the snagging procedure. Selection of appropriate materials and techniques may not always be thorough, particularly with respect to shrinkage of backing coats and resultant cracking, and detachment of surfaces. Rigorous design procedures and quality control on site are therefore of major importance in reducing, if not eliminating, defects. This Good Building Guide addresses these issues, drawing primarily from the experience of BRE site investigations. Part 1 describes the commonest types of gypsum and cement-based plasters available, the selection of suitable plastering specifications, whether for skim coat, two-coat or three-coat work in relation to the substrate material of wall or ceiling, the protection of abutments, avoidance of potential loss of adhesion, and thermal and moisture movements of the most common backgrounds and plasters. Workmanship, including permissible deviations of the finished surfaces, is dealt with in Part 2.

BRE, GG65, 2 parts, 2005, 14pp
ISBN: 978-1-86081-928-5 £20.00

Building masonry with lime-based mortars

Lime mortar is enjoying a revival and is being promoted by conservation organisations for restoration work and by environmentalists as an environmentally friendly material. It can be used for new build as well as for restoration and conservation work. This Good Building Guide gives guidance on the properties of lime mortars, mortar mix design and working with lime mortars. However, practice varies within the British Isles and the reader is advised to make sure that proposed works comply with local specifications, especially for heritage buildings. Some helpful further reading is given.

BRE, GG66, 2005, 8pp
ISBN: 978-1-86081-889-9 £15.00

Plasterboard

Part 1, 2 and 3

H Harrison

For satisfactory performance of a completed construction, it is crucial that the correct type, thickness or mass of plasterboard is selected. The first part of this Good Building Guide describes the range of boards available and when they can be used. The right fixing and finishing techniques for each type of board must also be used and the second and third parts provide practical guidance for operatives on fixing and finishing plasterboard, drawing on BRE observations of site practices. Checklists are included for use at both design and site stages.

BRE, GG70, 3 parts, 2007, 20pp
ISBN: 978-1-86081-955-1 £22.50

Hemp lime construction

A guide to building with hemp lime composites

R Bevan and T Woolley

Hemp lime is a composite construction material that can be used for walls, insulation of roofs and floors and as part of timber-framed buildings. It provides very good thermal and acoustic performance, and offers a genuinely zero-carbon contribution to sustainable construction. Hemp masonry is breathable and is able to absorb and emit moisture, leading to much healthier buildings. Comprehensive guidance on using this novel material for housing and low-rise buildings is given for the first time in this book, which is full of practical information on materials, design and construction. It is fully illustrated and includes case studies and design details, and explains how the use of hemp-based material can capture and store carbon dioxide in the fabric of buildings. The guide is the output from a Defra-funded study commissioned by the National Non-Food Crops Centre.

EP85, 2008, 120pp
ISBN: 978-1-84806-033-3 £30.00

PAINTS, ADHESIVES AND SEALANTS

Planned maintenance painting: improving value for money

Planned maintenance painting activities account for one of the largest proportions of a housing stock owner's budget. To make progress towards value for money goals, without compromising customer satisfaction, consideration needs to be given to partnering efficiently with contractors and coatings manufacturers. This Information Paper presents findings from a project funded by DTI and supported by industry. It explains some of the opportunities available for adopting best practice and for getting started in partnering initiatives.

BRE, IP7/03, 2003, 8pp
ISBN: 978-1-86081-617-8 £9.00

Low-solvent primers: performance in construction steelwork

This Paper summarises a BRE project drawing on experience from industry, to provide guidance on selection, application and performance of low solvent content pre- and post-fabrication primers applied as temporary protection to structural steelwork. It is one of four addressing the issues of low-VOC coatings on a range of construction substrates.

BRE, IP16/00, 2000, 6pp
ISBN: 978-1-86081-409-9 £9.00

The performance and use of coatings with low solvent content

Coatings of low solvent content are being increasingly used in areas where, traditionally, coatings with relatively high levels of organic solvent would have been used. These new formulations are becoming more widely available and will undoubtedly be the predominant coatings in the future. This Paper summarises the pressures driving the changes in coatings technology and, based on data from BRE projects, describes the properties and performance of these new materials. It presents this complex technology in a readily understood form that will be of interest to all users of coatings for construction applications, including architects, specifiers, painting contractors and householders.

BRE, IP8/99, 1999, 4pp
ISBN: 978-1-86081-338-2 £9.00

Resistance of masonry paints to microbial attack

Describes the range of organisms involved, the conditions required for growth and the influence of substrate and paint film on the rate of colonisation.

BRE, IP10/98, 1998, 4pp
ISBN: 978-1-86081-215-6 £9.00

Progress in European standardisation for exterior wood coatings

Of interest to specifiers, architects and paint manufacturers, this paper describes developments in European Standards for exterior wood coatings. This group of standards forms part of the range of construction-related European Standards intended to reduce technical barriers to trade and support the formation of the single European market.

BRE, IP5/96, 1996, 4pp
ISBN: 978-1-86081-087-9 £9.00

Controlling mould growth by using fungicidal paints

Fungicidal paints can prove effective as part of the overall strategy for preventing mould growth caused by dampness in dwellings. This paper provides information on the methods BRE have developed to assess these products, and gives recommendations for cleaning and redecoration procedures.

BRE, IP12/95, 1995, 4pp
ISBN: 978-1-86081-021-3 £9.00

Interior painting of trim with solvent-borne paints

This paper describes the results of research into solvent vapour concentrations generated during the painting of small surface areas, typical of interior trim.

BRE, IP8/95, 1995, 4pp
ISBN: 978-1-86081-021-3 £9.00

Water-borne coatings for exterior wood

Water-borne coatings for exterior wood are appropriate for most applications where exterior woodwork requires protection and decoration, but their properties and performance in use differ in many respects from those of traditional solvent-borne products. Describes the main types of water-borne coatings and summarises the requirements for their successful use.

BRE, IP4/94, 1994, 4pp

£9.00

Solvent vapour hazards during painting with white-spirit-borne eggshell paints

Describes the problem of solvent emission, and the effects of ventilation, surface area and temperature on solvent vapour levels.

BRE, IP3/92, 1992, 4pp

£9.00

Exterior wood stains

Summarises the properties and performance characteristics of exterior wood stains - an important class of natural finishes for timber. Also describes the main types of exterior wood stains and offers advice on end-use application.

BRE, IP5/91, 1991, 4pp

£9.00

Joint sealants and primers: further studies of performance with porous surfaces

A report of studies on the effect of polyvinylidene chloride on a range of sealants in wet conditions and the potential for improving the performance of sealants by adding other compounds to the primer.

BRE, IP4/90, 1990, 4pp

£9.00

Factory-applied priming paints for exterior joinery

The results of tests carried out to establish the performance of currently available factory applied primers and advice on their specification and use in joinery manufacture.

BRE, IP17/87, 1987, 4pp

£9.00

Maintaining paintwork on exterior timber

Exposure trials show the difficulty in achieving good performance from paints applied as maintenance coats on cleaned-up, weathered surfaces. Durability of maintenance coats not only varied markedly between different paints but in some cases was also affected by the type of clean-up method used.

BRE, IP16/87, 1987, 4pp

£9.00

Joint primers and sealants: performance between porous claddings

Recent experience indicates that high performance building sealants may fail prematurely when used between very porous cladding materials like grc. This Information Paper informs building professionals and sealant manufacturers of the important role of the primer in preventing early failure and identifies resistance to water permeation as a key property for primers used in sealant joints.

BRE, IP9/87, 1987, 4pp

£9.00

Site-applied adhesives - failures and how to avoid them

Describes the nature of the failures discovered (by BRE Advisory Service) and gives designers, specifiers and site supervisors general advice on how to avoid them.

BRE, IP12/86, 1986, 4pp

£9.00

Lead driers in paint: implications of their removal

Summarises the results of an investigation carried out on behalf of the Central Directorate of Environmental Protection. It demonstrates that lead driers can be reduced from accepted levels in paints without serious disadvantage and that new paints, with alternative driers, can be formulated without a reduction in performance.

BRE, IP12/85, 1985, 4pp

£9.00

Ageing of wood adhesives - loss in strength with time

Joints made with most common wood adhesives tend to lose strength as they age. This paper gives the results of long-term tests carried out at BRE which quantify these strength reductions over a period of 40 years for unstressed material and 27 years for stressed joints. Implications for glued structures are considered.

BRE, IP8/84, 1984, 4pp

£9.00

The selection and performance of sealants

Summarises the principal criteria for the selection of sealants, relating these to a general design procedure for building joints.

BRE, IP25/81, 1981, 4pp

£9.00

Solar reflective paints

Provides guidance on the merits of using solar reflective paints and other solar reflective treatments.

BRE, IP26/81, 1981, 4pp

£9.00

Painting plastics

Applying the wrong sort of paint can change the nature of a plastic component and shorten its life. This paper advises on the best way to prepare plastics for painting and discusses which paints should be used.

BRE, IP11/79, 1979, 4pp

£9.00

Exterior wood stains

Information is readily available on the characteristics and uses of exterior wood stains. This paper presents the current opinion on their performance and limitations, based on continuing research and considerable site expertise.

BRE, IP34/79, 1979, 4pp

£9.00

Choosing wood adhesives

Most wood adhesives are based on the resins of urea, melamine, phenol or resorcinol, or polyvinyl acetate emulsions. This Digest provides advice on the selection and specification of adhesives for use with solid woods.

BRE, DG340, 1989, 8pp

ISBN: 978-0-85125-734-1

£15.00

Painting exterior wood

Explains the principles underlying the successful painting of exterior wood, with details of paint systems and of the initial and maintenance painting process.

BRE, DG422, 1997, 8pp

ISBN: 978-1-86081-145-6

£15.00

Maintaining exterior wood finishes

This Good Building Guide advises on which type of finish to use for exterior doors and windows, discusses the pros and cons of finish types and how they compare in practice, advises on successful maintenance methods, and gives guidance on the method and extent of surface preparation necessary.

BRE, GG22, 1995, 4pp

ISBN: 978-1-86081-030-5

£9.00

Internal painting: tips and hints

Internal decoration is generally straightforward and less likely to cause problems than outside painting. Modern paints offer a wide choice of finishes and the techniques needed to get a good finish are well known. But there can be snags: for instance, painting on damp or unsound plaster or dealing with persistent mould growth on walls. Sometimes there are health hazards in removing old finishes or applying solvent-based paints indoors. This Good Repair Guide gives advice on how to tackle problems that crop up during internal painting, where to use fungicidal paints, and when to take safety precautions.

BRE, GR19, 1998, 4pp

ISBN: 978-1-86081-243-9

£9.00

Polymeric anti-corrosion coatings for protection of materials in contaminated land

Building on former industrial land (contaminated land) may necessitate the use of materials in aggressive ground conditions so some consideration must be given to their protection from chemical attack. This report reviews the coating process necessary to protect materials from chemical attack and discusses the essential properties required of anti-corrosion coatings.

BRE, BR286, 1995, 32pp
ISBN: 978-1-86081-017-6 **£22.50**

Selecting building sealants with ISO 11600

This paper describes how ISO 11600 classifies sealants and how the classification scheme relates to use in service and to British Standard methods for joint design (BS 6093) and sealant selection (BS 6213). Changes that are likely to be introduced in the revised version of ISO 11600 are included.

BRE, DG463, 2002, 4pp
ISBN: 978-1-86081-544-7 **£9.00**

EN 927: the new European Standard for exterior wood coatings

Miller

New European standards for exterior wood coatings are available in five parts: guide to selection and classification, specification for assessing the performance of wood coating systems in relation to end use, and test methods for natural weathering and water absorption. This Digest, which will interest buildings users and specifiers, architects and paint manufacturers, describes these standards.

BRE, DG466, 2002, 8pp
ISBN: 978-1-86081-559-1 **£15.00**

Selecting gaskets for construction joints

This Digest advises on selecting gaskets for fixed joints in the external envelope of buildings. Gaskets are the main alternative to sealants for sealing joints in construction. BS 6093, the code of practice for the design of joints and jointing in buildings, gives authoritative guidance on the design of joints. However, while there are supporting standards for sealants, for gaskets there is only a materials specification of limited scope. Gasketed joints can provide effective weathersealing, but this requires appropriately designed joints and gaskets coupled with the use of suitable gasket materials.

BRE, DG469, 2002, 12pp
ISBN: 978-1-86081-581-2 **£15.00**

Refixing ceramic wall tiles to internal walls

The differential thermal and moisture movements associated with the background substrate and tiles can disrupt or break an inadequate bond within the tiling system. Effective adhesion of tiling requires: good adhesion of tiles to the substrate, a suitable adhesive for the substrate and conditions, dry, sound backing and substrate, and provision for movement joints in large areas of tiling. This Good Repair Guide gives advice on how to prepare the background surface, apply the adhesive, build in movement joints and apply the grouting.

BRE, GR29, 2001, 4pp
ISBN: 978-1-86081-468-6 **£9.00**

STONE

Lightweight veneer stone cladding panels

This Information Paper reviews current knowledge on the use of thin stone veneer as part of composite cladding panels. In collaboration with industry, research was carried out to identify potential problems associated with thin veneer stone cladding. Three main areas were considered: vulnerability to impact damage, effect of repeated wetting and drying cycles, and the effect of differential thermal movement between the stone veneer and the backing material.

BRE, IP10/01, 2001, 6pp
ISBN: 978-1-86081-482-2 **£9.00**

Cleaning exterior masonry

Pretreatment assessment of a stone building

When buildings become soiled and stained, owners, occupiers and managers must decide whether and how they should be cleaned. This Information Paper describes the issues concerned with cleaning Stockport Town Hall, a stone building, one of two buildings studied for the likely effects, good and bad, of cleaning. (The other building, mainly of brick, is covered by IP10/99.) This paper is addressed to owners, building managers, architects, surveyors, and professionals with interest in the appearance of buildings, and the effect of cleaning on the durability of the building fabric.

BRE, IP9/99, 1999, 4pp
ISBN: 978-1-86081-347-4 **£9.00**

Cleaning exterior masonry

Assessing cleaning of a brick-built church

When buildings become soiled and stained, owners, occupiers and managers must decide whether and how they should be cleaned. This Information Paper describes the issues concerned with cleaning a London church, a brick building, one of two buildings studied for the likely effects, good and bad, of cleaning. (The other building, mainly of stone masonry, is covered by IP9/99.) This paper is addressed to owners, building managers, architects, surveyors, and professionals with interest in the appearance of buildings, and the effect of cleaning on the durability of the building fabric.

BRE, IP10/99, 1999, 4pp
ISBN: 978-1-86081-348-1 **£9.00**

Use of lightweight veneer stone cladding panels

This Information Paper reviews current knowledge on the use of thin stone veneer as part of composite cladding panels. In collaboration with industry, a limited research programme was carried out to identify potential problems associated with thin veneer stone cladding. Three main areas were considered: its vulnerability to impact damage, the effect of repeated wetting and drying cycles, and the effect of differential thermal movement between the stone veneer and the backing material.

BRE, IP17/98, 1998, 4pp
ISBN: 978-1-86081-258-3 **£9.00**

Stone cladding panels: in-situ weathering

As new sawing techniques become available, the use of thin stone cladding has been increasing. But the failure of some cladding indicates that more needs to be understood about its performance. This paper outlines recent research findings that have identified a number of areas where extra care is required from the designer and contractor. This research demonstrates the importance of reliable guidance for the selection and use of this type of stone cladding.

BRE, IP18/98, 1998, 4pp
ISBN: 978-1-86081-259-0 **£9.00**

External cladding: how to determine the thickness of natural stone panels

Describes in simple steps two ways to establish the suitability of a cladding panel: by direct reference to the load to be carried and by comparison with stones that can be specified at thinner sizes. These methods apply to most types but are of particular importance to limestones and sandstones where the current recommended thickness of 70 mm is often a significant barrier to the use of many traditional UK limestones.

BRE, IP7/98, 1998, 4pp
ISBN: 978-1-86081-211-8 **£9.00**

External claddings using thin stone

Describes BRE's research into the use of thin, natural stone cladding. Particularly important issues include changes to BS 8298: 1994, problems associated with the use of thin marble cladding and the effect of flame texturing granite cladding.

BRE, IP6/97, 1997, 4pp
ISBN: 978-1-86081-138-8 **£9.00**

Control of biological growths on stone

This paper provides guidance on the control of biological growths on external stone surfaces. It describes the types of growth occurring on external stone and their potential effects on the stone and reports on comparative tests on the efficacy of different types of control procedures using chemical washes. It will be of interest to buildings managers and architects.

BRE, IP11/95, 1995, 4pp
ISBN: 978-1-86081-013-8 **£9.00**

The building sandstones of the British Isles

This illustrated book provides designers and architects of new buildings, and others involved in restoration work, with a comprehensive guide to the currently available sandstones used in building. The book includes quarry locations, potential stone reserves, descriptions of the stone and available sizes, applications and reference buildings.

BRE, BR84, 1986, 132pp
ISBN: 978-0-85125-203-2 **£35.00**

The building magnesian limestones of the British Isles

A guide (with photographs) to the availability of magnesian limestones for building. Each quarry producing the stone is identified and located by grid reference, and information given about quarry size, suitable uses, size of blocks, petrography, durability and reference buildings.

BRE, BR134, 1988, 30pp
ISBN: 978-0-85125-356-5 **£25.00**

Durability tests for building stone

Tests for the durability of natural building stones are not generally understood, and there are few British Standards covering the selection of stone. This report lists the relevant British Standards, and details the tests developed by BRE for assessing the durability of limestones, sandstones and slates.

BRE, BR141, 1989, 14pp
ISBN: 978-0-85125-368-8 **£22.50**

The building slates of the British Isles

Guidance for architects and designers on the availability and durability of British building and roofing slate. For each of the 27 quarries it gives information on location, petrography of the slate, results of laboratory tests and lists of reference buildings.

BRE, BR195, 1991, 66pp
ISBN: 978-0-85125-483-8 **£52.50**

The building limestones of France

This publication deals with the identification of French limestones and the terms used to describe them. It also provides an assessment of their durability and their behaviour when exposed in the UK.

BRE, SO29, 1982, 120pp
ISBN: 978-0-11670-773-4 **£30.00**

The building limestones of the British Isles

A guide for architects to available British limestones including their durability, location, sizes of quarries, and buildings where they can be seen. 1983

BRE, SO36, 1989, 98pp
ISBN: 978-0-11671-365-0 **£30.00**

Selecting natural building stones

One of the attractions of natural building stone is the wide variety of colours and textures available to designers. Unlike colour and texture, durability is difficult to define and even more difficult to measure. This Digest summarises tests that can be applied to natural building stone.

BRE, DG420, 1997, 8pp
ISBN: 978-1-86081-125-8 **£15.00**

Principles of masonry conservation management

R C de Vekey

This Digest provides an overview of the principles of the conservation management of masonry in historic buildings. It discusses the legislative framework in the UK and the general principles of conservation practice.

BRE, DG502, 2007, 8pp
ISBN: 978-1-86081-966-7 **£15.00**

Conservation and cleaning of masonry

Part 1. Stonework

R de Vekey

The use of appropriate conservation techniques is critical to the preservation of buildings. Part 1 of this 3-part Digest gives advice on how to apply safe, effective, appropriate and enduring conservation techniques to stonework. It outlines how to identify the stone and associated mortars, and how to diagnose the causes of soiling and deterioration. It advocates avoidance of cleaning to optimise the life of masonry but outlines its use where appropriate. The other parts will cover conservation of terracotta, brickwork, renders, plasters and stucco. The companion Digest 502 explains the principles of the conservation of masonry in historic buildings.

BRE, DG508, 2008, 20pp
ISBN: 9781848060616 **£22.50**

TIMBER

Timber pack

BRE

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Green gluing of timber: a feasibility study (IP10/05)
Incising UK-grown Sitka spruce (IP13/05)
Preservative treated timber: the UK's code of best practice (IP13/01)
Preservative-treated timber: ensuring conformity with European Standards (IP6/99)

BRE, AP265, Ringbound set, 2007

ISBN: 978-1-84806-003-6 £130.00

Timber durability and treatment

Incising UK-grown Sitka spruce

This paper provides a platform for understanding the potential opportunities and benefits of incising spruce, and for increasing the end-use applications of UK-grown timber. It gives results of field trials and laboratory tests which show how incising the timber can improve penetration of preservative and hence increase durability. The paper will be of interest to those involved in the specification and use of treated wood products, and to the wider wood-processing industry and fencing producers.

BRE, IP13/05, 2005, 12pp

ISBN: 978-1-86081-884-4 £9.00

European Standards for wood preservatives and treated wood

Revision of the key European performance standards on wood preservatives and treated wood (EN 335, EN351 and EN 599) is due to be completed by the end of 2003, and preparation of standards for remedial treatment products is under way. This paper describes progress and reviews the work being done to support development of these standards.

BRE, IP1/03, 2003, 4pp

ISBN: 978-1-86081-609-3 £9.00

Evaluating joinery preservatives

Performance prediction using BS EN 330 L-joint trials

Findings from BRE's long-term programme of long-term field testing of timber out of contact with the ground are presented in this paper, which shows that new active ingredients for joinery preservatives are able to provide appropriate increases in the service life of timber joinery, while offering improvements in certain health and safety respects over those provided by traditional joinery preservatives.

BRE, IP2/01, 2001, 4pp

ISBN: 978-1-86081-459-4 £9.00

Preservative treated timber: the UK's code of best practice

European standards for the preservative treatment of timber are written in terms of the results of the treatment process rather than the process itself; to check compliance with this type of specification, a clear interpretation of the standards is needed for both specifier and treater. This Information Paper presents progress in the review of BSI DD 239, the UK's interpretative guidance document. It complements IPs 6/99, 4/97, 9/96 and 11/92.

BRE, IP13/01, 2001, 6pp

ISBN: 978-1-86081-489-1 £9.00

Durability of timber in ground contact

This paper reports findings from long-term testing at BRE to benchmark the performance of timber in ground contact. It concludes that most new hardwood species becoming available in the UK market are of limited durability. It recognises, though, that treatment can extend the service life of many softwood species, and concludes that a significant improvement in the service life of treated spruce in ground contact can be achieved by incising prior to treatment. This paper complements IP 6/99, IP 2/01 and Digest 429.

BRE, IP14/01, 2001, 8pp

ISBN: 978-1-86081-490-7 £9.00

Preservative-treated timber: ensuring conformity with European Standards

This Paper reports a study by BRE and industry of UK methods for quantifying retention of copper/chromium/arsenic and creosote in treated timber. It concludes that current methods are not wholly adequate and can cause uncertainties for specifier and treater. Unequivocal methods for sampling and analysis can be found. In addition, a common practical method for determining timber density is required since, to express retention, analytical results have to be converted to kg/m³. This paper complements IP4/97 and updates IP9/96. It will interest specifiers, manufacturers and timber treaters.

BRE, IP6/99, 1999, 6pp

ISBN: 978-1-86081-333-7 £9.00

Preservative-treated timber for exterior joinery: applying the new European Standards

Complementing Digest 393 and IP 9/96, this paper details the treatment of four commercial softwoods with light organic solvent wood preservatives using schedules currently in use in the UK, and compares them with the probable requirements based upon new European Standards on wood preservation.

BRE, IP4/97, 1997, 4pp

ISBN: 978-1-86081-128-9 £9.00

Preservative-treated timber: checking compliance with new European Standards

Explains the mechanism recommended in European Standards for checking timber compliance with results-type specifications. This includes procedures for obtaining a representative sample to assess penetration and retention of preservative. This paper complements Digest 393.

BRE, IP9/96, 1996, 4pp

ISBN: 978-1-86081-120-3 £9.00

House longhorn beetle: geographical distribution and status in the UK

House longhorn beetle cause potentially serious damage to softwood roofing timbers within a specific area of south-east England. This paper describes damage caused and prevalence of the species.

BRE, IP8/94, 1994, 4pp

£9.00

Schedules for the preservation of hem-fir timber

Describes the results achieved by three different schedules for the application of organic-solvent preservatives by double-vacuum processes tailored to meet the special requirements of hem-fir timber.

BRE, IP11/92, 1992, 4pp

£9.00

Factory-applied stain basecoats for exterior joinery

Trials have shown a wide disparity in the weather resistance of stain basecoats which can have major implications for the service life of joinery finishes. Advice is given on the selection and use of stain basecoats.

BRE, IP2/92, 1992, 4pp

£9.00

In-situ treatment of exterior joinery using boron-based implants

Describes the use of boron-based rods or tablets for the in-situ treatment of exterior joinery and recommends where to position these implants to give the best protection against further decay.

BRE, IP14/91, 1991, 4pp

£9.00

Blue staining of timber in service: its cause, prevention and treatment

Describes the defect of timber known as 'blue stain in service', caused by the growth of a particular group of fungi. This paper shows the conditions required for the growth of the fungi, the means of preventing the defect, and the remedial treatment necessary to prevent further development.

BRE, IP9/91, 1991, 4pp

£9.00

Preservation of hem-fir timber

Timbers at risk from attack by wood-destroying organisms need effective preservative treatments. This paper presents the results of an investigation into the treatment of joinery-grade and construction-grade hem-fir with preservatives and processes now used for exterior joinery and timber-frame studding.

BRE, IP5/90, 1990, 4pp

£9.00

External joinery: end-grain sealers and moisture control

Effective moisture control is essential for maintaining the integrity of external joinery and achieving good paint performance, best achieved by sealing the end-grain of joinery components before assembly. This paper reviews the effect of end-grain sealing on the performance of external joinery.

BRE, IP20/87, 1987, 4pp

£9.00

Preservative treating veneer plywood against decay

For certain uses, where there is an identifiable risk of decay, plywood may need to be treated with wood preservative. To assist suppliers and users of treated plywood this Information Paper discusses the treatment methods available and makes general recommendations based on laboratory trials on treatability and decay resistance.

BRE, IP24/86, 1986, 4pp

£9.00

Controlling deathwatch beetle

Because deathwatch beetle can cause structural damage, wood which is infested requires urgent examination and usually an effective insecticidal treatment. This Information Paper, an update of previous guidance, evaluates the control measures which are in current use and provides an outline approach to remedial treatment.

BRE, IP19/86, 1986, 4pp

£9.00

Emulsion-based formulation for remedial treatments against woodworm

Considers the overall performance of surface applied remedial treatment systems.

BRE, IP15/83, 1983, 4pp

£9.00

House longhorn beetle survey

Describes the damage caused to timber by the house longhorn beetle, the distribution of the insect in the UK and the area within which preservative treatment of softwood roofing timbers is mandatory.

BRE, IP12/82, 1982, 4pp

£9.00

The effect of water-repellent preservative treatment on moisture levels in window joinery

Gives information on moisture contents measured in Scots pine and whitewood window test units over an eight year period of natural exposure.

BRE, IP20/82, 1982, 4pp

£9.00

The termite resistance of board materials

Summarises research information obtained using the European subterranean termite *Reticulitermes santonenensis*.

BRE, IP9/81, 1981, 4pp

£22.00

Avoiding joinery decay by design

Outlines guidelines which should greatly improve the durability of joinery.

BRE, IP10/80, 1980, 4pp

£9.00

Wood preservation in Europe

Development of standards for preservatives and treated wood

A F Bravery

Describes the provision of technical specifications to define fitness for free trade within Europe, looks at the most critical Standards and describes performance requirements.

BRE, BR229, 1992, 26pp

ISBN: 978-0-85125-542-2

£22.50

Catalogue of the National Collection of wood-rotting macro-fungi

The list of fungi held in the collection with the current name for each, synonyms, and the name under which each strain was deposited. Also recorded are brief details of the source, history and accession numbers from other collections. Procedures for depositing, ordering and supply of, and reference to, cultures are given.

BRE, BR121, 1988, 36pp

ISBN: 978-0-85125-280-3

£22.50

Long-term field trials on preserved timber out of ground contact

Presents the results of BRE field trials to evaluate the durability of simulated joinery components exposed to the weather but above the ground. The simulated components were in the form of unpainted T-joints and painted L-joints either untreated or treated with various wood preservatives and water repellents. The exposure period was up to 23 years, during which time the joints were examined yearly. Revised to 1990.

BRE, BR249, 1993, 28pp

ISBN: 978-0-85125-572-9

£25.00

Long-term field trials on preserved timber in ground contact

R Orsler and G A Smith

This report is one of a series covering the long-term testing of wood preservatives and timber durability. It gives the results of 20 years' exposure for tests started since 1950, and details of new trials established between 1950 and 1970, and revised to 1993. The test is the ground contact stake test, the normal method for assessing preservatives intended for severe service conditions.

BRE, BR276, 1995, 22pp
£22.50

The biological natural durability of timber in ground contact

R Orsler and G A Smith

Presents detailed records of the long-term natural durability of 180 different timber species tested at BRE field sites, and classifies their performance. This report is the third in a series covering the long-term field trials of timber durability and complements BR249 and BR276.

BRE, BR311, 1996, 82pp
ISBN: 978-1-86081-085-5 £25.00

Dry rot: its recognition and control

Decay of timber occurs only when wood is allowed to remain wet over long periods. In buildings the most serious type of decay is dry rot, which is caused by the fungus *Serpula lacrymans*. This Digest explains how to recognise dry rot and how to eradicate it.

BRE, DG299, 1993, 8pp
ISBN: 978-0-85125-348-0 £15.00

Identifying damage by wood-boring insects

A number of insects are able to use wood as a food source and some of these may cause serious damage to building timbers in the UK. This Digest introduces wood-boring insects and illustrates the types of damage which are serious enough to require remedial treatment, distinguishing them from other, less significant types of damage.

BRE, DG307, 1992, 8pp
ISBN: 978-1-86081-091-6 £15.00

Insecticidal treatments against wood-boring insects

A strategy for remedial treatment of damaged building timbers is outlined in this Digest; it describes the types of treatments available and gives practical advice on their relative advantages and limitations in eradicating infestations by specific wood-boring insects. It complements Digest 307 which identifies the major wood-boring insects in the UK.

BRE, DG327, 1993, 8pp
ISBN: 978-0-85125-278-0 £15.00

Wet rots: recognition and control

A description of the main types of wet rot generally found in buildings, how to distinguish them from dry rot, and the strategy for their control. It complements Digest 299 which gives guidance on identifying and controlling dry rot.

BRE, DG345, 1989, 12pp
ISBN: 978-0-85125-389-3 £15.00

Timbers: their natural durability and resistance to preservative treatment.

Timber exposed to moisture is at risk from attack by wood-rotting fungi. To obtain a good service life, it is important to select a timber species that is either naturally durable or amenable to preservative treatment. This Digest explains the classification of durability and treatability for timber, and classifies these properties for over 150 species. It is concerned with natural durability only in relation to fungal decay and not to resistance to attack by insects and marine borers.

BRE, DG429, 1998, 8pp
ISBN: 978-1-86081-209-5 £15.00

Wood rot: assessing and treating decay

Contains advice on inspecting for wood rot, identifying and treating the different types, and repair or replacement of affected timbers. It should be read in conjunction with Good Repair Guide 13 in identifying and treating insect attack on timber.

BRE, GR12, 1997, 6pp
ISBN: 978-1-86081-184-5 £9.00

Wood-boring insect attack

Wood, including timber in buildings, can be a food source for many insect species. This Guide contains advice on inspecting timber for wood-boring insects, and identifying different types of attack. Part 1 deals with identifying and assessing damage, and Part 2 with treating damage.

BRE, GR13, 2 parts, 1998, 10pp
ISBN: 978-1-86081-187-6 £15.00

BEST SELLER: Recognising wood rot and insect damage in buildings

A F Bravery, R W Berry, J K Carey and D E Cooper

Gives clear and authoritative guidance on the process of inspecting buildings for timber damage and on the identification of the causes of damage. This third edition adds guidance on types of fungal growths, which though less regularly encountered in buildings, nonetheless confuse correct identification and mislead diagnosis. It also includes a short section on termites to provide reassurance on recognition and appropriate action should there be suspicion of a rare introduction.

BRE, BR453, 2003, 132pp
ISBN: 978-1-86081-603-1 £37.50

Termites and UK buildings

The unintentional importation and establishment of termites in a small area in North Devon has shown that at least one genus of termite can survive in the UK climate and present a risk to buildings. This Digest describes the biology of the termites, their significance as potential structural pests, and gives diagnosis and infestation, recognition and the key principles of termite detection and management. Part 1 deals with biology, detection and diagnosis. Part 2 deals with control and management, including colony elimination for eradication purposes.

BRE, DG443, 2 parts, 1998, 12pp
ISBN: 978-1-86081-820-2 £20.00

External timber structures

Preservative treatment and durability

T Reynolds, E Suttie and C Coggins

This Digest provides guidance on appropriate and enhanced specifications of timber preservatives, with additional measures for maximising the service life of timber. It takes account of new types of preservative that are available, and guidance in recent BRE publications, British Standards and other industry publications. It will be useful for all those wanting to specify durable timber structures for external use, and to understand the key issues in ensuring durability.

BRE, DG503, 2007, 8pp
ISBN: 978-1-86081-985-8 £15.00

Wood rot and other fungi in buildings

BRE Audio Visual

This CD contains 52 images of wood rot and other fungi found in buildings. The majority of these pictures appear in the BRE publication, *Recognising wood rot and insect damage in buildings*. The images within this publication on insect and insect damage are available on another CD, *Wood-Borers damaging Timber in Building*. There are high (approx. 10X8 inches @ 300 dpi), medium (7X5 @ 300 dpi) and low resolution (8X6 @ 72 dpi) images contained on the CD, all of which can be easily accessed. Low resolution copies can be viewed within a catalogue containing various data appropriate to each image. Royalty free usage means that following purchase of this CD all the images may be used in almost any way you choose as many times as you require and for as long as you want with very few exceptions.

BRE, AP152, CD ROM, 2003
ISBN: 978-1-86081-774-8 £115.00

Wood borers damaging timber in buildings

BRE Audio Visual

These two CDs contain 52 images of wood rot and other fungi and 78 images of wood-borers and damage to timber caused by wood-borers. The majority of these pictures appear in the BRE publication, *Recognising wood rot and insect damage in buildings*. The CD contains high, medium and low resolution images and can be viewed within a catalogue containing various data appropriate to each image. Royalty free usage following purchase.

BRE, AP153, CD ROM, 2003

£115.00

Timber materials and applications

Five-storey timber-frame hall of residence

A reconstruction case study

This Paper describes the design and construction challenges for a student hall of residence at Aberyswyth. The case study focuses on key features of the project with special attention given to the five-storey timber-frame structure. The building was required to re-house over 100 students displaced by fire damage and had to be designed and built in the shortest practicable time. It also had to meet demanding architectural, technical and conversation requirements.

BRE, IP19/00, 2000, 8pp
ISBN: 978-1-86081-425-9

£9.00

The selection of timber for exterior joinery from the genus *Shorea*

Offers specifiers and joinery manufacturers a set of possible selection criteria for stocks, suggests a selection procedure which can improve the overall durability of *Shorea* timber used for joinery and shows the importance of preservative treatment.

BRE, IP10/91, 1991, 4pp

£9.00

Serviceability design of ply-web roof beams

The majority of failures of ply-web beams has been caused by inadequate serviceability design. This paper (which complements IP 7/88) considers serviceability design, the effect of creep and other important factors and offers guidance on how to prevent serviceability failure in ply-web roof beams.

BRE, IP7/91, 1991, 4pp

£9.00

The design and manufacture of ply-web beams

Covers the design, manufacture and installation of ply-web beams and offers guidance on how to ensure satisfactory beam performance.

BRE, IP7/88, 1988, 4pp

£9.00

Waferboard and OSB

Describes these two related products, compares their properties with other wood-based materials and gives guidance on use.

BRE, IP5/86, 1986, 4pp

£9.00

Canafistula (*Peltophorum vogelianum*)

Describes the source of this commercially new timber from South America, its properties and possible uses.

BRE, IP2/84, 1984, 4pp

£9.00

Depth factor adjustments in the determination of characteristic bending stresses for visually stress graded timber

Summarises an examination of the effect of beam depth on the bending strength of timber for application in the determination of characteristic bending stresses.

BRE, IP1/83, 1983, 4pp

£9.00

Cerejeira (*Amburana acreana*, *Amburana cearensis*)

Describes the source of this commercially new timber from South America, its properties and uses.

BRE, IP5/83, 1983, 4pp

£9.00

Machine grading British-grown Corsican pine

The Code of practice for the structural use of timber, CP 112:Part 2, does not include stress values for British-grown Corsican pine (*Pinus nigra*). Because of an urgent requirement to machine grade this species it was decided to publish this Information Paper recommending machine grade stresses to enable BSI to issue settings to grading machine operators, and to enable designers to consider this species for structural use.

BRE, IP7/81, 1981, 4pp

£9.00

Tatajuba (*Bagassa guianensis*)

Describes properties and uses of this South American wood.

BRE, IP8/81, 1981, 4pp

£9.00

Grumixava (*Micropholis gardnerianum*)

Describes properties and uses of this Brazilian timber.

BRE, IP14/80, 1980, 4pp

£9.00

Timber for joinery

From the wide choice of timber types, it is important for the user to be able to specify the quality of wood and its moisture content appropriate to the end use. This Digest provides information on timber used in joinery and gives guidance on selection.

BRE, DG407, 1995, 8pp

ISBN: 978-1-86081-031-2

£15.00

A review of tropical hardwood consumption

Summarises available information and provides a benchmark level against which future tropical hardwood consumption can be compared. Considers alternative materials and discusses whether the use of tropical hardwoods should be continued.

BRE, BR226, 1992, 14pp

ISBN: 978-0-85125-536-1

£22.50

The strength properties of timber

G M Lavers

Describes the testing procedure and presents the results of physical and mechanical tests on 210 hardwoods and softwoods in the green and air-dry conditions. The standard deviation of individual results is also quoted for nominal specific gravity and all strength properties. See also BR329: 1997 supplement.

BRE, BR241, 1983, 68pp

ISBN: 978-0-85125-562-0

£22.50

Timber in construction: challenges for the future

A Bravery and C Grant

Proceedings of a joint BRE/TRADA Technology seminar at BRE, Garston in September 1996. The seminar focussed on improving construction processes to minimise material waste and eliminate unnecessary use; adding value to the home-grown resource to further reduce imports of timber; and promoting the proper use of timber for the benefit of users, the community and the environment.

BRE, BR323, 1997, 164pp

ISBN: 978-1-86081-132-6

£30.00

The strength properties of timber

This supplement to BR241 provides a summary of the physical and mechanical properties of 12 timber species supplied from current commercial resources. 1997 supplement

BRE, BR329, 1997, 4pp

ISBN: 978-1-86081-165-4

£15.00

Identification of hardwoods

A microscope key

This publication enables the identification and accurate specification of the world's hardwoods. A comprehensive index of common names, alongside botanical listings, is included.

BRE, BR335, 1997, 244pp
ISBN: 978-1-86081-180-7 £57.50

Timber selection by properties – the species for the job

Volume 2. Furniture

C Webster, V Taylor and J D Brazier

This guide gives guidance on the selection of timber and wood-based panel products for furniture. Extensive information is provided in tables to enable timbers for different uses to be correctly selected.

BRE, SO42, 1984, 92pp
ISBN: 978-0-11671-367-4 £30.00

Specifying structural timber

Offers guidance in the preparation of concise and unambiguous specifications for timber, for both materials and workmanship and the proper use of Standards and codes of practice.

BRE, DG416, 1996, 8pp
ISBN: 978-1-86081-100-5 £15.00

Hardwoods for construction and joinery

Current and future sources of supply

Presents information about changes in the supply of hardwoods in the UK, particularly types of wood and relative amounts from tropical sources. Suggests that greater use could be made of lesser-known species but that can happen only if adequate areas are available on their properties.

BRE, DG417, 1996, 12pp
ISBN: 978-1-86081-095-4 £15.00

Design of timber floors to prevent decay

Describes how to prevent decay in timber species most commonly used in modern building construction.

BRE, DG364, 1991, 4pp
ISBN: 978-0-85125-501-9 £9.00

Handbook of hardwoods

K Maun

The principal reference book provides fundamental information and data on timbers available to the UK. Data on strength properties, working properties and plywood manufacture are included. This edition of the Handbook comprises a facsimile reprint of the 1972 edition, providing full descriptions of 117 hardwoods and brief descriptions of a further 103, and a supplement published in 1997, introducing 12 species that were previously 'lesser known' or are now available as plantation-grown material.

BRE, BR400, 2000, 258pp
ISBN: 978-1-86081-410-5 £52.50

Life cycle impacts of timber

A review of the environmental impacts of wood products in construction

J Anderson, S Edwards, J Mundy and P Bonfield

Using Life Cycle Assessment (LCA), environmental impacts of construction products can be compared and the impacts of extraction, manufacture, use and disposal can be measured. Using BRE's industry-agreed approach, an LCA of timber products shows that in many applications timber has a low environmental impact, taking into account the impacts of replacement, maintenance and disposal. This Digest contains guidance to help construction professionals take advantage of the excellent performance of timber products.

BRE, DG470, 2002, 8pp
ISBN: 978-1-86081-586-7 £15.00

Hardwoods for joinery and construction

Digest 417 lists 16 lesser known species of timber that show potential for new or wider application in construction. This set of Digests gives the results of tests carried out on each of these species and recommends applications for each of them. Part 1 describes the technical assessment methods used. Subsequent parts describe in detail the findings and recommendations for each type of timber.

BRE, DG431, 3 parts, 1998, 36pp
ISBN: 978-1-86081-817-2 £25.00

Timber bridges

T N Reynolds, C J Mettern, G Freedman and V Enjily

This Digest covers the basic structural types of timber bridges, lists the standards for the different types of timber and composite that may be used, and discusses structural design including the evaluation of loads. Durability, detailing, connectors, parapets and handrails are covered briefly.

BRE, DG481, 2004, 12pp
ISBN: 978-1-86081-677-2 £15.00

Timber frame construction: an introduction

C Stirling

Over the past 75 years, timber framed housing has formed a substantial proportion of the Scottish construction market but a much smaller proportion in England and Wales. Building regulations are requiring increased thermal standards, and all forms of construction are having to adjust. Skills shortages and increasing demands for reduced construction times on site, are leading both to improved forms of traditional construction and to an increase in prefabrication mostly based, to date on timber and steel framing techniques.

This Good Building Guide gives a brief introduction to the basics of timber frame construction.

BRE, GG60, 2004, 6pp
ISBN: 978-1-86081-592-8 £9.00

Using UK grown Douglas fir and larch timber for external cladding

C Holland

This Digest discusses the potential for two UK-grown species, Douglas fir and larch for use as external cladding. These timbers have been benchmarked against western red cedar to determine their comparative properties as external cladding timbers during a 2-year project conducted by BRE.

BRE, DG494, 2005, 4pp
ISBN: 978-1-86081-840-0 £9.00

Timber frame. A guide to the construction process

T Reynolds and V Enjily

Timber frame is a well proven, versatile construction method with the following key benefits: off-site construction method, fast erection, reduction in overall build programme, reduction in risk of delays, easy project planning, timber is a sustainable building material. Choosing timber frame can help achieve a high BREEAM or EcoHomes rating. Through early involvement of the timber frame specialist from project conception, an optimised design solution and build programme can be formulated. Descriptions of the elements of timber frame construction and of the types of timber frame construction are given in feature boxes.

BRE, DG496, 2005, 12pp
ISBN: 978-1-86081-882-0 £15.00

Using UK-grown Sitka spruce for exterior cladding

D Jones

UK grown Sitka spruce is a fast-grown softwood. Its use in the UK has been relatively low, although recently this has changed with increasing interest from architects and designers. Cladding offers an aesthetically pleasing way of enhancing the outside features of a building.

This Digest reviews work within projects funded by the Northern Periphery Programme and the Forestry Commission. The project has considered and combined information about the properties and treatment for Sitka spruce, so that selection of a suitable material for the required service life of cladding may be possible. The end product will potentially have a service life beyond that which is currently achieved.

BRE, DG500, 2006, 8pp
ISBN: 978-1-86081-917-9 £15.00

Timber products and processing

Green gluing of timber: a feasibility study

This Information Paper reports on the technical and commercial feasibility of creating a green gluing enterprise in the Greenwood Community Forest in the East Midlands. Results from the study strongly indicate that this enterprise would be commercially viable. It also outlines the steps required for its implementation.

BRE, IP10/05, 2005, 8pp
ISBN: 978-1-86081-841-7 £9.00

Best practice of timber waste management

This paper presents the practical issues that affect timber waste in UK construction. It describes timber sources, composition, use and waste, and markets for recycling and disposal together with the plant and machinery for exploiting this resource. It proposes a timber waste classification. Equipment for processing waste timber is listed; legislation covering the disposal of waste timber is mentioned. This material provides the best practicable environmental option for timber waste; a model is tested to provide two examples of what could be achieved. The paper concludes with suggestions of best practice for timber waste management.

BRE, IP9/03, 2003, 12pp
ISBN: 978-1-86081-634-5 £9.00

Reducing kiln-drying twist of Sitka spruce

This paper describes the extent and significance of twist in UK-grown and commercially prepared Sitka spruce. It describes how top weighting during kiln drying, together with modified kiln schedules, can limit twisting, and assesses distortional stability of timber under fluctuating humidity conditions in storage and use. This paper will be of interest to sawmillers, timber agents, suppliers and specifiers.

BRE, IP8/98, 1998, 4pp
ISBN: 978-1-86081-102-9 £9.00

An assessment of exterior medium density fibreboard (MDF)

This paper provides information on the performance of one MDF product exposed to natural weathering conditions for five years and subjected to accelerated laboratory tests. These tests were designed to predict the eventual performance of boards under natural exposure conditions.

BRE, IP2/96, 1996, 4pp
ISBN: 978-1-86081-080-0 £9.00

Perspectives on European Standards for wood-based panels

Sets out the reasoning behind the set of European Standards being drafted to govern the use of panel products. Also describes some of the new testing and research that has been required.

BRE, IP9/93, 1993, 4pp
£9.00

Wood-based panel products: moisture effects and assessing the risk of decay

Suggests how the risk of decay can be assessed using data derived from laboratory tests.

BRE, IP19/92, 1992, 4pp
£9.00

Specifying plywood

Outlines the background to the development of BS 6566, its structure and aims.

BRE, IP4/85, 1985, 4pp
£9.00

LOCAS - a control system for sawmills

This paper describes LOCAS (Laser Optimiser and Cant Alignment System): a system which has been developed to control automatically the conversion of sawlogs, reducing waste and increasing the use of high value timber.

BRE, IP3/84, 1984, 4pp
£9.00

Timber stress grading machines

Describes general operation of machines, and specifically describes machines manufactured by MPC, Cook-Bolinder and Raute.

BRE, IP17/84, 1984, 4pp
£9.00

Cypermethrin: a new insecticide for wood preservation

Summarises the data obtained on the use of the pyrethroid cypermethrin in preventative and remedial wood preservative formulations.

BRE, IP18/84, 1984, 4pp
£9.00

Developments in stress grading

Provides a brief history of the development of stress grading, and explains the reasons for the changes which are taking place.

BRE, IP4/82, 1982, 4pp
£9.00

Veneer plywood - a new approach to bond performance

Outlines the new proposed test method, classification by bond type and the sampling and preparation of specimens.

BRE, IP10/81, 1981, 4pp
£9.00

Sawmilling - what can we learn from North America

Itemises some of the more relevant and thought-provoking developments in sawmilling from North America.

BRE, IP11/80, 1980, 4pp
£9.00

The determination of design stresses for plywood

Examines the test data available on the strength and stiffness of structural plywood.

BRE, BR79, 1984, 180pp
ISBN: 978-0-85125-210-0 £35.00

Timber drying manual

K W Maun and A E Coday

In this edition, there have been five areas in which significant information has been added or amended. The manual continues to provide a source of educational and reference information as it combines explanatory text with up-to-date data appendices.

BRE, BR321, 1997, 118pp
ISBN: 978-1-86081-124-1 £32.50

The determination of softwood strength properties for grades, strength classes and laminated timber for BS 5268: Part 2

A R Fewell

Outlines the procedures developed at BRE to determine the modified grade stresses put forward in BS 5268 and explains the new strength class system for structural timber which is incorporated in the standard.

BRE, BR48, 1984, 36pp
ISBN: 978-0-85125-079-3 £22.50

Wood-based panel products

Their contribution to the conservation of forest resources

One of a series of Digests on issues of environmental significance, this publication describes how an increase in the use of wood-based panel products could make a major contribution to the conservation of forest resources.

BRE, DG375, 1992, 4pp
ISBN: 978-0-85125-547-7 £9.00

The structural use of wood-based panels

Discusses available approaches to structural design with wood-based panels. Also explains the difference between the UK and the European approach, in advance of the European standards being adopted in 2004.

BRE, DG423, 1997, 8pp
ISBN: 978-1-86081-154-8 £15.00

Advances in timber grading

BRE has played a leading role in the development and implementation of methods for grading structural timber by visual and mechanical means. This Digest reviews current developments and presents new information in the grading of structural timbers in accordance with BS 5268: Part 2. It also presents the grade stresses for sweet chestnut, larger-section Douglas fir and Trussed Rafter grades TR26/TR20, together with a review of the density of British grown Sitka spruce. The information in this Digest supports the consultation leading to the revision of BS 5268: Part 2, and makes it available for application in the design of timber structures.

BRE, DG445, 2000, 6pp
ISBN: 978-1-86081-378-8 £9.00

Wood bending handbook

W C Stevens and N Turner

The Wood bending handbook is written from a practical viewpoint. Background information and theory are provided to give reasons for and support the various procedures that are explained. The nature of the timber to be bent and general principles are discussed and these are further clarified by presenting some typical examples. Illustrated throughout.

BRE, BR407, 2000, 114pp
ISBN: 978-1-86081-446-4 £42.50

Guide to machine strength grading of timber.

C Benham, C Holland and V Enjily

Machine strength grading of timber has been used commercially for at least 30 years, but, for many people involved with the process, it has remained a mystery. Timber enters a grading machine at one end and leaves the other having been given a strength class with no obvious means of how this is achieved. The problems in explaining grading are concerned with statistics, the characteristics of distribution, modification and adjustment factors, and jargon. Without knowing the theory and practice of grading, misunderstandings are likely to arise. The main aim of this Digest, then, is to improve understanding of machine strength grading.

BRE, DG476, 2003, 12pp
ISBN: 978-1-86081-620-8 £15.00

Timber grading and scanning

Chris Holland and T Reynolds

Timber is an immensely useful but naturally variable material. Wood can contain features, such as knots and sloping grain, that may not be suitable for certain end uses. Dimensional defects and distortion can also affect the use of timber. To use timber reliably for structural purposes, it is important that the strength properties of any member fall within certain limits. Machine grading is a form of non-destructive testing that allows timber to be sorted into strength classes, also enabling timber unsuitable for construction to be rejected. Timber for non-structural uses, such as furniture or flooring, may also be sorted to meet certain appearance grades. This Digest details advances in grading and scanning technology, for both logs and sawn timber, and changes to structural timber grading due to European harmonisation

BRE, DG492, 2005, 12pp
ISBN: 978-1-86081-748-9 £15.00

Modified wood

An introduction to products in UK construction

Ed Suttie

This Digest reviews the modified wood products that are already being used in the UK construction market and the technologies that create them. It discusses the future for modified wood products, particularly in cladding, decking and flooring for domestic and commercial buildings.

BRE, DG504, 2007, 12pp
ISBN: 978-1-84806-015-9 £15.00

Wood-based panels

J M Dinwoodie and V Enjily

This seven-part series of Digests provides an authoritative overview of current wood-based panels. Part 1: Oriented strand board (OSB), Part 2: Particleboard (chipboard), Part 3: Cement bonded particleboard, Part 4: Plywood, Part 5: Medium density fibreboard (MDF), Part 6: Hardboard, medium board and soft board, Part 7: Selection.

BRE, DG477, 7 parts, 2003, 62pp
ISBN: 978-1-86081-825-7 £30.00