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Dow - Building Solutions

Insulating buildings with STYROFOAM

Contents

Note

Information contained in this brochure may be subject to change. When specifying STYROFOAM it is important to follow the most recent advice and recommendations. Contact Dow or visit our web site at www.styrofoameurope.com

Introduction

In the demanding conditions of today's building and engineering projects STYROFOAM™ blue extruded polystyrene boards can deliver the thermal performance and strength you require - for the lifetime of the structure. As a world-class producer of thermal insulation products, Dow can provide all the help, advice and information you need to achieve the solutions you're looking for.

Dow has developed STYROFOAM Solutions, for using STYROFOAM to maximum effect in a wide selection of typical application areas.

About STYROFOAM

STYROFOAM has been manufactured by Dow for more than 60 years. The process of extruding foamed polystyrene results in a material with uniformly small, closed cells, a smooth 'skin' and an unrivalled set of properties which make it the choice of specifiers in a wide range of demanding insulation applications:

- low thermal conductivity - minimising the board thickness needed to achieve a specific U-value, thus allowing the designer greater flexibility.
- high compressive strength - in load-bearing applications, the closed cell structure gives the foam great rigidity and makes it highly resistant to compression.
- low water absorption - STYROFOAM has natural resistance to rain, snow, frost and water vapour which makes it an exceptionally stable material, which retains its initial insulation performance and physical integrity in exposed conditions over the very long term. It was this unusual property that made possible the inverted warm roof concept, pioneered by Dow.
- workability - STYROFOAM is easily worked with normal hand tools.
- hygiene - STYROFOAM boards have low susceptibility to rot, mould or fungal growth is therefore minimised. They are clean, odourless and free from irritating dust.

STYROFOAM is available in a number of different grades designed to meet the performance requirements of specific applications.

Developing your STYROFOAM Solution

Each construction project has its own unique combination of insulation requirements. Developing an accurate insulation project specification can be a time-consuming process. However, the designer now has available a range of fast-track templates in the form of STYROFOAM Solutions. You will find each STYROFOAM Solution detailed in a dedicated section of this manual.

The STYROFOAM product range itself is described in the Product Data section. Further information is available on the STYROFOAM Solutions web site at **www.styrofoameurope.com**

Authority

STYROFOAM is manufactured under a BS EN ISO 9001:2001 Quality Assurance System (BSI Certificate Q05968).

STYROFOAM products comply with BS EN 13164: 2001 Thermal insulation products for buildings - factory made products of extruded polystyrene (XPS) - specification.

STYROFOAM products have been evaluated by the British Board of Agrément and certified as suitable for use in:

- Floors (Certificate 92/2782)
- Cavity walls (Certificate 88/2105).
- Pitched roofs - warm roof concept (Certificate 87/1836).
- Inverted roofs (Certificate 97/3431).

Meeting environmental standards

Concern about ozone depletion in the stratosphere has led to international agreements to phase out the use of ozone-depleting chemicals.

All STYROFOAM products are hydrochlorofluorocarbon (HCFC) free and comply with the requirements of EC Regulation No 2037/2000 (1 Oct 2000) on substances which deplete the ozone layer. STYROFOAM `X' products are foamed with a hydrofluorocarbon (HFC) and `A' products with carbon dioxide.

Product data

Technical description

Surface characteristics

Dow STYROFOAM boards are blue. All boards have a smooth homogeneous skin on both sides with the exception of ROOFMATE™ LG-X and PERIMATE™ DI-A.

Performance

Structural

STYROFOAM boards are available in a range of compressive strengths to suit different loadbearing requirements.

Fire

Information on aspects of fire performance of extruded polystyrene in building applications is given in BS 6203: 1991, 'Fire characteristics and fire performance of expanded polystyrene materials used in building applications'.

STYROFOAM products contain a flame retardant additive to inhibit accidental ignition from a small fire source. STYROFOAM is, however, combustible and if exposed to an intensive fire may burn rapidly.

During Shipment, storage, installation and use STYROFOAM products should not be exposed to flames or other ignition sources.

Fire classification is based on small-scale tests, which may not reflect the reaction of the product in its end use state under actual fire conditions.

STYROFOAM products should, when installed, be adequately protected from direct exposure to fire. STYROFOAM products achieve Euroclass E (reaction to fire).

Temperature

Polystyrene products will melt when brought into direct contact with high temperature heat sources: for Dow STYROFOAM boards the recommended maximum continuous operation temperature is 75°C.

Water/moisture

STYROFOAM is highly resistant to water absorption. STYROFOAM boards are very resistant to the passage of water vapour and are unaffected by repeated freeze/thaw cycles.

Biological

STYROFOAM has low susceptibility to rot; mould or fungal growth is therefore minimised.

Chemical

STYROFOAM boards are resistant to most commonly occurring construction materials such as lime, cement, plaster, anhydrous gypsum, solvent-free bituminous compounds, water-based wood preservatives, as well as alcohols, acids and alkalis. Certain organic materials such as solvent-based wood preservatives, coal tar and derivatives (creosote), paint thinners and common solvents (e.g. acetone, ethyl acetate, petrol, toluene and white spirit) will attack STYROFOAM, resulting in softening, shrinkage and possible dissolution, with a consequent loss of performance.

The use of solvent-free adhesives is recommended. Advice on compatibility with polystyrene foam should be sought from the adhesive manufacturers.

Product data

Sunlight

Protect STYROFOAM from prolonged exposure to intense sunlight to prevent degradation of the surface of the board.

Durability

Properly installed, STYROFOAM boards have a service life comparable with that of the building or structure.

Environmental

STYROFOAM is non bio-degradable and does not present an environmental hazard.

Disposal

STYROFOAM can be:

- recycled mechanically.
- recycled chemically.
- used as land-fill.
- incinerated under control to recover the energy content.

Products

FLOORMATE

FLOORMATE™ is the STYROFOAM Solution for insulating floors. FLOORMATE insulation is available in a range of compressive strengths to match the loading requirements of individual projects.

FLOORMATE insulation can be installed under or over the slab in groundbearing concrete floors and is suitable for use on suspended beam and block or timber floors.

WALLMATE

WALLMATE™ CW-X is the STYROFOAM Solution for insulating walls. WALLMATE CW-X insulation can be used as partial cavity fill without increasing the risk of water penetration.

The low water absorption of WALLMATE CW-X insulation enables it to be used in walls without any loss of performance. WALLMATE CW-X boards are sized to co-ordinate with common brick and block sizes.

Properties	Standard	Unit	Value
Specific heat	—	kJ/kgK	1.4
Coefficient of linear thermal expansion	BS 4370: Part 3: 1988:Method 13	mm/mK	0.07
Working temperature range	—	°C	-50 to +75
Fire classification: reaction to fire	BS EN 13164 + BS EN 13501: Euroclass E		

Table 01 Common properties of STYROFOAM products

ROOFMATE SL-X & LG-X

ROOFMATE SL-X and ROOFMATE LG-X are the STYROFOAM Solutions for insulating inverted roofs. The boards are unaffected by the conditions encountered on flat roofs, including wide fluctuations in temperature or repeated freeze/thaw cycles. ROOFMATE SL-X insulation is intended for use on heavyweight decks with a ballast layer of gravel or concrete slabs. It can also be used in the ROOFMATE MinK system, which will reduce the rain water cooling penalty, thereby minimising the insulation thickness required. Its rot-resistance makes it ideal for insulating roof gardens.

ROOFMATE LG-X boards have a 10mm modified concrete topping on the upper surface, eliminating the need for separate ballast and making it possible to gain the benefits of the inverted roof on lightweight decks.

ROOFMATE RL X

ROOFMATE RL-X is the STYROFOAM solution for insulating single-ply roof decks. ROOFMATE RL-X boards provide a lightweight, rigid substrate beneath light-coloured single-ply polymeric membranes on flat or low slope metal decked roofs. The large area and high dimensional stability of ROOFMATE RL-X boards minimise the installation time as well as the number of fixings required.

ROOFMATE RL-X can also be used to insulate warm pitched roofs at rafter line. ROOFMATE RL-X boards are for installation above the rafters with ROOFMATE RL-X boards cut to size to fit between the rafters The insulation is supplied in large boards for rapid coverage.

PERIMATE DI-A

PERIMATE DI-A is the STYROFOAM solution for insulating structure below ground. PERIMATE DI-A boards have vertical channels cut into one face, to drain water away, and a filter fabric bonded to the face to prevent soil particles blocking the channels.

CE marking (to BS EN 13164)

FLOORMATE 200-X

T1 – CS(10/Y)200 - CC(2/1.5/50)60 - WL(T) 0.7 - DS(TH)

STYROFOAM SP-X

T1 – CS(10/Y)300 - CC(2/1.5/50)120- WL(T) 0.7 - DS(TH)

FLOORMATE 500-X

T1 – CS(10/Y)500 - CC(2/1.5/50)150 - WL(T) 0.7 - DS(TH)

FLOORMATE 700-A

T1 – CS(10/Y)700 - CC(2/1.5/50)250 - WL(T)0.7 - WD(V)3 - FT2 - DS(TH) - DLT(2)5

WALLMATE CW-X

T1 – CS(10/Y)100 - WL(T) 0.7 -DS(TH)

ROOFMATE RL-X

T1 – CS(10/Y)300 - WL(T) 0.7 - DS(TH)

ROOFMATE SL-X

T1 –CS(10/Y)300 - CC(2/1.5/50)110 - WL(T) 0.7 - WD(V)3 - FT2 - DS(TH) - DLT(2)5

ROOFMATE LG-X †††

T1 – CS(10/Y)300 - CC(2/1.5/50)110 - WL(T)0.7 - WD(V)3 - FT2 DS(TH) - DLT(2)5

PERIMATE DI-A†††

T1 – CS(10/Y)300 - WL(T)0.7 - WD(V)3 - FT1 - DS(TH)

††† Insulation only

Product data: data tables

		PERIMATE DI-A	FLOORMATE 200-X	STYROFOAM SP-X	FLOORMATE 500-X	FLOORMATE 700-A	WALLMATE CW-X	ROOFMATE RL-X	ROOFMATE SL-X	ROOFMATE LG-X
FLOORS	Domestic Medium load bearing High load bearing V high load bearing		♦	♦	♦	♦				
WALLS	Partial fill cavity Below ground/basement	♦					♦			
ROOFS	Pitched - insulation at rafter line Flat: inverted -ballasted -lightweight -terraced Flat: conventional warm							♦ ♦	♦ ♦	♦
AGRICULTURAL BUILDINGS				♦	♦			♦		

Table 02 Product Selector

Thickness mm	PERIMATE DI-A	FLOORMATE 200-X	STYROFOAM SP-X	FLOORMATRE 500-X	FLOORMATE 700-A	WALLMATE CW-X	ROOFMATE RL-X	ROOFMATE SL-X	ROOFMATE LG-X
25		0.85							
30		1.00							
35		1.20	1.20						
40		1.35				1.35			
50		1.70	1.70	1.70	1.35	1.70	1.70	1.70	1.70
60	1.70	2.05				2.05	2.05	2.05	2.05
70		2.4				2.40			
75			2.55					2.55	
80		2.75				2.75	2.75	2.75	2.75
90		3.10				3.10	3.10	3.10	
100	2.75	3.45						3.45	3.45
120	3.30	4.10		4.10			4.10	4.10	4.10
140		4.50						4.50	4.50
150									4.85
160								5.15	5.15
180								5.80	5.80
200								6.45	

Table 03 Declared thermal resistance (R_D) - m²K/W

Product data: data tables

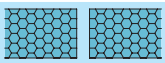
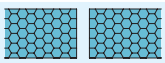
Properties	Standard	unit	CE Code	FLOORMATE 200-X	STYROFOAM SP-X
Thermal conductivity* ≤80mm 81-120 >121	 BS EN 12667 BS EN 12667 BS EN 12667	 W/mK W/mK W/mK	 λD λD λD	 0.029 0.029 0.031	 0.029 0.029 -
Compressive strength at 10% or break (90 days)	BS EN 826	kN/m2	CS(10/Y)i	200	350
Design load 2% max. deflection (50 years)	BS EN 1606	kN/m2	CC(2/1.5/50) σ_C	60	110
Water vapour resistivity	BS EN 12086	MNs/gm	-	825	875
Water vapour diffusion resistance factor	BS EN 12086	m	MUi	165	175
Water absorption Total immersion Diffusion Freeze/thaw, after 300 cycles	 BS EN 12087 BS EN 12088 BS EN 12091	 % vol % vol % vol	 WL(T)i WL(V)i FTi	 <0.5 - -	 <0.5 - -
Dimensional stability 48hrs at 70C/90% RH 168hrs at 40kPa/70C	 BS EN 1604 BS EN 1605	 % %	 DS(TH) DLT(2)5	 <2 -	 <2 -
Density (aim)	BS EN 1602	kg/m3	-	38	38
Dimensions Length Width Thickness	 BS EN 822 BS EN 822 BS EN 823	 mm mm mm	 - - Ti	 2500 600 25, 30, 35, 40, 50, 60, 70, 80, 90, 100, 120, 140	 2500 600 50, 75
Fire classification – reaction to fire	BS EN 13164 BS EN 13501	-	Euroclass	E	E
Appearance Surface Edge profile				 skin butt edge	 skin butt edge
					
Application				Floors - domestic	Floors - medium load bearing
Certification	BBA Agrément	-	-	92/2782	92/2782

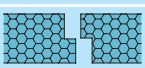
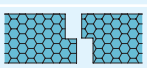
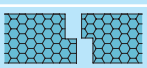
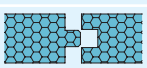
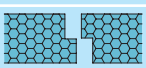
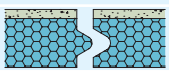
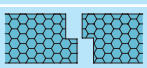
Table 04 Product data

The properties given above are typical (unless stated otherwise). Results of tests described are available from Dow.

* declared 90/90 value - BS EN 13164

** includes 10 mm for the mortar topping; thicker products available on request up to 190 mm

Product data: data tables

FLOORMATE 500-X	FLOORMATE 700-A	WALLMATE CW-X	ROOFMATE RL-X	ROOFMATE SL-X	ROOFMATE LG-X	PERIMATE DI-A
0.029 0.029 -	0.036 - -	0.029 0.029 -	0.029 0.029 -	0.029 0.029 0.031	0.029 0.029 0.031	0.035 0.036 -
500	700	200	300	300	300	300
150	250		110	110	110	
825	825	575	825	825	825	825
165	165	115	165	165	165	165
<0.5 <3 <1	<0.5 <3 <1	<0.5 - -	<0.5 - -	<0.5 - -	<0.5 <3 <1	<0.5 <3 <1
<2 -	<2 <5	<2 -	<2 -	<2 <5	<2 <5	<2
40	45	38	38	38	38	45
1250 600 50, 80, 120	1250 600 50	1200 450 50, 60, 70, 80, 90	2500 600 50, 60, 80,120	1250 600 50, 60, 75, 80, 90 100, 120, 140, 160, 180, 200	1200 600 60, 70, 90, 110, 130**	1250 600 60, 100 120
E	E	E	E	E	E	E
skin shiplap	skin shiplap	skin shiplap	skin tongue & groove	skin shiplap	mortar topping tongue & groove	grooved face & geotextile shiplap
						
Floors - high load bearing	Floors - very high load bearing	Cavity wall - partial fill	Pitched roofs insulation at rafter line Flat roofs Agricultural	Inverted roofs ballasted	Inverted roofs lightweight	Basement walls external
92/2782	-	88/2105	87/1836	97/3431	97/3431	

Part L 2006 Guidance

6 April 2006 saw the introduction of changes to Part L of the Building Regulations in England and Wales†.

The changes are intended to:

- reduce the UK's emissions of greenhouse gases, particularly carbon dioxide. The operation of buildings accounts for 46% of the UK's carbon dioxide emissions; the intention behind the regulations is to reduce emissions for new buildings by 20 - 28% compared to the 2002 regulations.
- implement parts of the European Union's Energy Performance of Buildings Directive, which requires the introduction of standardised methods of assessing the energy efficiency of buildings. For dwellings the selected method is a revised version of the government's Standard Assessment Procedure (SAP 2005), whilst for other buildings the government has introduced the Simplified Building Energy Model (SBEM).
- reduce fuel poverty.

Meeting Part L 2006 Requirements

The latest changes to Part L of the Building Regulations complete the move towards a single compliance route for all new buildings. The change, which began in 1995 with the introduction of SAP ratings for new dwellings, requires designers to adopt a 'whole building' approach and to demonstrate that carbon dioxide emissions from the new building will not exceed a stipulated maximum.

This holistic approach offers greater design flexibility but requires simultaneous consideration of all factors affecting energy efficiency including:

- type of building and its configuration
- siting and orientation
- fenestration
- elemental U-values
- air leakage rate
- thermal bridging
- space heating/solar gain/space cooling
- water heating
- lighting efficiency
- ventilation
- type of fuel (for dwellings only).

Demonstrating compliance for extensions to and refurbishment of existing buildings, especially dwellings, will still rely heavily on elemental U-values.

There are now four new Approved Documents:

L1A New dwellings
L1B Work on existing dwellings
L2A New buildings other than dwellings
L2B Work on existing buildings other than dwellings

† similar changes are expected to be introduced in Northern Ireland in November 2006 and in Scotland in 2007

	Improvement factor	LZC benchmark††	Overall improvement factor without LZC benchmark
dwellings	20%	N/A	20%
non dwellings - naturally ventilated - mechanically ventilated - air conditioned	 15% 20% 20%	 10% 10% 10%	 23.5% 28.0% 28.0%

†† The LZC benchmark is intended to implement Article 5 of the EPBD by ensuring the use of LZC energy supply systems is considered before construction starts.

Table 05 Improvement factors and low or zero carbon (LZC) benchmarks

New buildings
Approved Documents L1A & L2A

These set out five criteria which must be met if a new building is to meet the requirements of Part L. The criteria apply to dwellings and to buildings other than dwellings, although the methods of demonstrating compliance vary between building types.

1. Achieving the Target carbon dioxide emission rate.

Carbon dioxide emissions from the proposed building must be lower than a target rate. The process for calculating the target and design rates is:

1. calculate the carbon dioxide emissions per square metre of floor area from a notional building of the same dimensions as the proposed building, which would have passed the 2002 regulations by the Elemental method. – see table 06
2. apply an improvement factor and a low or zero carbon (LZC) benchmark (see table 05) to the calculated rate: the resultant figure is the Target carbon dioxide emission rate, the TER.

   For dwellings:

   $TER = (C_H \times \text{fuel factor} + C_L) \times (1 - \text{improvement factor})$

   C_H = carbon dioxide emissions from heating and hot water

   C_L = carbon dioxide emissions from lighting

   For non - dwellings:

   $TER = C_{notional} \times (1 - \text{improvement factor}) \times (1 - \text{LZC benchmark})$

   $C_{notional}$ = carbon dioxide emissions from a notional buiding
3. calculate the carbon dioxide emission rate for the proposed building: the Dwelling emission rate (DER) for dwellings, or the Building emission rate (BER) for other buildings.
4. the building meets the criterion if the DER or BER is equal to or lower than the TER.

For dwellings (up to 450m² floor area) the calculations use the SAP 2005 methodology implemented in an approved SAP program. For other buildings the calculations are performed by the SBEM, using software from the ODPM augmented if necessary by other approved software. Both methods take account of heat loss through air infiltration and thermal bridging.

2. Limits on design flexibility

The emissions rating assessment allows designers considerable flexibility in the methods they employ to achieve the required rating. To ensure the building's fabric and services are reasonably energy efficient they must perform no worse than the limits set out in the Approved Documents - see table 07. An air permeability limit of 10m³/m²/hr @ 50Pa applies to all buildings.

3. Limiting the effects of solar gains in summer

Lowering elemental U-values and improving airtightness bring a risk of building interiors overheating in summer as a result of solar gain. Both SAP and SBEM assessments will test for overheating and indicate if there is an excessive risk.

	Dwellings	Non - dwellings
Walls	0.35	0.35
Floors	0.25	0.25
Roofs – Pitched Flat	0.16 (0.25)	0.16 0.25
Windows/Doors	2.0	2.2

Table 06 Elemental U-values for 2002 notional buildings(W/m².K)

	Area weighted average	Worst for any sub-element
Walls	0.35	0.70
Floors	0.25	0.70
Roofs	0.25	0.35
Windows	2.2	3.3
Doors	2.2	3.3[a]/3.0[b]

[a] dwellings

[b] non - dwellings

Table 07 Limiting U-values – New build (W/m².K)

4. Quality of construction and commissioning

The standard of construction must ensure the actual performance of the building is consistent with the predicted carbon dioxide emission rate. To achieve that:

- The thermal insulation must be reasonably continuous around the building envelope. Designers should use approved construction details or be able to demonstrate equivalent levels of performance in proposed alternative details.
- measured air permeabilities must be lower than the values used in the emissions calculation and less than 10m^3/m^2/hr @ 50Pa. Whilst all buildings other than dwellings must be tested, only a sample of dwellings within a development need be tested (the size of the sample depends upon the adoption of approved construction details and the results of the first test.)
- building services must be properly commissioned: in some cases that may involve air leakage testing of ductwork.

5. Operating and maintenance instructions.

The owner of the building must be provided with sufficient information to enable the fixed building services to be efficiently operated and maintained.

Existing buildings
Approved Documents L1B & L2B

Because existing buildings account for a substantial proportion of carbon dioxide emissions the revisions to Part L have raised performance standards for building fabric and services for extensions, material alterations and changes of use – tables 08 and 09.

For buildings other than dwellings, work on extensions and initial fit out may require improvements to be made to existing services. Those 'consequential improvements' may cost as much as 10% of the proposed work. Increases in the capacity of heating or cooling plant will require consequential improvements to the thermal elements: there is no cost limit on such improvements, but they should have a payback period not exceeding 15 years.

Thermal element	New①	Replacement②
Walls	0.30	0.35
Floors	0.22	0.25
Roofs – Pitched (rafters) (joist) Flat	0.20 0.16 0.20	0.20 0.16 0.25
Windows	1.8	2.0
Doors	3.0③/6.0④	3.0③/6.0④

① Extensions to non-dwellings which are greater than 100m^2 in floor area and more than 25% of the floor area in the existing building come under ADL2A

② If > 25% of surface area is to be renovated then whole element has to be upgraded to this level

③ Dwellings

④ Non - Dwellings

Table 08 Extensions & Renovations – U-values (W/m^2.K)

Thermal element	Threshold	Improved
Cavity Wall	0.70	0.55
Other wall type	0.70	0.35
Floors	0.70③/0.35④	0.25
Roofs – Pitched (rafters) (joist) Flat	0.35 0.35③/0.16④ 0.35	0.20-0.25 0.16 0.25

If U-value is worse than "threshold" then upgrade to "improved" if economically viable (15 years payback or less)

③ Dwellings

④ Non - Dwellings

Table 09 Upgrade of retained thermal elements – U-values (W/m^2.K)

Transitional arrangements

Where work on site began before 6 April 2006 a building will only have to comply with the requirements of Part L 2002. Similarly, a building need only comply with Part L 2002 if the local authority has granted full plans approval before 6 April 2006 and work begins on site before 1 April 2007. In most other cases the building must meet the requirements of Part L 2006 – see ODPM Circular 03/2006.

Implementing the regulations

The key challenge for designers is to design buildings which will produce 20 - 28% less carbon dioxide emissions (some clients may, require buildings with emission levels much lower than the bare minimum set by Building Regulations).

Insulation will continue to play a dominant role in achieving the carbon dioxide emissions targets in both new and existing buildings as can be see from table 10. Part L: 2006 ensures that the emphasis will not shift away from the long-term benefits of insulating the building fabric towards the short-term benefits of 'renewable' plant.

Designers should consider a two stage approach: first, design the building to require the minimum amount of heating, cooling and lighting for its operation; secondly provide those services with the minimum carbon dioxide emissions. To do that designers may have to adopt different forms of construction and it may be that some constructions will be unable to give the performance required by the regulations.

	2002	2006				
	All buildings	Dwellings	Non - Dwellings			
			Natural ventilation		Mechanical ventilation	
LZC		-	10%	0%	10%	0%
Overall improvement factor		20%	15%	23.5%	20%	28%
Flat roofs	0.25	0.20	0.21	0.19	0.20	0.18
Floors	0.25	0.20	0.21	0.19	0.20	0.18
Walls	0.35	0.28	0.30	0.27	0.28	0.25
Pitched roofs	0.20	0.16	0.17	0.15	0.16	0.14

Table 10 2006 U-values (W/m².K): Impact on new build

Shows the overall improvement factor required, including any compensation for not incorporating low or zero carbon technology.

References

Agrément certificates

- 87/1836 Pitched roofs - warm roof concept
- 88/2105 Cavity walls
- 92/2782 Floors
- 97/3431 Inverted roofs

Building Regulations

- Approved Documents to the Building Regulations
  - A Structure
  - B Fire safety
  - C Site preparation and resistance to moisture
  - E Resistance to the passage of sound
  - L1A Conservation of fuel and power in new dwellings
  - L1B Conservation of fuel and power in existing dwellings
  - L2A Conservation of fuel and power in new buildings other than dwellings
  - L2B Conservation of fuel and power in existing buildings other than dwellings
- Technical Handbooks to Building Standards Scotland Regulations

BRE publications

- Thermal insulation: avoiding risks BR 262:2002.
- Conventions for U-value calculations
  - B. Anderson BR443: 2006
- Building Elements: 'Floors and Flooring' – PW Pye and HW Harris BR 332: 1997
- Foundations, basements and external walls BR 440: 2002.
- BRE Digest 311. Wind scour of gravel ballast on roofs.
- BRE IP 17/01. Assessing the effects of thermal bridging at junctions and around openings in the external elements of buildings.

British Standards

- BS 743: 1970: Specification for materials for damp proof courses.
- BS 476: Fire tests on building materials and structures.
  Part 2: 1987. Methods for determination of the fire resistance of loadbearing elements of construction.
  Part 3: 1958: External fire exposure roof test
- BS 743:1970: Specification for Materials for Damp proof courses.
- BS 1202: Specification for nails.
  Part 1: 2002: Steel nails.
- BS 5250: 2002: Code of practice for control of condensation in buildings.
- BS 5427: Code of practice for the use of profiled sheet for roof and wall cladding on buildings.
  Part 1: 1996: Design.
- BS 5950: Structural use of steelwork in building.
  Part 4: 1994 Code of practice for design of composite slabs with profiled steel sheeting.
- BS 5268: Structural use of timber.
  Part 4: Fire resistance of timber structures.
  – Section 4.2: 1990: Recommendations for calculating fire resistance of timber stud walls and joisted floor constructions.
  Part 7: Recommendations for the calculation basis for span tables.
  – Section 7.1: 1989: Domestic floor joists.
- BS 5502: Buildings and structures for agriculture.
  Part 23: 1990: Code of practice for fire precautions.
  Part 42: 1990: Code of practice for design and construction of pig buildings.
  Part 71: 1992: Code of practice for design and construction of ventilated stores for potatoes and onions.
- BS 5534: 2003: Code of practice for slating and tiling.
- BS 5628: Code of practice for use of masonry.
  Part 3: 1985: Materials and components, design and workmanship.
- BS 6203: 1991 (1996) Guide to fire characteristics and fire performance of expanded polystyrene materials used in building applications.
- BS 6229: 2003: Code of practice for flat roofs with continuously supported coverings.
- BS 6398: 1983: Specification for bitumen damp proof courses for masonry.
- BS 6399: Loading for Buildings
  Part 1: 1996: Code of practice for dead and imposed loads.
  Part 2: 1997: Code of practice for wind loads.
  Part 3: 1988: Code of practice for imposed roof loads.

References

- BS 6515: 1984 (1996) Specification for polyethylene damp-proof courses for masonry.
- BS 8000: Workmanship on building sites.
  Part 4: 1989: Code of practice for waterproofing.
- BS 8102: 1990: Code of practice for protection of structures against water from the ground.
- BS 8103 Structural Design of low-rise buildings.
  Part 1: 1995: Code of practice for stability, site investigation, foundations and ground floor slabs for housing.
- BS 8110: Structural use of concrete.
  Part 1: 1997: Code of practice for design and construction.
- BS 8203: 2001 Code of practice for resilient floor coverings.
- BS 8204: Screeds, bases and in-situ floorings.
  Part 1: 1999 Code of practice for concrete bases and cement sand levelling screeds to receive floorings.
  Part 2: 1999: Code of practice for concrete wearing surfaces.
- BS 8215: 1991: Code of practice for design and installation of damp proof courses in masonry construction.
- BS 8218: 1998: Code of practice for mastic asphalt roofing.
- CP 1018: 1971 (1993) Electric floorwarming systems for use with off-peak and similar supplies of electricity.

European standards

- BS EN 1264: Floor heating. Systems and components.
  Part 4: 2001 Installation
- BS EN 12056: Gravity drainage systems inside buildings.
  Part 3: 2000: Roof drainage, layout and calculation.
- BS EN 13164: 2001 Thermal insulation products for buildings - Factory made products of extruded polystyrene (XPS) specification.
- BS EN 13501: Fire classification of construction products and building elements.
  Part 1: Classification using test data from reaction to fire tests
- BS EN 13370: 1998 Thermal performance of buildings – Heat transfer via the ground – Calculation methods
- BS EN 13789: 1999: Thermal performance of buildings - Transmission heat loss coefficient - Calculation method.

International standards

- BS EN ISO 6946: 1997 Building components and building elements – Thermal resistance and thermal transmittance – Caculation method.

Other publications

- CIBSE Guide A (1999)
- DEFRA/DTLR Robust Details – Limiting thermal bridging and air leakage: Robust Construction details for dwellings and similar buildings. 2002
- NBS Domestic Heating Compliance Guide: 2006

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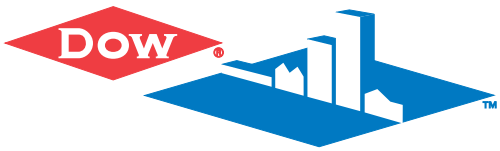

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