

The Irish Agrément Board is designated by Government to issue European Technical Approvals.

Irish Agrément Board Certificates establish proof that the certified products are 'proper materials' suitable for their intended use under Irish site conditions, and in accordance with the Building Regulations 1997.

The Irish Agrément Board operates in association with the National Standards Authority of Ireland (NSAI) as the National Member of UEAtc.

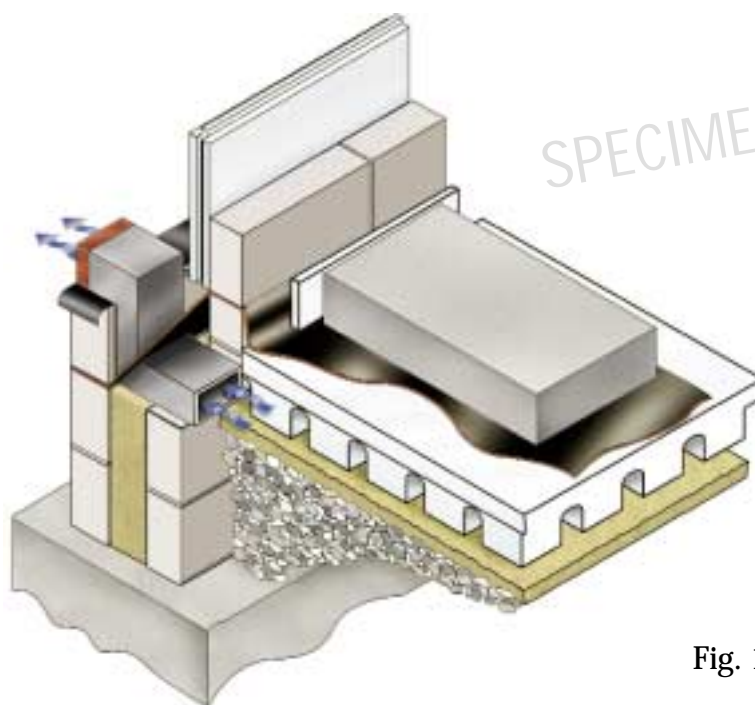


Fig. 1.

PRODUCT DESCRIPTION

Aeroflo Insulated Flooring System consists of expanded moulded polystyrene panels with integral legs (ground contact area 44%) to provide a support for a floating concrete slab for either suspended or ground supported floors. The Aeroflo Insulated Flooring System offers two main functions:

- (1) It provides thermal insulation to the ground floor.
- (2) It facilitates the passive venting of methane and radon soil gases (dangerous substances) from beneath the ground floor of the building.

The Panels are moulded from expanded polystyrene board manufactured to BS 3837: *Expanded polystyrene boards. Part 1: 1986 (1996) Specification for boards manufactured from expandable beads*. This Certificate certifies compliance with the requirements of the Building Regulations 1997. When used with an IAB

approved gas resistant membrane it facilitates the effective ventilation of methane and radon gas from underneath the floor.

USE:

The Aeroflo Insulated Flooring System is used for the construction of insulated ground supported concrete floors.

When used with an IAB approved gas resistant membrane it facilitates the effective passive ventilation of methane and radon gases from underneath the floor. A separate sump is not required.

MANUFACTURE AND MARKETING

The product is manufactured and marketed by Aerobord Ltd., Askeaton, Co. Limerick, and Aircell Ltd., Loch Gowna, Co. Cavan.

1.1 ASSESSMENT

In the opinion of the Irish Agrément Board (IAB), the Aeroflo Insulated Flooring System, if used in accordance with this Certificate, meets the requirements of the Building Regulations 1997 as indicated in Section 1.2 of this Certificate.

1.2 BUILDING REGULATIONS 1997

REQUIREMENT:

D1 & D3 – Materials and Workmanship (1997) revised 2000

D3 The Aeroflo Insulated Flooring System as certified in this Irish Agrément Board Certificate, is comprised of 'proper materials' fit for their intended use. (See Part 4 of this Certificate.)

D1 The Aeroflo Insulated Flooring System, as certified in this Irish Agrément Board Certificate, meets the requirements of the Building Regulations 1997 for workmanship.

A1 - Loading

The system has adequate strength and stiffness to accept floor loads. (see Part 3 of this Certificate).

B3 - (1) (3) Internal fire spread (structure)

The Aeroflo Insulated Flooring System meets the requirements when used in accordance with Part 4 of this IAB Certificate in ground floor constructions.

C3 - Dangerous Substances

Every ground floor must include a radon sump and

provide the facility for extracting 'Dangerous Substances' e.g. methane, radon. Where it is shown that protection from dangerous substances e.g. methane, radon, is required, an approved gas resistant membrane and gas handling system must be provided under the ground floor.

The Aeroflo Insulated Flooring system provides the facility for extracting 'dangerous substances' i.e. methane and radon from beneath the ground floor of a building, through the use of its passive venting system of soil gases. The Aeroflo Insulated Flooring System does not require a sump as the system acts as a sump. In a radon classified area, an IAB approved radon resistant membrane should be used with the Aeroflo Insulated Flooring system to meet Building Regulation requirements.

C4 - Resistance to weather and ground moisture
The Aeroflo Insulated Flooring System meets the requirements when installed as indicated in Section 2.4 of this Certificate.

J3 - Protection of Building

When used in accordance with Section 4.1 of this Certificate, the Aeroflo Insulated Flooring System meets the Regulation requirements.

L1 - Conservation of Fuel and Energy

The Aeroflo Insulated Flooring System meets the current U-value requirements of the building regulations.

2.1 PRODUCT DESCRIPTION

The Aeroflo Insulated Flooring System consists of expanded polystyrene panels with integral legs forming a ventilation layer supporting a 150 mm slab. Where necessary to prevent shrinkage and provide crack control a min. A98 mesh should be used in the construction of the concrete slab. The panels are manufactured to BS 3837 : *Expanded Polystyrene Boards. Part 1 : 1986 (1996) Specification for boards manufactured from expandable beads.* The panels are available in three grades of expanded polystyrene, SD, HD, EHD and in two standard thicknesses (see Table 1). The gaps between the legs assist airflow which is essential for passive venting and the design creates equivalent airflow paths as shown in Table 1. The legs account for 44% of the ground contact area. The large void area is easily ventilated with cross flow ventilation through external ventilators in the external wall and does not require the installation of a separate ventilated sump.

2.2 MANUFACTURE

The Aeroflo Insulated Flooring panels are manufactured to BS 3837: *Expanded polystyrene boards. Part 1: 1986 (1996) Specification for boards manufactured from expandable beads.*

Table 1: Aeroflo Insulated Flooring Panel Sizes (1350mm x 900mm):

Type	Density kg/m ³	Total Depth mm	Leg Depth	Equiv. Depth of clear void mm**	Max. Load kPa*
SD	15	80	40	22	9
SD	15	100	60	34	
HD	20	80	40	22	20
HD	20	100	60	34	
EHD	25	80	40	22	31
EHD	25	100	60	34	

*Applied load + slab + screed.

Max. compression under load 1%.

**Equivalent clear height under floor.

Aeroflo Insulated Flooring panels are moulded polystyrene panels manufactured to the sizes shown in Table 1.

2.2.1 QUALITY CONTROL

Quality control checks on Aeroflo Insulated Flooring panels include board dimensions, board density, board dimensional stability, compressive strength and thermal conductivity.

2.3 DELIVERY, STORAGE AND MARKING

Aeroflo Insulated Flooring panels:

The Aeroflo Insulated Flooring panels should be stacked on a flat base, clear of the ground and protected against direct sunlight. They should be stored under cover or protected with polyethylene. The panels should be ballasted to avoid wind damage. Care must be taken to avoid contact with solvents and with materials containing volatile organic components, e.g. coal tar, pitch or timber newly treated with creosote.

The Aeroflo Insulated Flooring panels must not be exposed to a naked flame or other ignition sources. Handling and storage arrangements should comply with the recommendations of para. 7 of BS 6203: 1991 (1996) *Guide to Fire Characteristics and Fire Performance of Expanded Polystyrene materials used in Building Applications*.

The Aeroflo Insulated Flooring panels are polyethylene wrapped. Reasonable care must be taken to avoid damage during transit and storage.

Each pack shows the manufacturer's name and product description. Every pack shows the IAB identification mark and Certificate number and contains instructions on storage and installation.

2.4 INSTALLATION PROCEDURE

2.4.1 The ground beneath the floor should be free of topsoil and vegetable matter. The bottom of the excavation must be flat, even, properly compacted and blinded with concrete where necessary. Figure 2 shows a properly compacted and sand blinded hardcore. It is very important that a properly compacted and sand blinded hardcore is laid before the Aeroflo Insulated Flooring System is installed, as any penetration of the legs of the Aeroflo panels into the sand blinding layer (and hardcore) will reduce the gas dispersal performance of the Aeroflo Insulated Flooring System. Damp-proofing and ventilation arrangements must be in accordance with normal good practice, for example provision of damp-proof sleeves to ventilators and adequate drainage of the sub-floor. To ensure that sub-floor ventilation will not enter the wall cavity all wall ventilators must be sleeved through the cavity. Figure 2 also illustrates this clearly. Where a site investigation reveals the presence of methane or radon gases the Aeroflo Insulated Flooring System must be used incorporating an IAB approved gas



Fig. 2 Shows a properly compacted and sand blinded hardcore with through and cavity vents highlighted.

resisting membrane system, in accordance with design requirements and with the recommendations of IS 325: Part 2: 1995, clause 11 of BS CP 102: 1973 *Code of practice for protection of buildings against water from the ground* and with this Certificate.

Guidance on the design of radon protection systems for new and existing buildings is given in DoELG Document: 'Radon in Buildings' and in the BRE (UK) Document: 'Radon - Guidance on protective measures for new dwellings'.

A continuous damp-proof course should be laid along the support wall below the floor level in accordance with CP 102: 1973 - *Code of Practice for protection of buildings against water from the ground*.

Before the Aeroflo Insulated Flooring panels are placed in position, consideration must be given to the ground floor plan layout and area. The panels are then laid in the most efficient way to minimise the amount of cutting of panels required. The panels can readily be cut on site to match sympathetic layouts. Where cutting is required, this should be done with a fine toothed saw or a hot wire cutter. Fig. 3 shows the Aeroflo Insulated Flooring System being laid.

The Aeroflo Insulated Flooring panels are closely butted against each other to keep gaps to a minimum. However the joints between the Aeroflo Insulated Flooring panels



Fig. 3 Aeroflo Insulated Flooring System being laid

are not gas tight. Therefore to make the sub-floor ventilation layer gas tight a suitable IAB approved radon resisting membrane is laid directly on the Aeroflo Insulated Flooring panels in a radon classified area. In a non-radon classified area an approved dpm is required.

Care should be taken to avoid overloading the Aeroflo Insulated Flooring panels during construction. Planks should be laid across the panels before any materials are stacked.

Where a radon resisting membrane is used this will perform the same function as a dpm. Where services puncture a membrane a fully sealed 'Top-Hat' section must be used. Where joints occur in the radon membrane all joints must be taped with a minimum 150 mm overlay.

All radon-resisting membranes must bridge cavities and should form an outward draining cavity tray. Prevention of a slip plane in masonry walls is achieved by locating the radon membrane at a different level to the DPC.

2.4.2 Before pouring the concrete screed, the precise positioning of the Aeroflo Insulated Flooring panels should be checked to ensure that the whole floor area is covered properly. Where necessary boards will be cut to size and all panels will be laid with closely butted joints. Perimeter edge pieces are cut and placed around the perimeter.

Where a reinforcing mesh is used in the slab the mesh should be fixed in position using galvanised spreader plates under the spacers, to avoid puncturing the radon barrier membrane.

When using a concrete pump or skip, concrete should not be discharged onto the Aeroflo Insulated Flooring panels from heights greater than 300 mm and should be spread immediately so that concrete heaps are not formed.

When wheelbarrows are used barrow runs must be provided.

When a fully compacted reinforced slab of at least 150 mm is laid, the relevant clauses of BS 8204 Part 1 : 1987 *Code of Practice for concrete bases and screeds to receive in-situ floorings*; BS 8204 Part 2 : 1987 *Code of Practice for concrete wearing surfaces*; BS 8204 Part 4 : 1993 *Code of Practice for terrazo wearing surfaces*; and BS 8204 Part 5 : 1994 *Code of Practice for mastic asphalt underlays and wearing surfaces* should be followed to complete floor finishes.

Passive venting of sub-floor ventilation layer
The Aeroflo Insulated Flooring System acts as a passive gas protective system which removes unwanted soil gases from beneath buildings. A passive gas protective system comprises an IAB approved gas resistant membrane over a high permeability ventilation layer i.e. Aeroflo Insulated Flooring System. The hazardous soil gases migrate up into the ventilation layer and are diluted and dispersed into the atmosphere by natural phenomena i.e. notably wind, temperature and changing atmospheric pressure.

The Aeroflo Insulated Flooring System sub-floor ventilation layer is made up of an orthogonal ventilation network moulded from expanded polystyrene. The purpose of the ventilation layer is to minimise the concentration of methane, radon (and any other dangerous soil gases) below the gas barrier, to an acceptable concentration level and to ensure that only a minimal differential pressure can develop across the gas barrier, such that if a failure occurs in the gas barrier there is no significant increase in the risk to the occupants in the building. The principal driving force behind passive venting is wind. The wind enters the sub-floor ventilation layer through ventilators strategically positioned in the external walls of the building.

Position and number of ventilators

In the Aeroflo Insulated Flooring System wind enters the ventilation layer through cavity wall vents. The size, type, quantity, location and spacing of ventilator connections to the atmosphere determines the effectiveness of the passive ventilation. The wall ventilators used with the Aeroflo Insulated Flooring System have 6,600mm² free air opening. Fig 4 shows the cavity ventilator used with the Aeroflo Insulated Flooring insulating System.

Ventilator openings must be placed so that the ventilating air will have a free path between opposite sides and to all of the underfloor orthogonal network. The location of ventilators on opposite faces of the ventilation layer promotes cross flow ventilation which in turn reduces the risk of dead spots.

The ventilator openings must be large enough to give a natural opening of at least equivalent to 1,500mm² for each meter run of wall. The cavity ventilators must be sleeved through the cavity and sealed to prevent ventilation of cavity with soil gases. The number of ventilators required for passive ventilating of the Aeroflo Insulated Flooring System is determined by the following formula:

FORMULA						
Total length perimeter of wall in metres	x	The minimum ventilation opening required per meter run of wall = 1,500mm ²	÷	free air opening of the ventilator being used in mm ²	=	Total number of ventilated openings required

A typical example of calculating the number of vents for a building is as follows:

The perimeter of a rectangular shaped building is 40 meters. The cavity vents have a 6,600mm² free air opening.
 $(40m) \times (1,500mm^2) \div (6,600mm^2) = 10$ No. vents.

The vents should then be positioned to maximise airflow. The cavity vents must be provided on at least two sides of the Aeroflo Insulated Flooring System and preferably on all sides. Cavity vents should not be situated directly under any external openings of the above building i.e. windows and doors, as this could lead to soil gases entering the building.

Internal loadbearing walls

Internal loadbearing walls must be constructed off their own independent foundations and must not be constructed off the floor slab. Where internal loadbearing walls occur in the ground floor plan of a building and intercept the underfloor passive ventilation of the Aeroflo Insulated Flooring System, through vents must be provided in these internal loadbearing walls as shown in Figure 2. Through vents prevent the build-up of dead spots in the ventilation area.



Fig. 4 Cavity ventilator

PART

3

DESIGN DATA

3 GENERAL

The Aeroflo Insulated Flooring System consists of moulded expanded polystyrene panels with integral legs forming a ventilation layer and supporting a 150 mm slab. Where necessary to prevent shrinkage and provide crack control a min. A98 mesh should be used. The Aeroflo Insulated Flooring System using IAB approved Radon or Gas resistant membranes is assessed as suitable for ground floor installations when used in accordance with this Irish Agrément Board Certificate.

3.1 LOADING

The Aeroflo Insulated Flooring System has adequate strength and stiffness to sustain the loadings given in Table 1. Maximum long-term deformation will not exceed 1%. Load bearing walls must have independent foundations and must not be constructed off the floor slab

3.2 THERMAL INSULATION

The required maximum U-values can be obtained for typical floor sizes as indicated in Table 2 (See Part 4).

3.3 RADON AND GAS PROTECTION

The Aeroflo Insulated Flooring System can incorporate an IAB approved Radon or Gas resistant membrane placed under the floor slab (See Fig. 5) meeting the requirements of Part C3 Dangerous Substances of the Building Regulations 1997. All Radon or Gas resistant membranes must have adequate tear strength and may incorporate 'folds', designed to cope with settlements or designed movements of the construction.

To facilitate the extraction of dangerous substances such as Radon and Methane, the Aeroflo Insulated Flooring System acts as a passive venting sub-floor ventilation layer. With the overlay of a suitable approved IAB radon

resisting membrane the Aeroflo Insulated Flooring System can be made gas-tight, within the external walls of the building being constructed.

3.4 FIRE PROTECTION

Aeroflo panels in proximity to a constructional hearth or flue must be protected by 250 mm of solid concrete or as detailed in Diagram 4 of the TGD to Part J of the Building Regulations 1997.

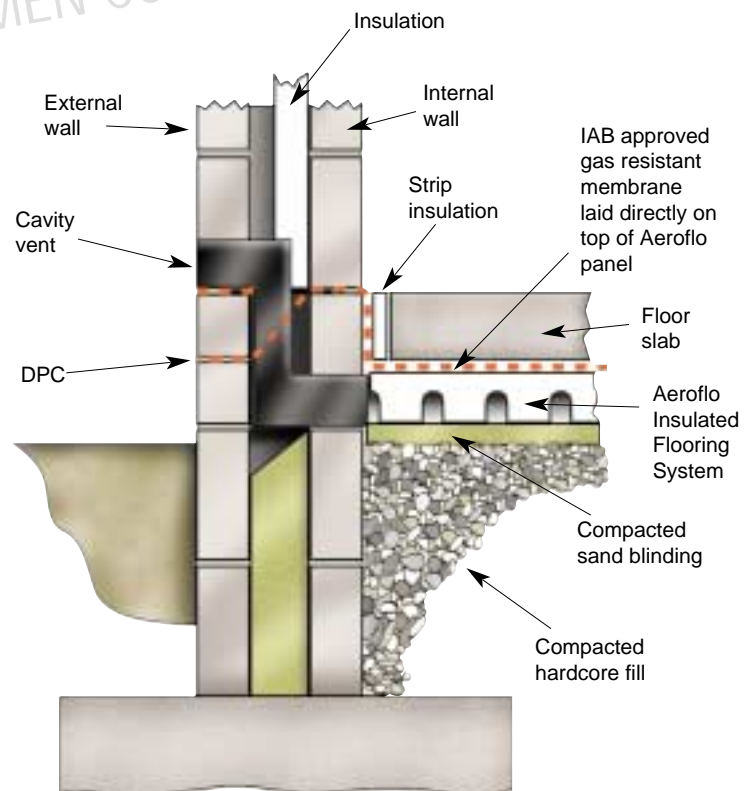


Fig. 5 Aeroflo Insulated Flooring System with IAB approved gas resistant membrane.

4.1 BEHAVIOUR IN FIRE

As the Aeroflo Insulated Flooring panels are separated from the habitable side of the floor by the screed overlay, they will not contribute to the development stages of a fire or present a smoke or toxic hazard.

EPS materials used in proximity to a constructional hearth or flue must be protected by 250 mm of solid concrete or as detailed in Diagram 4 of the TGD to Part J of the Building Regulations 1997.

4.2 MATERIALS IN CONTACT WITH ELECTRIC WIRING

It is recommended that PVC insulated electric cables likely to come in contact with polystyrene foam should be protected by conduit or PVC trunking. As with any form of insulation, de-rating of electric cables should be considered where the insulation restricts the air cooling of cables.

4.3 CFC GASES

Aeroflo Insulated Flooring panels are manufactured without the use of CFC or HCFC gases and are easily recycled.

4.4 WATER VAPOUR PENETRATION AND CONDENSATION RISK

The Aeroflo Insulated Flooring panels have a vapour resistivity exceeding $145 \text{ MNsg}^{-1}\text{m}^{-1}$. They have a significant resistance to the passage of water vapour. The risk of condensation occurring in a floor over the ventilation layer is very low.

4.5 THERMAL INSULATION

Thermal conductivity, λ value,¹ of the Aeroflo Insulated Flooring panels at a density of 20 kgm^{-3} when measured in accordance with BS 874: Part 2: Section 2.1 :1986 *Guarded hot-plate method*, is $0.034 \text{ Wm}^{-1}\text{K}^{-1}$.

4.6 DURABILITY

The Aeroflo Insulated Flooring panels are rot-proof and durable.

4.7 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING:

- – density
- – water vapour resistance
- – water uptake
- – dimensional accuracy
- – compressive and cross- breaking strength
- – dimensional stability
- – thermal conductivity
- – efficiency of construction
- – floor strength
- – adequacy of EPS panels

4.8 OTHER INVESTIGATIONS

(i) Existing data on product properties in relation to fire, toxicity, environmental impact and the effect on mechanical strength/stability and durability were assessed.

(ii) The manufacturing process was examined including the method adopted for quality control, and details were obtained of the quality and composition of the materials used.

(iii) Site visits were conducted to assess the practicability of installation and the history of performance in use of the product.

(iv) A condensation risk analysis was performed.

TABLE 2 - TYPICAL U VALUES ($\text{W/m}^2\text{K}$)

Aeroflo 80 mm HD panels with 150 mm slab overlay					
Floor area m x m U $\text{W/m}^2\text{K}$	4 x 4 0.45	8 x 4 0.44	12 x 4 0.43	16 x 4 0.42	20 x 4 0.42
Floor area m x m U $\text{W/m}^2\text{K}$		8 x 8 0.40	12 x 8 0.38	16 x 8 0.36	20 x 8 0.35
Floor area m x m U $\text{W/m}^2\text{K}$			12 x 12 0.35	16 x 12 0.33	20 x 12 0.32
Floor area m x m U $\text{W/m}^2\text{K}$				16 x 16 0.31	20 x 16 0.30
Floor area m x m U $\text{W/m}^2\text{K}$					20 x 20 0.28

5.1 CONDITIONS OF CERTIFICATION

The National Standards Authority of Ireland ("NSAI") following consultation with the Irish Agrément Board ("IAB") has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this Certificate and in accordance with the manufacturer's instructions and usual trade practice. This Certificate shall remain valid so long as:

- (a) the specification of the product is unchanged;
- (b) the Building Regulations 1997 and any other regulation or standard applicable to the product/process, its use or installation remain unchanged;
- (c) the product continues to be assessed for the quality of its manufacture and marking by NSAI.
- (d) no new information becomes available which in the opinion of the NSAI, would preclude the granting of the Certificate.
- (e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this Certificate.

5.2 The IAB mark and certification number may only be used on or in relation to product/processes in respect of which a valid Certificate exists. If the Certificate becomes invalid the Certificate holder must not use the IAB mark and certification number and must remove them from the products already marked.

5.3 In granting Certification, the NSAI makes no representation as to;

- (a) the absence or presence of patent rights subsisting in the product/process; or
- (b) the legal right of the Certificate holder to market, install or maintain the product/process; or
- (c) whether individual products have been manufactured or installed by the Certificate holder in accordance with the descriptions and specifications set out in this Certificate.

5.4 This Certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

5.5 Any recommendations contained in this Certificate relating to the safe use of the certified product/process are preconditions to the validity of the Certificate. However the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this Certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act. 1989, or of any other current or future common law duty of care owed by the manufacturer or by the Certificate holder.

5.6 The NSAI is not responsible to any person or body for loss or damage including personal injury arising as a direct or indirect result of the use of this product or process.

5.7 Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made thereunder, Statutory Instrument, Code of Practice, National Standards, Manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certification.

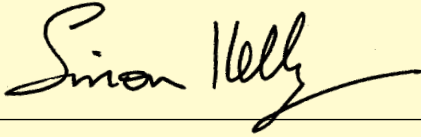
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THE IRISH AGRÉMENT BOARD

This Certificate No. 00/0114 is accordingly granted to Aerobord Ltd. on behalf of The Irish Agrément Board.

Date of Issue November 2000

Signed: _____



Chief Executive, NSAI

Readers may check that the status of this Certificate has not changed by contacting the Irish Agrément Board, NSAI, Glasnevin, Dublin 9, Ireland.

Telephone: (01) 8073800.

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BUILDING PRODUCT CERTIFICATION

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