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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
85/1566
Product Sheet 3

RACKHAM FLOOR SYSTEMS

POLY-PLUS AND POLY-PLUS EXTRA FLOOR SYSTEMS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Poly-Plus and Poly-Plus Extra Floor Systems, used to construct insulated, suspended ground floors.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Structural performance — the systems have adequate strength and stability to resist the design loads (see section 5).

Thermal performance — a building incorporating the systems and utilising the typical details can provide adequate thermal resistance (see section 6).

Condensation risk — a building incorporating the systems and utilising the typical details will minimise the risk of condensation (see section 8).

Durability — the components of the systems have adequate resistance to the likely exposure conditions (see section 12).

The BBA has awarded this Agrément Certificate to the company named above for the systems described herein. These systems have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Second issue: 20 March 2009
Originally certificated on 24 December 2004

Brian Chamberlain
Head of Approvals — Engineering

Greg Cooper
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, Poly-Plus and Poly-Plus Extra Floor Systems, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:

The Building Regulations 2000 (as amended) (England and Wales)

Requirement:	A1(1)	Loading
Comment:		Floors incorporating the systems can be designed to sustain and transmit dead and imposed floor loads to the ground. See sections 5.1 to 5.4 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		Floors incorporating the systems can adequately limit the risk of surface and interstitial condensation. See sections 8.1 and 8.2 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The systems can contribute to meeting this Requirement. See sections 6.1 to 6.4 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The systems are acceptable. See sections 12.1 and 12.2 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The systems can contribute to a construction meeting this Regulation. See sections 11, 12.1 and 12.2 and the *Installation* part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	1.1(a)(b)(c)	Structure
Comment:		Floors incorporating the systems can be designed to be capable of safely accommodating dead and imposed loads, with reference to clauses 1.1.1[(1)(2)], 1.1.2[(1)(2)] and 1.1.3[(1)(2)]. See sections 5.1 to 5.4 of this Certificate.
Standard:	3.2	Site preparation — protection from radon gas
Comment:		Floors incorporating the systems can be designed to be capable of providing a protection against radon gas, with reference to clauses 3.2.1[(2)] and 3.2.2[(1)]. See section 1.10 of this Certificate.
Standard:	3.4	Moisture from the ground
Comment:		Floors incorporating the systems can contribute to satisfying this Standard, with reference to clauses 3.4.1[(1)(2)], 3.4.3[(1)(2)] and 3.4.6[(1)(2)]. See section 9 of this Certificate.
Standard:	3.15	Condensation
Comment:		The systems will have a minimal risk of interstitial and surface condensation, with reference to clauses 3.15.1[(1)], 3.15.2[(1)], 3.15.4[(1)] and 3.15.5[(1)]. See sections 8.1 and 8.2 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The systems can contribute to satisfying the requirements of these Standards, with reference to clauses 6.1.2[(2)], 6.1.3[(2)], 6.1.6[(1)], 6.2.1[(1)(2)], 6.2.3[(1)], 6.2.4[(1)(2)], 6.2.5[(1)(2)] and 6.2.6[(2)]. See sections 6.1 to 6.4, 7, 8.1 and 8.2 of this Certificate. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The systems are acceptable. See sections 12.1 and 12.2 and the *Installation* part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The product does not normally require maintenance. See section 11 of this Certificate.
Regulation:	C5	Condensation
Comment:		The systems will have a minimal risk of interstitial condensation. See sections 8.1 and 8.2 of this Certificate.
Regulation:	D1	Stability
Comment:		Floors incorporating the systems can be designed to sustain and transmit dead and imposed floor loads to the ground. See sections 5.1 to 5.4 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Comment:		The systems can satisfy the requirements of this Regulation. See sections 6.1 to 6.4 and 7 of this Certificate.

Construction (Design and Management) Regulations 2007
Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 2 *Delivery and site handling* (2.5) and 14 *General* (14.5).

Non-regulatory Information

NHBC Standards 2008

NHBC accepts the use of Poly-Plus and Poly-Plus Extra Floor Systems, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 5.2 *Suspended ground floors*.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, Poly-Plus and Poly-Plus Extra Floor Systems, when installed and used in accordance with this Certificate, satisfy the requirements of the *Zurich Building Guarantee Technical Manual*, Section 3 *Substructure*, Sub-section *Floors*.

General

This Certificate relates to Poly-Plus and Poly-Plus Extra Floor Systems, used to construct insulated, suspended ground floors comprising: polystyrene infill panels, polystyrene edge pieces, concrete perimeter slip bricks, prestressed concrete joists and the specification for a structural concrete screed.

Technical Specification

1 Description

1.1 Poly-Plus and Poly-Plus Extra Floor Systems comprise polystyrene infill panels, polystyrene edge pieces (block edge and screed edge), concrete perimeter slip bricks, concrete closure blocks, prestressed concrete joists, and a structural concrete screed. Poly-Plus F/T Flat Top (white polystyrene) and Poly-Plus F/T Extra (grey polystyrene) are flat-topped versions of the Poly-Plus Extra System sized to bring the top of the insulation level with the top of the joists (see Figure 1).

1.2 Typical floor construction details are shown in Figure 2.

Figure 1 Polystyrene infill blocks (dimensions in mm)

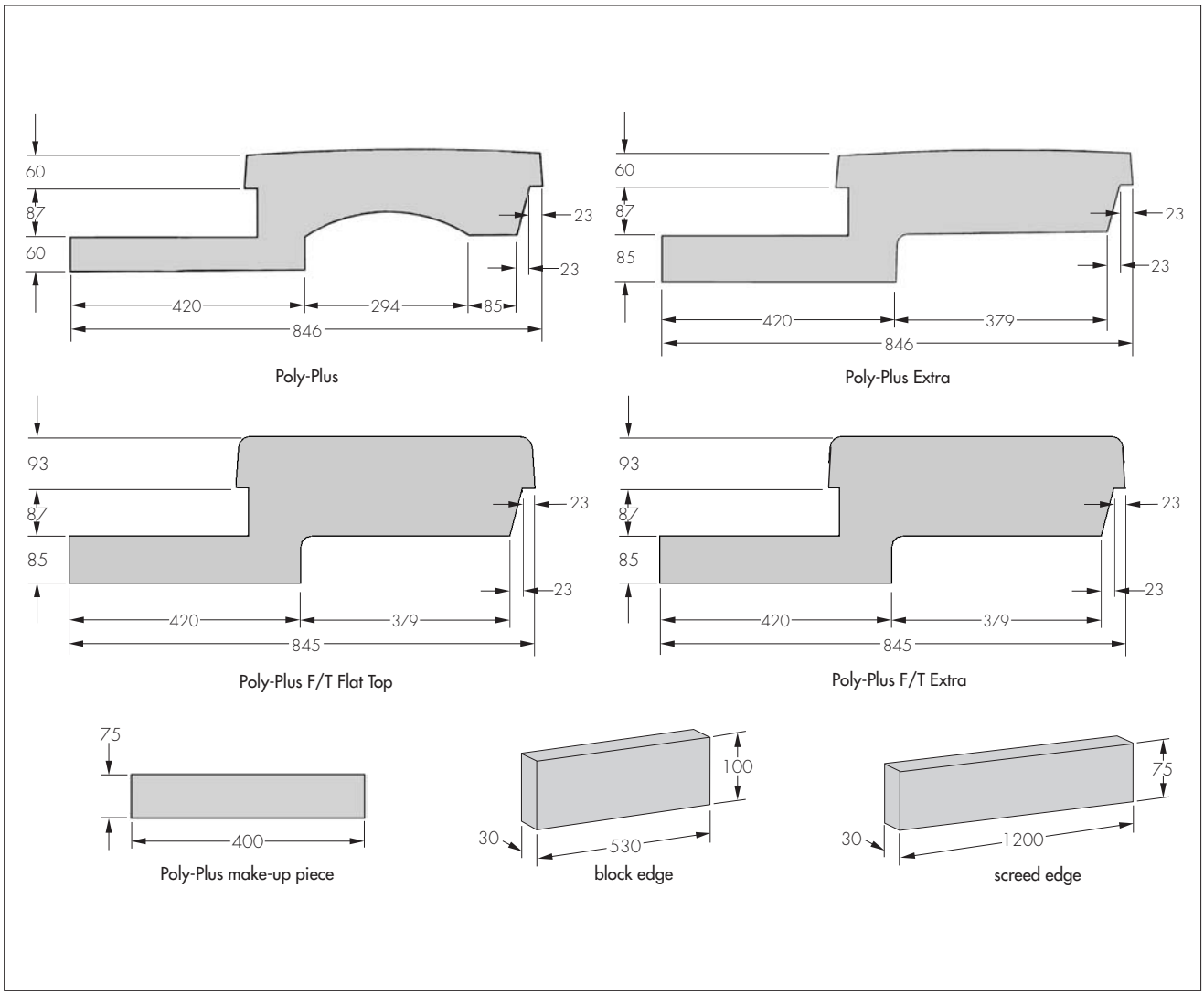
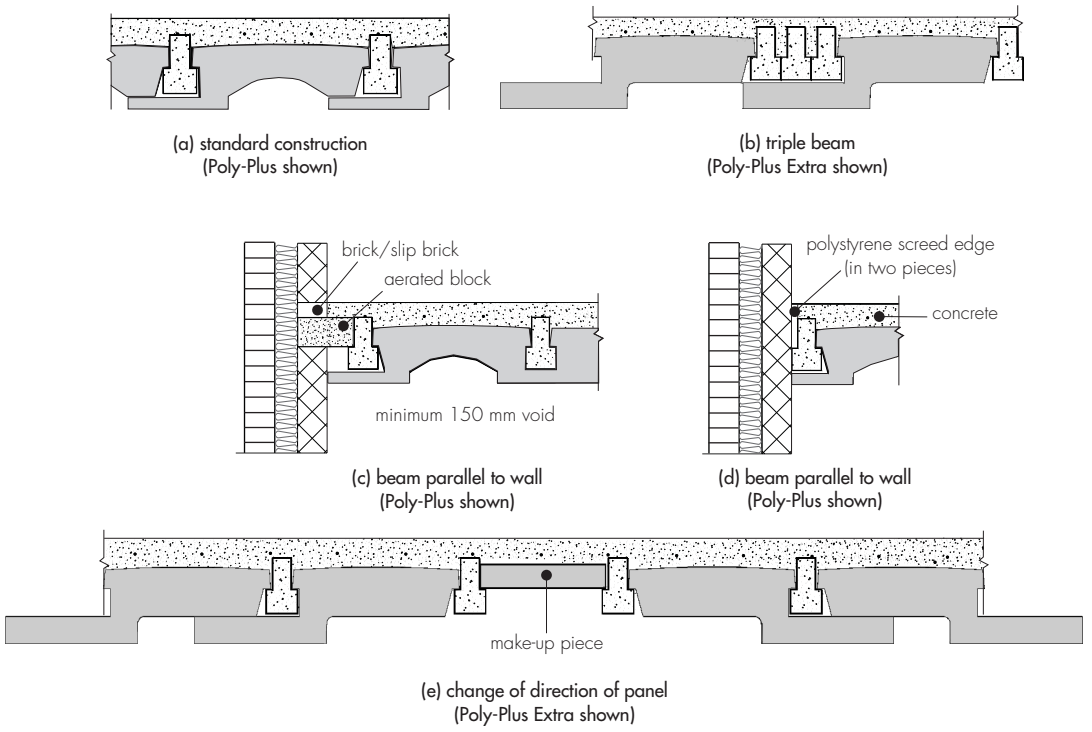


Figure 2 Typical floor construction



similar details are used for Poly-Plus, Poly-Plus Extra, Poly-Plus F/T Flat Top and Poly-Plus F/T Extra

1.3 The systems use the range of Rackham Housefloors Type 175 Prestressed Concrete Joists (details of these joists are described in detail in other parts of this Certificate).

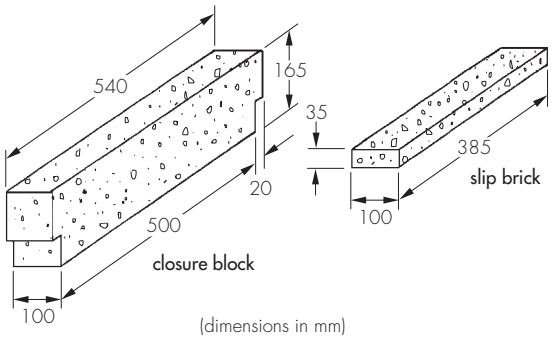
1.4 The expanded polystyrene panels are available in 1200 mm lengths with the profiles shown in Figure 1 and can be cut to suit various joist lengths. A minimum panel length of 300 mm after cutting is specified by the Certificate holder.

1.5 Polystyrene block edge pieces 30 mm thick, 100 mm deep and 530 mm long and polystyrene screed edge pieces 30 mm thick, 75 mm deep and 1200 mm long are used in conjunction with concrete perimeter closure blocks and provide continuous insulation cover of the floor (see Figure 1).

1.6 The polystyrene infill panels and polystyrene edge pieces are manufactured using conventional moulding techniques from expandable polystyrene beads with a flame-retardant additive (to BS EN 13163 : 2001).

1.7 The concrete perimeter slip bricks and closure blocks are manufactured by a conventional static block-making machine to a minimum compressive strength of 7 Nmm^{-2}. Quality control checks are generally in accordance with BS EN 771-3 : 2003 and BS EN 772-2 : 1998 and include checks on dimensions, compressive strength and flexural strength. Typical blocks used are shown in Figure 3.

Figure 3 Typical concrete perimeter blocks



(dimensions in mm)

1.8 The system also utilises 100 mm thick aerated concrete blocks (see Figure 2).

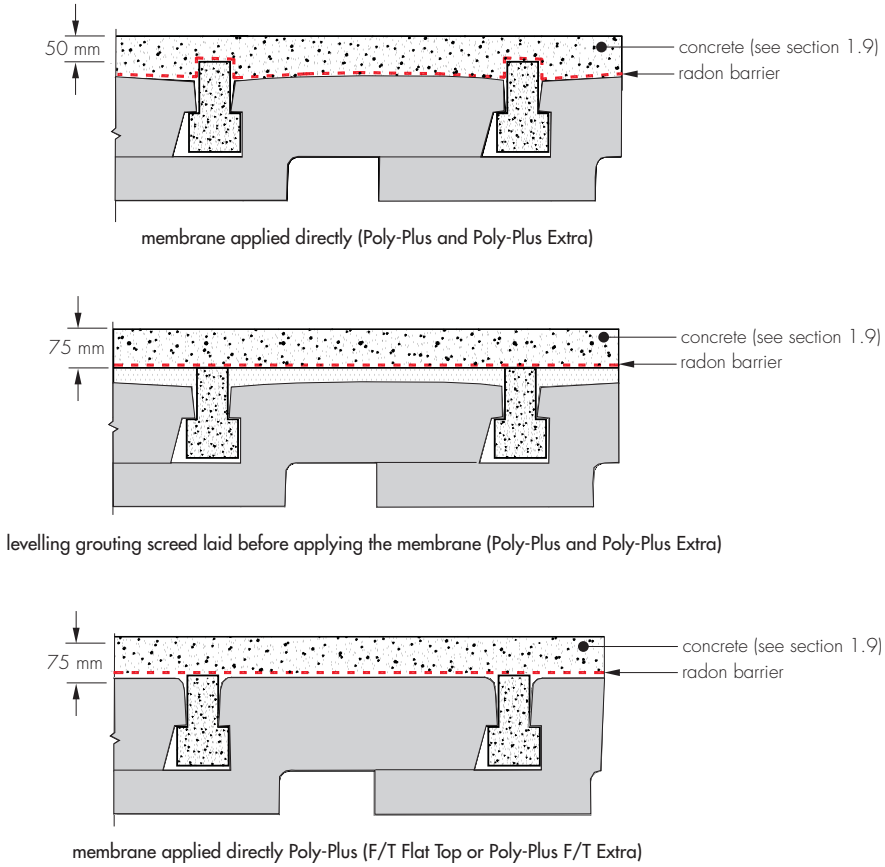
1.9 A minimum thickness of structural concrete screed is applied above the top of the beams — 50 mm for Poly-Plus and Poly-Plus Extra and 75 mm for Poly-Plus F/T and Poly-Plus F/T Extra. The concrete is of grade 25 with a maximum aggregate size of 10 mm reinforced with A142 mesh to BS 4483 : 2005. Alternatively, a concrete screed can be reinforced with Fibrin 23 or polypropylene fibres to BS EN 14889-2 : 2006 at a rate of 0.9 kgm^{-3} and in accordance with BS 8204-1 : 2003 or BS 8204-2 : 2003.

1.10 Where radon barriers are required, BBA Certificated products[1] should be used and installed in accordance with that Certificate. Radon barriers can be installed in three ways (see Figure 4) and in each case, a layer of C25 concrete (see section 1.9) must be applied over the membrane:

- membrane applied directly to the standard panels
- levelling grouting screed laid before applying the membrane
- membrane applied directly to the F/T Flat Top or F/T Extra panel.

(1) Users are advised to check the BBA website for current Certificates.

Figure 4 Radon barriers



1.11 Where steel mesh is used, spacers designed to provide 10 mm cover to the steel mesh above the beam should be provided and have a flat base so as not to penetrate the radon barrier:

2 Delivery and site handling

Polystyrene components

2.1 The polystyrene components are shrink-wrapped and banded in packs, but are unprotected. Reasonable care must be taken during transit and storage to avoid damage.

2.2 The polystyrene components should be stacked on a flat base, clear of the ground and protected against direct sunlight and secured to avoid wind damage. Care must be taken to avoid contact with solvents and with materials containing volatile organic components, such as coal tar, pitch and timber newly treated with creosote.

Concrete slip bricks and closure blocks

2.3 The concrete perimeter slip bricks and closure blocks are delivered to site shrink-wrapped to pallets and should be stacked on a flat base.

Prestressed concrete joists

2.4 The joists are delivered to site stacked and supported on vertically aligned timber bearers at 300 mm from each end.

2.5 Care must be taken in unloading, stacking and storing the joists to prevent damage. They should be lifted as near as possible to each end and should be handled and stacked the right way up at all times. On site, joists must be stored on firm, level ground, clear of the ground and stacked. Timber bearers should be used to separate the joists and should be placed in line with each other near the ends of the joists.

2.6 For storage periods exceeding three months, the joists should be kept under cover.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Poly-Plus and Poly-Plus Extra Floor Systems.

Design Considerations

3 General

Poly-Plus and Poly-Plus Extra Floor Systems are assessed as suitable for use as part of a ground-floor installation.

4 Practicability of installation

The systems are designed to be installed by a competent general builder, or a contractor, experienced with this type of system (see sections 13 to 16).

5 Structural performance

5.1 The structural performance and conditions of use for the Rackham 175 prestressed concrete joists are shown in other parts of this Certificate.

5.2 Where multiple joists are used to support blockwork walls, the spaces between the top flanges should be infilled with concrete of minimum C25 grade, to ensure unity of action.

5.3 Calculations in accordance with EN 1992-1.1 : 2004 (Eurocode 2) in conjunction with structural tests were used to verify the ability of systems, incorporating the concrete screeds defined in section 1.9 of this Certificate, to be used where the following design loads are applicable:

Domestic and residential

- point load of 1.4 kN
- uniformly distributed load of 1.5 kNm^{-2}, together with an allowance of 1 kNm^{-2} for partitions
- line load of 5 kNm^{-1} from blockwork, both perpendicular and parallel to the span.

Communal areas in flats and offices

- point load of 4.5 kN
- uniformly distributed load of 5 kNm^{-2}, together with an allowance of 1 kNm^{-2} for partitions.

5.4 Due to manufacturing and construction tolerances, the bearings of the polystyrene infill panels may be reduced. It is important to ensure that the minimum bearing that the polystyrene has on the flange of the joist is 15 mm.

6 Thermal performance

6.1 The thermal performance of each building, incorporating the units must be evaluated in accordance with the relevant national Building Regulations; the evaluation is the responsibility of the overall designer of the building.

6.2 Calculations of the thermal transmittance (U value) of specific floors should be based on an EPS nominal thermal conductivity value of 0.03 $Wm^{-1}K^{-1}$ and the relevant unit dimensions.

6.3 Typical ground-floor U values, calculated in accordance with BS EN ISO 6946 : 1997 and BS EN ISO 13370 : 1998, indicate the values shown in Table 1.

6.4 Constructions incorporating the floor can meet the requirements of the national Building Regulations thus:

England and Wales

- ground floors incorporating the panels can improve on the U value (0.25 $Wm^{-2}K^{-1}$) required for the 'notional' building. Therefore, the panels can contribute to a building achieving the required overall carbon dioxide emission rate reduction of on average 20% for dwellings and 23% or 28% (for air-conditioned locations) for buildings other than dwellings (see Table 1)
- junctions shown in Figure 2 adequately limit heat loss by conduction and, when installed to limit air infiltration (see section 6), comply with the requirements of *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings* TSO 2002. Junctions shown in Figure 2 also comply with the requirements of the Accredited Construction Details, (version 1.0). The default psi values quoted in BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*, Table 3, may be taken for these junctions and be used in calculations to *The Government's Standard Assessement Procedure for Energy Rating of Dwellings* (SAP 2005) or the Simplified Building Energy Model (SBEM)

Scotland

- subject to the selection of an appropriate construction, P/A ratio and insulation thickness, a floor construction can contribute to achieving the following design U values:
  - 0.20 $Wm^{-2}K^{-1}$ required for the 'simplified approach – solid fuel packages 3 and 6' 'notional' dwelling

— 0.22 $Wm^{-2}K^{-1}$ required for 'notional' dwellings in SAP 2005 (for Scotland) and the 'simplified approach – packages 1, 2, 4 and 5' in Mandatory Standard 6.1, clause 6.1.2[1][2]

— 0.25 $Wm^{-2}K^{-1}$ required for 'notional' dwellings as described in Mandatory Standard 6.2, clause 6.1.6[1]

— 0.22 $Wm^{-2}K^{-1}$ for extensions the value described by the Table to Mandatory Standard 6.2, clause 6.2.9[1] and 6.2.10[2]

— 0.70 $Wm^{-2}K^{-1}$ limit for an individual element specified in Mandatory Standard 6.2, clause 6.2.1[1].

- junctions shown in Figure 2 adequately limit heat loss by conduction and comply with the requirements of BRE report (BR 262 : 2002) *Thermal insulation: avoiding risks.*

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland

- ground floors incorporating the panels can improve on the U value (0.25 $Wm^{-2}K^{-1}$) required for the 'notional' building. Therefore, the panels can contribute to a building achieving the required overall carbon dioxide emission rate reduction of on average 20% for dwellings and 23% or 28% (for air-conditioned locations) for buildings other than dwellings (see Table 1)
- junctions shown in Figure 2 adequately limit heat loss by conduction and, when installed to limit air infiltration (see section 10), comply with the requirements of the Accredited Construction Details (version 1.0). The default psi values quoted in BRE Information Paper IP 1/06, Table 2, may be taken for these junctions and be used in SAP 2005 or SBEM calculations.

Table 1 Floor U values

Perimeter/ area ratio	Poly-Plus		Poly-Plus Extra		Poly-Plus F/T Flat Top		Poly-Plus F/T Extra	
	U value[2] ($Wm^{-2}K^{-1}$)	Improvement in 'notional' value (%)[3]	U value[2] ($Wm^{-2}K^{-1}$)	Improvement in 'notional' value (%)[3]	U value[2] ($Wm^{-2}K^{-1}$)	Improvement in 'notional' value (%)[3]	U value[2] ($Wm^{-2}K^{-1}$)	Improvement in 'notional' value (%)[3]
0.4	0.18	28	0.17	32	0.17	32	0.14	44
0.5	0.18	28	0.18	28	0.17	32	0.15	40
0.6	0.19	24	0.18	28	0.17	32	0.15	40
0.7	0.19	24	0.18	28	0.18	28	0.15	40
0.8	0.20	20	0.19	24	0.18	28	0.15	40
0.9	0.20	20	0.19	24	0.18	28	0.15	40

(1) The average slab U value is slightly dependent on the number and type of concrete perimeter blocks within the floor area, use of multiple concrete joists and floor finishes, and must be taken into account in any calculation.

(2) The calculated U values are based on the following parameters:
- structural concrete screed: thickness 50 mm above the top of the joist — conductivity 2.0 $Wm^{-1}K^{-1}$
- precast concrete joist — conductivity 2.3 $Wm^{-1}K^{-1}$
- polystyrene — conductivity 0.03 $Wm^{-1}K^{-1}$ ($\lambda_{90/90}$ *value*) declared by manufacturer
- soil (taken as typical clay) — conductivity 1.5 $Wm^{-1}K^{-1}$
- wall (300 mm thick) U value — 0.35 $Wm^{-2}K^{-1}$
- slab U value (mean) — 0.27 $Wm^{-2}K^{-1}$ for Poly-Plus, 0.22 $Wm^{-2}K^{-1}$ for Poly-Plus Extra and 0.18 $Wm^{-2}K^{-1}$ for Poly-Plus F/T Extra
- design wind speed — 5 ms^{-1}
- underfloor ventilation — 0.0015 $m^{-2}m^{-1}$
- wind shielding factor — 0.05
- void depth under slab — 150 mm (nominal).

(3) Compared to the value of 0.25 $Wm^{-2}K^{-1}$ required for the 'notional' building.

7 Air infiltration

To minimise heat loss by unwanted air infiltration, care must be taken to effectively seal service penetrations and junctions with abutting walls. Design guidance is given in the documents referred to in section 6.4.

8 Condensation risk

8.1 To minimise the risk of interstitial condensation at junctions with external walls, specifiers should ensure that wall insulation extends to at least 150 mm below the bottom of the structural concrete screed. The structural screed should be isolated from the wall using 30 mm thick EPS strip (see Figure 2).

8.2 The risk of surface condensation will be minimal in normal circumstances.

9 Ventilation

Ventilators should provide the void beneath the floor with an equivalent open area of:

England and Wales and Northern Ireland — either 1500 mm^2 per metre of external perimeter wall or a 500 mm^2 per m^2 of floor area, whichever gives the greater opening area.

Scotland — 1500 mm² for at least every metre run of wall[1] or 500 mm per m² of floor area.

(1) The ventilation is to be provided by permanent ventilation of the underfloor space direct to the the outside air by ventilators in two external walls on opposite sides of the building. Internal sleeper walls and other obstructions must also be provided with the same amount of open area to maintain the underfloor ventilation. The ventilated space beneath the floor slab or beam to be 150 mm.

10 Behaviour in relation to fire

An assessment was made of the contribution of the system to the development stages of a fire. The assessment concluded, in relation to floors constructed in accordance with the Certificate holder's specifications, that the polystyrene infill blocks will be contained within the floor by the structural concrete screed, until the topping itself is destroyed. Therefore, they will not contribute to the development stages of a fire or present a smoke or toxic hazard. Electrical cables running within the polystyrene should be enclosed in a suitable conduit, such as rigid PVC.

11 Maintenance

When installed in accordance with this Certificate and the Certificate holder's recommendations, maintenance is not required.

12 Durability

12.1 The exposure condition beneath a suspended ground floor over a ventilated void and soil without oversite concrete or other surface seal is considered to be 'moderate' for the prestressed concrete joists and 'mild' for structural screed as defined in BS 8110-1 : 1997 (Table 3.2). The prestressed concrete joists and structural screed will have adequate durability for these exposure conditions for the 60-year design life of the building.

12.2 The polystyrene components are protected in service from agencies liable to cause deterioration and will be as durable as the prestressed concrete joists.

Installation

13 Site preparation

13.1 The ground beneath the floor should be free of topsoil and vegetable matter. Oversite concrete or other surface seal is not required, but material added to bring the solum to an even surface should be hard and dry.

13.2 Damp-proofing and ventilation arrangements must be in accordance with normal good practice, eg the provision of damp-proof sleeves to ventilators and adequate drainage of the sub-floor.

13.3 A continuous damp-proof course should be laid along the support wall below the floor in accordance with BS 8102 : 1990.

13.4 A void of at least 150 mm deep for the system must be provided between the underside of the floor and the ground surface. With heavy clay soil, the depth should be an additional 150 mm (ie a minimum of 300 mm) to prevent problems associated with heave. With good natural drainage or where site drains are provided to prevent water collecting and standing, the ground level beneath the floor does not need to be raised to the external ground level but, where the levels differ, the ability of the perimeter walls to act as retaining walls must be checked.

14 General

14.1 Typical details of the system are shown in Figure 1 and the *Rackham Installation Guide* and *Technical Guidance Notes*.

14.2 The bearings for the prestressed concrete joists should be level and clear of debris.

14.3 For cavity wall construction, the minimum bearing should be 100 mm provided on the inner leaf (see Product Sheet 1 of this Certificate). Joists should not project into the cavity and careful setting-out will be required when the joists are built into cavity walls at both ends.

14.4 The joists must not be cut or otherwise altered on site without formal authorisation from the Certificate holder.

14.5 Generally, the joists are lifted into position by two operatives.

14.6 The 30 mm polystyrene edge pieces are to be placed inside the perimeter edge of the slip bricks/wall as shown in Figure 2(d).

14.7 Perimeter concrete blocks are to be installed in accordance with the Certificate holder's *Technical Guidance Notes,* the relevant layout drawings and good practice.

14.8 The prestressed concrete joists must be accurately positioned and fixed to ensure that the infill blocks can be installed at a later stage without damage and with adequate bearings. This can be achieved by using the purpose-made concrete spacer blocks, or the polystyrene infill panels as temporary spacers while the ends of the joists are built into the support wall. Using either method, the spacing of the joists should also be checked at mid-span.

14.9 Care should be taken to avoid overloading the prestressed concrete joists during construction. Planks should be laid across the joists before materials are stacked; such materials should be as close as possible to the joist bearings.

14.10 To avoid damage to the polystyrene infill panels, the structural concrete screed should be laid as soon as possible after the blocks have been installed.

14.11 Before pouring the structural concrete screed finish, it must be ensured that the polystyrene infill blocks are centrally located between the joists with a maximum gap of 8 mm between the polystyrene and the joist face. These gaps may be due to normal construction or manufacturing tolerances.

14.12 When steel mesh reinforcement is used, spacers should be installed to ensure 10 mm cover to the top of the beam.

14.13 Where gaps occur, concrete is placed along the edges of the polystyrene infill panels to prevent displacement during the main concreting operation.

14.14 When using a concrete pump, truck or skip, concrete should not be discharged onto the polystyrene infill panels from heights greater than 300 mm and concrete heaps must not be formed over 200 mm high.

14.15 When wheelbarrows are used, planks must be placed to spread the wheel load to the joists.

14.16 Spot boards must be used when tipping and shovelling.

15 Incorporation of services

15.1 Services must not be attached to joists or blocks in such a way as to impair their durability or strength.

15.2 Vertical services passing through floors and vapour barriers must be sealed. The polystyrene infill panels can be cut easily with a saw to accommodate service pipes.

15.3 In areas subject to landfill gas or methane and areas where full radon precautions are required, services should not pass through the floor if this is avoidable. Where this is unavoidable the services should be sealed against the gas-proof barrier as detailed in the BRE Report 212 *Construction of new buildings on gas contaminated land* and BRE Report 211 *Radon : guidance on protective measures for new dwellings*.

16 Finishes

These should be selected and used as described in the *Rackham Installation Guide* and are outside the scope of this Certificate.

Technical Investigations

17 Tests

Tests were carried out on Poly-Plus and Poly-Plus Extra Floor Systems to determine:

- the ability of the floor to withstand short- and long-term static loads and to distribute point loads to adjacent parallel concrete joists (steel mesh and fibre-reinforced screeds)
- the adequacy of the polystyrene infill panels for use as permanent formwork (resistance to construction loads)
- creep under sustained loading
- ability of the finished floor to withstand impact loads
- ability of the finished floor to withstand line loads from blockwork partition walls parallel and perpendicular to the prestressed concrete joints.

18 Investigations

18.1 Existing data was examined relating to:

- durability of the system
- condensation risk
- thermal properties
- fire risk assessment
- allowable spans for prestressed concrete joists (verified in accordance with BS 8110-1 : 1997)
- allowable loads for different concrete topping thicknesses were verified in accordance with EN 1992-1.1 : 2004.

18.2 U values and floor/wall junction psi values were derived from the floor system using modelling methods to BS EN ISO 13370 : 1998. The risk of condensation was examined.

18.3 Site visits were carried out to assess the practicability of installation including setting out and placement of the prestressed concrete joists, installing the infill panels and polystyrene sheets and placing the concrete.

18.4 The manufacturing processes for the prestressed concrete joists, polystyrene infill panels and sheets and concrete blocks were examined including the methods adopted for quality control, and details obtained of the quality and composition of the materials used.

Bibliography

BS 4483 : 2005 *Steel fabric for the reinforcement of concrete — Specification*

BS 8102 : 1990 *Code of practice for protection of structures against water from the ground*

BS 8110-1 : 1997 *Structural use of concrete — Code of practice for design and construction*

BS 8204-1 : 2003 *In-situ floorings — Code of practice for concrete bases and screeds to receive in-situ floorings*
BS 8204-2 : 2003 *In-situ floorings — Code of practice for concrete wearing surfaces*

BS EN 771-3 : 2003 *Specification for masonry units — Aggregate concrete masonry units (dense and light-weight aggregates)*

BS EN 772-2 : 1998 *Methods of test for masonry units — Determination of precentage area of voids in aggregate concrete masonry units (by paper indentation)*

BS EN 13163 : 2001 *Thermal insulation products for buildings — Factory made products of expanded polystyrene (EPS) — Specification*

BS EN 14889-2 : 2006 *Fibres for concrete — Polymer fibres — Definitions, specifications and conformity*

BS EN ISO 6946 : 1997 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 13370 : 1998 *Thermal performance of buildings — Heat transfer via the ground — Calculation methods*

EN 1992-1.1 : 2004 *(Eurocode 2) Design of concrete structures — General rules for buildings (together with United Kingdom National Application Document)*

19 Conditions

19.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English law.

19.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

19.4 In granting this Certificate, the BBA is not responsible for:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

19.5 Any information relating to the manufacture, supply, installation, use and maintenance of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

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