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**Agrément
Certificate
No 86/1602**
Second issue*

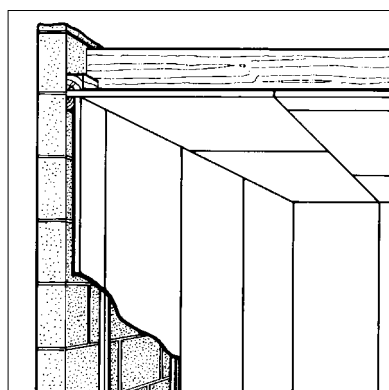
Designated by Government
to issue
European Technical
Approvals

STYROLINER

Isolation de murs
Wärmedämmung

Product

- *THIS CERTIFICATE RELATES TO STYROLINER, A RIGID EXTRUDED POLYSTYRENE FOAM BOARD, BONDED TO GYPROC PLASTERBOARD.*
- *The product is for use as an internal insulating dry lining system for walls of new and existing dwellings or buildings of similar occupancy, type and conditions.*
- *It can be used to improve the thermal insulation of existing and new, solid and cavity, brick and block walls.*
- *It can also be used in locations where the insulated surface is inaccessible, eg ceilings of flat roofs.*



Regulations

1 The Building Regulations 1991 (as amended) (England and Wales)

 The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of internal dry lining systems with the Building Regulations. In the opinion of the BBA, Styroliner, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement:	B2(1)	Internal fire spread (linings)
Comment:		The product meets this Requirement in every purpose group. See section 11.1 of this Certificate.
Requirement:	L1	Conservation of fuel and power
Comment:		The product can meet or contribute to meeting this Requirement. See sections 8.2 to 8.4 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 16 of this Certificate.

2 The Building Standards (Scotland) Regulations 1990 (as amended)

 In the opinion of the BBA, Styroliner, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and Technical Standards as listed below.

Regulation:	10	Fitness of materials
Standard:	B2.1	Selection and use of materials and components
Comment:		The product is acceptable. See section 16 of this Certificate.
Regulation:	13	Means of escape from fire, facilities for fire-fighting and means of warning of fire in dwellings
Standard:	E6.1	Internal fire spread — General
Comment:		The plasterboard side of the product is considered Class 0 in accordance with Table 2 of the provisions deemed to satisfy this Standard. See section 11.1 of this Certificate.
Regulation:	18	Preparation of sites and resistance to moisture
Standard:	G4.1	Interstitial condensation
Standard:	G4.2	Surface condensation
Comment:		The product is acceptable. See section 9.3 of this Certificate.
Regulation:	22	Conservation of fuel and power
Standard:	J2.1	Standards for buildings in purpose group 1
Standard:	J3.1	Standards for buildings in purpose groups 2 to 7
Comment:		The product can satisfy or contribute to satisfying these Standards. See sections 8.2 to 8.3 of this Certificate.
Standard:	J4.1	Limiting infiltration
Comment:		Constructions incorporating the product can satisfy this Standard. See section 8.4 of this Certificate.

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3 The Building Regulations (Northern Ireland) 1994 (as amended)



In the opinion of the BBA, Styroliner, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 1.6 of this Certificate.
Regulation:	C7	Condensation
Comment:		The product is acceptable. See section 9.3 of this Certificate.
Regulation:	E4	Internal fire spread — Linings
Comment:		The plasterboard side of the product is considered Class 0 in accordance with Section 2.4 of Technical Booklet E. See section 11.1 of this Certificate.
Regulation:	F2	Conservation of fuel and power — Building fabric
Comment:		The product can satisfy or contribute to satisfying this Regulation. See sections 8.2 to 8.4 of this Certificate.

4 Construction (Design and Management) Regulations 1994

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See section: 6 Delivery and site handling.

Technical Specification

5 Description

5.1 Styroliner consists of Gyproc 9.5 mm or 12.5 mm thick plasterboard manufactured to BS 1230 : Part 1 : 1985(1994) factory bonded to various thicknesses of LB grade extruded polystyrene Styrofoam board.

5.2 The boards comprise decorative faced, square or tapered edge wallboard for direct decoration. A grey paper-faced, square-edge board is also available for use where a plaster finish is required. The nominal standard sizes are given below:

width (mm)	1200
length (mm)	2400
thickness (mm) (plasterboard)	9.5 (12.5 on request)
thickness (mm) (insulation)	12, 16, 21, 25, 30, 37 and 46
approximate weight of laminate (kgm ⁻²)	7.5–9.0

5.3 Fixing of the boards depends on the substrate and is detailed in the manufacturer's literature. Boards for masonry walls are fixed to a frame of either timber battens or metal furrings or direct to the wall using adhesive (see section 1.8 of this Certificate).

5.4 Accessories include adhesives and fixings specified for use with the boards.

5.5 The product may be used either to construct ceilings where the insulated face will be inaccessible, eg flat roofs, or to renovate existing plasterboard or plaster and lath ceilings (see section 1.8.11). In either case they should be fixed in the same way as conventional plasterboard.

6 Delivery and site handling

6.1 The boards are delivered to site in polythene wrapped stacks on pallets which can be off-loaded by mechanical handling equipment or by hand. Each stack incorporates a label bearing the manufacturer's name, sheet type and size and the BBA identification mark incorporating the number of this Certificate.

6.2 It is essential, for successful fixing, that boards are stored flat on a dry, level surface completely protected from rain and snow but in a well ventilated situation. Stacks of boards should not exceed a height of 1 m.

6.3 Panel Systems Ltd's technical literature details site handling and storage practices which should be followed.

6.4 Dry materials, such as adhesives, should be stored in the same way as plaster. Metal components should be stored in dry conditions.

7 General

7.1 When correctly installed and used in accordance with Panel Systems Ltd's technical manual and this Certificate, Styroliner will significantly improve the thermal insulation of existing and new, solid or cavity masonry walls (masonry includes clay and calcium silicate bricks, concrete blocks, natural and reconstituted stone blocks) of dwellings and buildings of similar occupancy, type and condition.

7.2 The walls of new buildings should be designed and constructed in accordance with the relevant Codes of Practice, eg BS 5628 : Part 3 : 1985, BS 5390 : 1976(1984) and the relevant recommendation of BS 8000 : Part 3 : 1989.

7.3 The walls must be in a good state of repair and rain resistant with no evidence of rain penetration, damp (other than surface condensation) or frost damage.

7.4 If present, mould or fungal growth should be treated prior to the application of the product.

7.5 Where fixing methods rely on adhesives it is essential to establish, before installation, that a satisfactory bond can be achieved between the wall surface and the adhesive. Backgrounds of high suction will behave very differently to those of low suction. If difficulty is experienced with adhesion, the Certificate holder's advice should be sought before proceeding.

7.6 The installation of insulated dry lining systems requires careful detailing around doors and windows to achieve a satisfactory surface for finishing. In addition, every attempt should be made to minimise the risk of cold bridging at reveals and where heavy party walls are attached to the external wall. In new work the construction must be designed to accommodate the thickness of the dry lining, particularly at reveals, heads, sills and in relation to ceiling height. On existing walls, lining the reveals with a board incorporating a thinner layer of insulation should be considered.

7.7 Where dry lining installations form a void of 20 mm or more (ie timber batten systems), services can be incorporated behind the dry lining, making the chasing of the wall unnecessary. When using an adhesive system, or where the services have a greater depth than the void, the wall should be chased rather than the insulation. It is recommended that services penetrating the dry lining, such as light switches, power outlets, be kept to a minimum to limit possible penetration of water vapour.

7.8 When the boards are to be installed in existing buildings it should be realised that a small reduction in room size will occur and that

permanent fixtures, for example, baths, may present difficulties.

7.9 When boards are used as a ceiling they must be mechanically fixed.

7.10 Provided the boards are installed neatly, the jointing and finishing systems specified are capable of providing a satisfactory surface for direct decoration without the need for further plastering.

7.11 Decorative-faced, square- or tapered-edge board, if properly installed with the jointing and finishing systems available, is capable of providing a satisfactory surface for direct decoration without plastering.

7.12 The recommendations of the manufacturer's literature should be followed before plastering on grey-faced, square-edge board.

8 Thermal insulation

8.1 For the purposes of determining compliance with the Building (or other statutory) Regulations the thermal conductivity (λ value) of the LB grade polystyrene component of the product should be taken as $0.027 \text{ Wm}^{-1}\text{K}^{-1}$. The λ value for plasterboard may be taken as $0.16 \text{ Wm}^{-1}\text{K}^{-1}$.



8.2 The requirement for limiting heat loss through the building fabric can be satisfied if the U values of the building elements, including thermal bridging, do not exceed the maximum values in the relevant Elemental Methods given in the national Building Regulations:

England and Wales

Approved Document L.

Scotland

Technical Standards, Part J.

Northern Ireland

Technical Booklet F.

8.3 Guidance on selecting the thickness of insulation required to enable a wall or roof to achieve the desired U value is given in these documents. Alternative approaches are also described which allow for some flexibility in design of U values for individual constructional elements.

8.4 Guidance on limiting unwanted air infiltration is also given in these documents (see section 17.7 of this Certificate).

8.5 The ultimate thermal performance of the system will depend on the construction of the wall or roof against which it is installed. The dynamic performance of a structure can be determined by the admittance procedure given in Section A5 (1986) of the CIBSE Guide.

8.6 The dynamic thermal performance of a building can be expressed as a ratio called the response factor (Equation A3.36 of the CIBSE Guide). The approximate factors are 2.5 for a

thermally lightweight building and 6 for a heavyweight building. The use of any form of insulation will affect this factor and it should be considered when designing heating systems for new buildings. Modifications to existing heating systems may also have to be considered in buildings upgraded by the application of the product. Methods of sizing heating plant are given in Section A9 (1986) of the CIBSE Guide.

8.7 Where the boards are used to upgrade existing ceilings it is essential that services, such as pipework, water tanks, existing in the space above are insulated.

9 Condensation and hygrothermal characteristics

9.1 The extruded polystyrene component of the laminate has a significant water vapour resistivity, therefore dry lining with the product can offer significant resistance to water vapour transmission provided all joints between the boards are filled and taped in accordance with the manufacturer's literature.

9.2 When carrying out condensation risk assessments the design values given in Table 1 are to be used. Calculations using the method described in BS 5250 : 1989(1995) should be carried out for any particular construction. An indication of typical design requirements, based on BS 5250 : 1989(1995), when using a design thickness of Styrofoam of 46 mm is given in Table 2.

Table 1 Design values — condensation risk

	Water vapour resistivity ($\text{MNsg}^{-1}\text{m}^{-1}$)	Resistance (MNsg^{-1})
Plasterboard (9.5 mm)	45 to 60	0.43 to 0.57
Plasterboard (12.5 mm)	47 to 63	0.6 to 0.8
Extruded expanded polystyrene foam (LB grade)	520	—
Two coats of Drywall Sealer	—	15

Table 2 Product selection for typical wall construction

Wall construction	Styroliner
Solid wall, 230 mm brickwork, Ardurit X7, or timber batten fixing of insulated dry lining	Yes
Solid wall, 230 mm brickwork, 15 mm plaster intact, Panel Systems' adhesive system of insulated dry lining	Yes
Solid wall, either of the above with rendering to outside of wall	Yes*
Cavity wall, 100 mm brick inner and outer leaf, 50 mm cavity unventilated, Ardurit X7 system or timber batten fixing of insulated dry lining	Yes
Cavity wall, 100 mm brick outer leaf, 100 mm inner leaf of aerated concrete block of approximately 700 kgm^{-3} density, 50 mm unventilated cavity, Ardurit X7 system or timber battens, insulated dry lining	Yes

*Yes' indicates that the product can be used.

*with Drywall Sealer.



9.3 It can be shown by calculations that it is feasible to design dry-lined walls that will not suffer from condensation within the structure.

However, when using the product as a vapour control layer, due consideration must be taken in the overall installation to minimise perforations by services. Joints at wall/ceiling and wall/floor level must be well sealed.

9.4 As with any insulation applied to the inside of a wall, there may be a risk of cold bridging from the floors or ceilings, particularly in concrete slab construction. It has been demonstrated that the use of coving at the wall/ceiling joint will significantly reduce this problem.

9.5 Insulated dry lining has been successfully used in the rehabilitation of buildings suffering from surface condensation of walls where the dampness has been caused by the lack of thermal insulation.

9.6 When insulating ceilings the recommendations of BS 5250 : 1989(1995) must be followed to minimise the risk of condensation within the roof structure. Perforations for services must be well sealed.

10 Infestation

The use of insulated dry lining does not in itself promote infestation. The creation of voids within the wall structure, ie gaps between wall and boards, may provide habitation for insects or vermin in areas already infested. Care should be taken to ensure that, wherever possible, all voids are sealed, as any infestation may be difficult to eradicate. There is no food value in the materials used.

11 Properties in relation to fire



11.1 With regard to the national Building Regulations the product can be used in all situations requiring a Class 0 surface. Details of such situations are contained in the relevant documents.

11.2 Where recessed lighting is used, provision should be made to prevent the fitting overheating, ie insulation should be cut back or ventilated fittings used.

11.3 The laminate used in ceilings with an accessible space above must be protected, eg by installing a layer of plasterboard first or leaving an existing ceiling in place. Recessed luminaires must not be used in ceilings with this form of insulation.

12 Proximity of flues and appliances

When installing the product in close proximity to certain flue pipes and/or heat-producing appliances, the relevant provisions of the national Building Regulations are acceptable:

England and Wales

Approved Document J.

Scotland

Technical Standards, Part F, *Provisions deemed to satisfy the standards.*

Northern Ireland

Technical Booklet L.

13 Impact resistance

Test data obtained by the BBA show that under soft body impacts no damage is likely to be sustained and under hard body impacts the resulting damage would be approximately the same as would be expected from plasterboard alone.

14 Materials in contact — wiring installations

14.1 The materials in the system are compatible but with polystyrene foam and PVC insulated electrical cables there is a risk of reaction. Plasticiser in the PVC migrates to the foam and forms a sticky layer of polystyrene, subsequently forming a rigid skin around the cable. The process causes the polystyrene foam to lose contact with the PVC and, provided both foam and PVC are fixed, the reaction stops. Therefore, the risk to PVC covered electrical cables is present but minimal. Where this reaction is likely to be a problem it is recommended that PVC covered electrical cables likely to come into contact with polystyrene foam are protected by conduit or PVC trunking.

14.2 De-rating of any electrical cables should be considered in areas where dry lining restricts the flow of air.

15 Wall mounted fittings

The recommendations of the manufacturer should be followed. Any object fixed to the wall, other than lightweight items, eg framed pictures, should be fixed through the lining board into the wall behind, using recommended proprietary fixings. Ceiling fixtures will require longer screws to secure them to the structure.

16 Durability

The durability of the materials is satisfactory. Provided the products are used in accordance with this Certificate and the manufacturer's instructions, and are fixed to satisfactory stable and durable substrates by fully trained operatives, the laminate should have a life equal to the building in which it is installed. Under normal conditions of occupancy the boards are unlikely to suffer damage, but if damage does occur repairs are easily carried out.

17 General

17.1 It is recommended that Styroliner is installed by trained dry-lining operatives or, where plastering is used, by plasterers.

17.2 The boards may be installed on internal walls and ceilings of new or existing buildings with the fixing method depending on the type and condition of the substrate.

17.3 Installation should be in accordance with the relevant parts of the supplier's literature and good dry lining practice. The former should be referred to for a detailed description of the methods of installation.

17.4 On existing walls and ceilings, remove any loose plaster or wallpaper and scour any painted surfaces.

17.5 Mould or fungal growth present in the substrate should be treated before the product is installed. If wood preservatives or damp-proofing treatments are used, sufficient time must be allowed for the dispersion of solvents that may be contained in them. Similarly, backgrounds should be allowed to dry out before fixing insulating dry lining.

17.6 All installations of insulated dry lining require careful planning and setting out.

17.7 Unintentional air paths through the building envelope should be limited as far as is reasonably practical by sealing gaps and junctions:

- at edges of openings, such as windows and doors
- at junctions with walls, floors and ceilings
- around service penetrations through the Styroliner board.

17.8 It must be ensured that any PVC sheathed cables are not in direct contact with the Styrofoam. Either the Styrofoam is cut back or protected within conduit.

18 Systems and fixing procedure

18.1 Fixing methods (see Figure 1) comprise:

Ardurix X7 adhesive — a cement based, latex modified adhesive with gap filling properties; suitable for use with a range of substrates

Panel Systems' adhesive system — for bonding Styroliner to dry, smooth, absorbent surfaces

Tapcon masonry fastening system — a mechanical fixing system of self-tapping masonry screws

Hilti fastening system — a mechanical fixing system

A range of special application tools is available for the installation of Tapcon fixings and the jointing finishes.

18.2 Ardurit X7 Adhesive System — for application to brick, block, concrete or previously plastered walls which are damp. The adhesive is applied to the wall in a band, to match the perimeter of the board, and a central strip. The thickness of the Ardurit X7 adhesive depends on the trueness of the wall. The board is placed in position and, with a timber batten, is tamped back using a straight edge to ensure all-round contact (see below for secondary fixings).

18.3 Panel Systems' Adhesive System — for application to dry, smooth, absorbent surfaces such as plaster or fairfaced concrete walls where only small irregularities exist. After surface preparation and setting out, the adhesive is applied to the wall in a perimeter band with centre strip using a square-notched float, with a minimum 13 mm notch. The board is placed in position and clamped back firmly. Secondary mechanical fixings are used to hold the board in place. Fixings should penetrate the masonry surface by not less than 25 mm.

18.4 Timber Batten System — may be used on any stable, dry walls capable of taking the fixings for the timber battens. Timber battens are mechanically fixed to the substrate in a defined pattern and the boards are then fixed to the battens using either galvanized lath head plasterboard nails or protected screws of a length suitable for the thickness of the product. Skirting plates can be fitted at the recommended centres and the boards are fixed to the battens using either nails or screws. If the board is fixed with the grey face exposed it can be plastered using traditional techniques. It is recommended that the timber battens be treated with preservative.

18.5 Tapcon mechanical fixings — a minimum of four fasteners per board is recommended when combined with an adhesive fixing system. A pilot hole is drilled and the screw driven home.

18.6 Hilti fixings — a minimum of four fasteners per board is recommended when combined with an adhesive fixing system.

Finishing

18.7 The vapour resistance of an installation can be improved by applying two finishing coats of Drywall Sealer to the laminate.

18.8 When decorative faced laminate is used, all the methods of installation described above are capable of providing a suitable base for the application of paint or wallpaper decorative finishes provided the boards are applied carefully and jointed in accordance with the manufacturer's instructions.

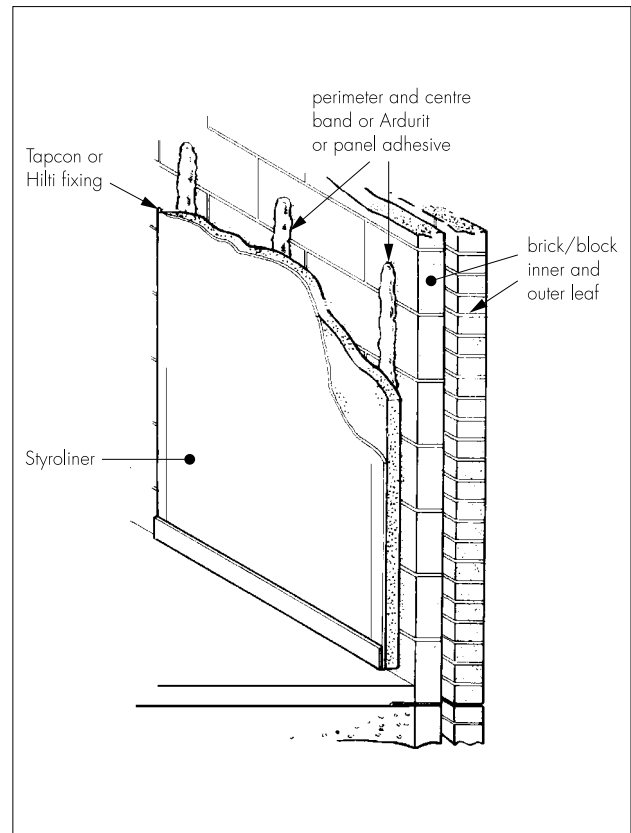
18.9 Styroliner can be finished using either a plaster skim or with established drywall techniques.

18.10 Once the boards are installed, timber skirting can be applied to skirting plates or by other appropriate methods.

Ceilings

18.11 The boards are installed in the same way as ordinary plasterboard, ie mechanically fixed at suitable centres. Grey-faced board is finished with gypsum plaster, decorative-faced board by jointing or by the application of a plaster decorative finish.

Figure 1 Typical fixing system



Technical Investigations

The following is a summary of the technical investigations carried out on Styroliner insulated dry lining system.

19 Tests

19.1 The product was tested for:
water vapour permeability to BS 4370 : Part 2 :
1973

bond strength (insulation to plasterboard)
flexural strength
stability in changing humidity conditions
stability under temperature differences.

19.2 The bond strengths of the specified wall adhesive were tested for performance under the effect of high humidity, low temperatures and liquid water.

19.3 The performance of the mechanical fixings was examined.

20 Other investigations

20.1 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

20.2 Sites were visited where the various methods of installation were being carried out.

20.3 Sites were visited where the products had been installed and the buildings occupied.

20.4 Data relating to water vapour permeability of the laminate and Drywall Sealer were examined.

20.5 An examination was made of data relating to:

λ value
fire performance.

20.6 Independent reports on the behaviour and performance of dry lining systems were examined.

20.7 A theoretical analysis of the hygrothermal behaviour of various installations was carried out.

Bibliography

BS 1230 *Gypsum plasterboard*

Part 1 : 1985(1994) *Specification for plasterboard excluding materials submitted to secondary operations*

BS 5250 : 1989(1995) *Code of practice for control of condensation in buildings*

BS 5390 : 1976(1984) *Code of practice for stone masonry*

BS 5628 *Code of practice for use of masonry*

Part 3 : 1985 *Materials and components, design and workmanship*

BS 8000 *Workmanship on building sites*

Part 3 : 1989 *Code of practice for masonry*

CIBSE A3 : 1986 *Thermal properties of building structures*

CIBSE A5 : 1986 *Thermal response of buildings*

CIBSE A9 : 1986 *Estimation of plant capacity*

Conditions of Certification

21 Conditions

21.1 This Certificate:

- (a) relates only to the product that is described, installed, used and maintained as set out in this Certificate;
- (b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;
- (c) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;
- (d) is copyright of the BBA.

21.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, shall be construed as references to such publication in the form in which it was current at the date of this Certificate.

21.3 This Certificate will remain valid for an unlimited period provided that the product and the manufacture and/or fabricating process(es) thereof:

- (a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) continue to be checked by the BBA or its agents; and

(c) are reviewed by the BBA as and when it considers appropriate.

21.4 In granting this Certificate, the BBA makes no representation as to:

- (a) the presence or absence of any patent or similar rights subsisting in the product or any other product;
- (b) the right of the Certificate holder to market, supply, install or maintain the product; and
- (c) the nature of individual installations of the product, including methods and workmanship.

21.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do 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 or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future 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 installation and use of this product.



In the opinion of the British Board of Agrément, Styroliner insulating dry lining system is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. This Certificate No 87/1602 is accordingly awarded to Panel Systems Ltd.

On behalf of the British Board of Agrément

Date of Second issue: 10th November 1999

Chief Executive

**Original Certificate issued on 23rd June 1987. This amended version issued to include updated national Building Regulations and associated text, addition of CDM Regulations, updated Conditions of Certification, change of Certificate holder's telephone number and addition of Certificate holder's facsimile number.*