



## Euroroof Ltd

Denton Drive  
Northwich  
Cheshire CW9 7LU

Tel: 0606 48222 Telex: 669205 EUROOF-G  
Fax: 0606 49940

**Agrément  
Certificate  
No 90/2486**

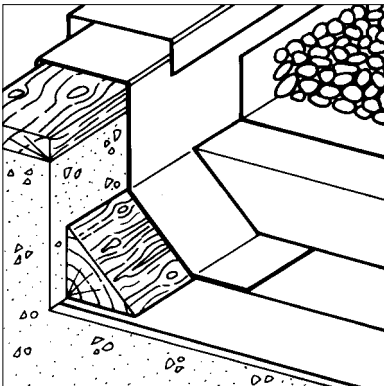
Designated by Government  
to issue  
European Technical  
Approvals

## TOPFOAM ROOFBOARDS 220 AND 350 VACUUM EXTRUDED POLYSTYRENE BOARDS

Isolation pour toitures  
Dachabdichtungen


### Product

- THIS CERTIFICATE RELATES TO TOPFOAM ROOFBOARD 220 AND ROOFBOARD 350 VACUUM EXTRUDED POLYSTYRENE BOARDS.
- The products are for use as a thermally insulating layer on flat roofs with limited access in the protected membrane roof system, on suitably designed concrete, metal or timber decks.



### Building Regulations

#### 1 The Building Regulations 1985 (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 roof insulation with the Building Regulations. In the opinion of the BBA, Roofboard 220 and Roofboard 350, if used in accordance with the provisions of this Certificate, will meet the relevant requirements.

Requirement: L2/3

Resistance to the passage of heat

Comment:

When used in accordance with this Certificate, Roofboard 220 and Roofboard 350 will contribute towards enabling a roof to meet the U value of buildings subject to the requirements of L2 and L3. See sections 11.1 to 11.6 of this Certificate.


Requirement: Regulation 7

Materials and workmanship

Comment:

Roofboard 220 and Roofboard 350, installed in accordance with this Certificate, are acceptable materials. See section 14 of this Certificate.

#### 2 The Building Standards (Scotland) Regulations 1981 to 1987

 In the opinion of the BBA, Roofboard 220 and Roofboard 350, if used in accordance with the provisions of this Certificate, will satisfy the various Regulations as listed below.

Regulation: B2

Selection and use of materials

Comment:

Roofboard 220 and Roofboard 350 are acceptable when installed in accordance with this Certificate. See section 14 of this Certificate.

Regulation: D19

Structural fire precautions — Roofs

Regulation: D21

Special provisions as to certain groups of garages

Regulation: D22

Special provisions as to certain small garages and carports

Regulation: D23

Attached greenhouses, carports and covered ways

Comment:

When used in conjunction with appropriate roof decks and roof finishes, Roofboard 220 and Roofboard 350 are unrestricted under these Regulations. See sections 9.3 and 9.4 of this Certificate.

Regulation: G10

Control of interstitial condensation

Comment:

When used in accordance with this Certificate, Roofboard 220 and Roofboard 350 will contribute towards enabling a roof to satisfy the requirements. See section 12 of this Certificate.

Regulation: J3

Resistance to the transmission of heat and means to conserve energy — Walls, floors and roofs

Comment:

When used in accordance with this Certificate, Roofboard 220 and Roofboard 350 will contribute towards enabling a roof to satisfy the requirements. See sections 11.1, 11.2, 11.6 and 11.8 of this Certificate.

# Electronic Copy

## 3 The Building Regulations (Northern Ireland) 1977 (as amended)



In the opinion of the BBA, Roofboard 220 and Roofboard 350, if used in accordance with the provisions of this Certificate, will satisfy the various Building Regulations as listed below.

Regulation:	<b>B1</b>	Fitness of materials
Comment:		Roofboard 220 and Roofboard 350 are acceptable when installed in accordance with this Certificate. See section 14 of this Certificate.
Regulation:	<b>E17</b>	Structural Fire Precautions — Roofs
Comment:		When used in conjunction with appropriate roof decks and roof finishes, Roofboard 220 and Roofboard 350 are unrestricted under this Regulation. See sections 9.3 and 9.4 of this Certificate.
Regulation:	<b>F3(1)</b>	Maximum U values of walls, floors and roofs
Regulation:	<b>FF3</b>	Conservation of Fuel and Power
Comment:		When used in accordance with this Certificate, Roofboard 220 and Roofboard 350 will contribute towards enabling a roof to satisfy the requirements. See sections 11.1, 11.2, 11.6 and 11.8 of the Certificate.

## Technical Specification

### 4 Description

4.1 Roofboard 220 and Roofboard 350 are manufactured by a continuous vacuum extrusion process which forms a skin on both sides. The boards are cut to size and the edges rebated (see Figure 1).

4.2 The protected membrane roof system incorporates the boards above the waterproofing membrane, ie an upside-down or inverted configuration (see Figure 2).

4.3 The nominal characteristics of the boards are given in Table 1.

4.4 The boards must be covered by one of the protective finishes described in section 17 of this Certificate, depending on the access to the roof, wind effects, etc.

4.5 A range of accessories is available from the supplier but these have not been assessed by the BBA and are not covered by this Certificate. The range includes:

- dual-level rainwater outlets
- paving supports
- filter layer
- separation layer
- flashings.

4.6 Quality control is maintained throughout production and finished boards are checked visually and measured for dimensional accuracy. Samples are taken at regular intervals to check:

- compressive stress
- density
- thermal conductivity
- presence of flame retardant additive.

Figure 1 Rebate detail

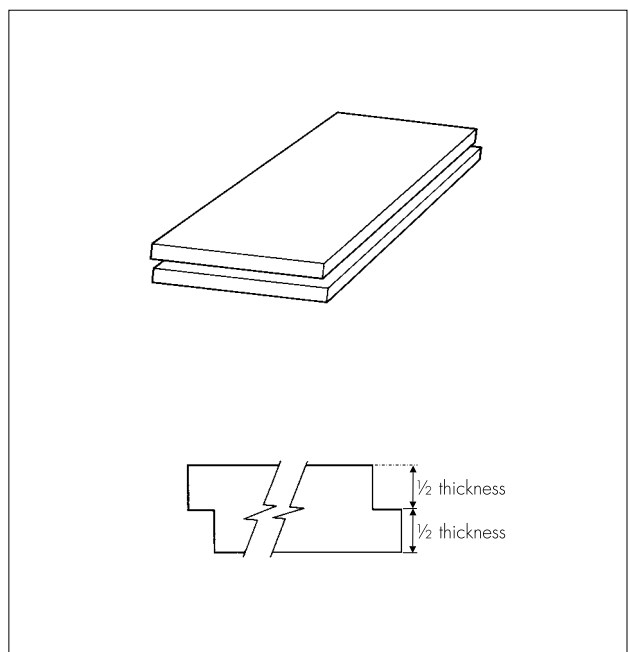


Figure 2 Typical arrangement of protected membrane roof system

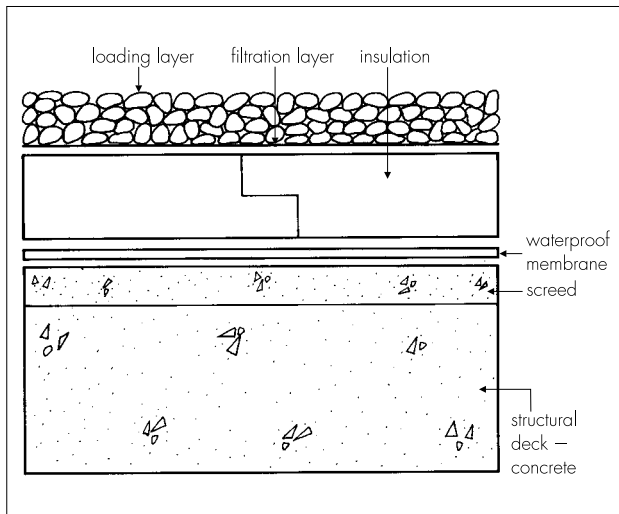


Table 1 Nominal characteristics

Characteristic (unit)	Roofboard 220	Roofboard 350
Density ( $\text{kgm}^{-3}$ )	27	35
Thermal conductivity ( $\text{Wm}^{-1}\text{K}^{-1}$ ) (at 10°C mean temperature)	0.027	0.026
Compressive stress at 10% relative deformation (kPa)	220	350
Work size (mm)	1250 x 600	1250 x 600
Overall size (mm)	1265 x 615	1265 x 615
Rebate size (mm)	15 x 1/2 board thickness	15 x 1/2 board thickness
Standard thickness (mm)	50 and 75	50 and 75

## 5 Delivery to site and storage

5.1 Roofboard 220 and Roofboard 350 are delivered to site wrapped in polythene film. Each pack bears a label incorporating the BBA identification mark and the number of this Certificate in addition to the following details:

board dimensions and type of edge profile  
number of boards in pack  
grade of insulation  
manufacturer's reference codes.

5.2 The boards must be protected from prolonged exposure to sunlight by either storing them under cover or covering them with light-coloured, opaque polythene sheets.

5.3 Care must be taken to prevent contact with solvent-based wood preservatives, coal tar and derivatives (eg creosote), paint thinner and solvents (eg toluene, white spirit).

5.4 The boards must not be exposed to naked flame or other ignition sources.

## Design Data

### 6 General

6.1 Roofboard 220 and Roofboard 350 are for use in the protected membrane roof system as a thermal insulation layer on limited access flat roofs. The deck must be either concrete (a minimum of 50 mm thick), timber or metal (covered with a suitable boarded material to take the waterproofing membrane).

6.2 The deck must have a thermal resistance of at least  $0.15 \text{ m}^2 \text{ KW}^{-1}$  and be designed in accordance with the relevant clauses of CP 144 : Part 3 : 1970 *Roof coverings — Built-up bitumen felt. Metric units*, CP 144 : Part 4 : 1970 *Mastic asphalt. Metric units*, BS 6229 : 1982 *Code of practice for flat roofs with continuously supported coverings* and, where appropriate, NHBC Practice Note 13.

6.3 Decks should be covered with one, or more, of the following waterproof specifications:

(a) built-up bitumen felt to BS 747 : 1977(1986) *Specification for roofing felts*, excluding the rag based grade, in accordance with CP 144 : Part 3 : 1970;

(b) mastic asphalt in accordance with CP 144 : Part 4 : 1970;

(c) other waterproofing systems which are the subject of a current Agrément Certificate laid in accordance with, and within the limitations imposed by, that Certificate.

6.4 Limited access roofs are defined for the purpose of this Certificate as those roofs that are subjected only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters, etc. Where traffic in excess of this is envisaged, special precautions such as the use of additional protection to the membrane must be taken.

6.5 Flat roofs are defined for the purpose of this Certificate as those roofs having a minimum finished fall of 1:80. Pitched roofs are defined as those having falls in excess of 1:6. Where the finished fall is less than 1:80 the waterproofing layer must be to tanking specification which is the subject of a current Agrément Certificate, laid in accordance with, and within the limitations imposed by, that Certificate.

6.6 For design purposes on flat roofs, twice the minimum finished fall should be assumed unless a detailed analysis of the roof is available, including overall and local deflection, direction of falls, etc.

6.7 Where there is a risk from plasticiser migration or other contaminants from the roof waterproofing, a suitable plastic fibre, or similar, isolating sheet must be interposed between the roof covering and the boards in accordance with the manufacturer's instructions.

## 7 Resistance to foot traffic

7.1 When covered with one of the protection systems described in section 17 the system can accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance operations.

7.2 Where regular foot traffic is envisaged, ie access to lift motor rooms, walkways of paving on suitable supports must be provided. Where such traffic cannot be controlled, paving slabs must be used as the loading medium.

## 8 Resistance to plant growth and insects


8.1 The boards, when covered with one of the protection systems described in section 17, will not normally support the growth of plants. However, where there is a run-off from a large sill or gully onto the surface of the roof, the excessive build-up of silt may provide conditions for germination of seeds. Therefore this type of detail should be avoided. Growth that may occur will be restricted, will not normally affect the performance of the roof, and will be no worse than that which may occur on normal flat roofs.

8.2 Small insects may be found under the boards, they will neither attack nor have any effect on the performance or durability of the roof.

## 9 Properties in relation to fire

9.1 When the boards are used in the protected membrane roof system and ballasted with aggregate (minimum depth of 50 mm) the roof may be deemed to be of designation AA. The roof, therefore, meets Requirement B4(2) of the Building Regulations 1985 (England and Wales).

9.2 The designation of other specifications should be confirmed by test or assessment in accordance with clause A1 of Appendix A of the Approved Document B2/3/4 of the Building Regulations 1985 (England and Wales).


 9.3 When the boards are used in the protected membrane roof system and ballasted by aggregate (minimum depth of 50 mm) the roof may be considered to be of designation AA and therefore satisfies the requirements of Regulations D19, D21, D22 and D23 of the Building Standards (Scotland) Regulations 1981 to 1987 and Regulation E17 of the Building Regulations (Northern Ireland) 1977 (as amended).

9.4 The designation for other specifications should be confirmed by test or assessment.


## 10 Effect on roof coverings

The protected membrane roof system will provide solar protection and also limit the range of temperature to which the waterproofing membrane will be subjected. Placing the insulation on top of the roof covering will normally lead to an extended life provided the top layer of the membrane is strengthened with a durable reinforcement (eg glass and/or polyester).

## 11 Thermal insulation


 11.1 The thermal conductivity ( $\lambda$  value) of Roofboard 220 and Roofboard 350, when measured using the guarded hot-plate method conforming to BS 874 : Part 2 : Section 2.1 : 1986 *Methods for determining thermal insulating properties — Tests for thermal conductivity and related properties — Guarded hot-plate method*, were found to be  $0.027 \text{ Wm}^{-1}\text{K}^{-1}$  and  $0.026 \text{ Wm}^{-1}\text{K}^{-1}$  respectively.

11.2 For the purpose of U value calculations to determine if the requirements of the Building or of other statutory Regulations are met, the thermal conductivity ( $\lambda$  value) of the boards may be taken as detailed in section 11.1.

 11.3 Table 3 of Approved Document L2/3 of the Building Regulations 1985 (England and Wales) gives guidance on the selection of the correct thickness of insulation. The table can be used to calculate the thickness of insulation required to achieve the U value required by the Building Regulations.

11.4 Example calculations using Approved Document L2/3, Table 3, show that a roof containing Topfoam boards with the minimum thickness (given in Table 2) will meet the required U values of the relevant building type, regardless of the contribution to the insulation value by the rest of the construction.

11.5 For thicknesses of insulation less than those quoted, the contribution to the insulating value by the construction may be taken into account, resulting in a reduction of the minimum insulation thicknesses required. Calculations based on Table 3 of Approved Document L2/3 give the permissible reductions given in Table 3.

 11.6 Rainfall slightly affects the rate of loss of heat of the roof systems but, once it has stopped, the normal heat/loss pattern of the roof resumes. To compensate for the effect the required thickness of the insulation is increased by 20%.

11.7 When a cushion layer, ie Ethafoam, is incorporated between the waterproofing membrane and the boards, the effect of rainfall on the thermal insulation is likely to be slightly reduced.


 11.8 Topfoam can contribute towards enabling a roof to satisfy the requirements of Regulations J3 of the Building Standards (Scotland) Regulations 1981 to 1987 and Regulations F3(1) and FF3 of the Building Regulations (Northern Ireland) 1977 (as amended).


Table 2 Minimum insulation thickness

Building type	Required U value (Wm <sup>-2</sup> K <sup>-1</sup> )	Minimum insulation thickness (mm)	
		Roofboard 220	Roofboard 350
Dwellings	0.35	74	71
Industrial/storage	0.70	35	34
Any other building	0.60	41	40

Table 3 Permissible reduction of insulation thickness

Element of construction	Permissible reduction (mm)	
	Roofboard 220	Roofboard 350
At least 25 mm air or roof space	4	4
At least 40 mm screed	2	2
At least 100 mm concrete beams or slabs with a dry density of not more than 500 kgm <sup>-3</sup>	17	16
Lightweight plaster or plasterboard	2	2
Plasterboard on framing	5	5
Insulating plasterboard on framing	8	8

## 12 Condensation risk

 12.1 Warm water trapped under the boards is likely to be replaced by colder water when it is raining. During heavy or continuous rainfall, therefore, the roof waterproofing and the deck will be cooled (if condensation does occur it will be short term, disappearing when the rain stops).

12.2 Interstitial condensation will not be a problem with concrete decks but metal and timber decks will be subjected to short periods of moisture; timber, therefore, must be treated with a suitable preservative in accordance with BS 5268 : Part 5 : 1977 *Structural use of timber — Preservative treatments for constructional timber*, BRE Digest 180 *Condensation in roofs* should be consulted.

## 13 Maintenance/upgrading


13.1 The protected membrane roof system should require little or no maintenance other than annual removal of any plants and checking that the gravel loading, if used, has not been displaced, and is not blocking a gully.

13.2 Should a leak occur in the roof waterproofing, access to it is achieved by removal of the surface protection and the boards.

13.3 Protected membrane roofs are able to accept upgrading of the thermal insulation at a later date without difficulty, provided there is sufficient height to parapets, rooflights, etc. Where there is insufficient height, they must be modified to accommodate the additional thickness. Should more loading be needed it must be established that the deck can support it.

13.4 If upgrading involves laying boards on top of the existing boards, rather than replacement with thicker boards, the advice of Eurorroof Ltd should be sought.

## 14 Durability

 14.1 Topfoam boards are unaffected by freeze/thaw cycles and water.

14.2 The protected membrane roof system will have a life of at least 20 years under normal circumstances, when a topping of gravel, paving or concrete is used.

14.3 New roof coverings on which a Topfoam specification is laid can be expected to have a life in excess of that obtained when they are used in an exposed situation.

14.4 When used to upgrade existing roofs the system can be expected to extend the remaining life of the roof waterproofing provided it is in a sound condition when the boards are laid.

## Installation

### 15 General

15.1 Decks must be designed to take account of the loads imposed by the heavy protective finishes described in section 17.

15.2 Decks must be covered by one of the waterproofing specifications described in section 6.3.

15.3 If a separation sheet or a cushion layer is being used, this is loose laid and one layer of boards is laid in accordance with the manufacturer's instructions.

15.4 It is essential that all joints between the boards are tight and no gaps exist where they meet rooflights, edge details and other services which perforate the roof deck. Where required, the boards can be cut easily using a handsaw or knife.

15.5 The boards may be installed in any weather but care should be taken in high winds. Installers must not carry boards near to parapets or apertures in the deck and, once placed, the boards must be loaded immediately.

# Electronic Copy

15.6 None of the heavy protections should be piled or stacked in one place on the roof deck unless it is strong enough to carry the loads.

## 16 Procedures

**New constructions** (Figures 3, 4, 5 and 6)

16.1 It is essential to establish that the roof waterproofing has been installed correctly and that it is weathertight. Every joint between sheets, flashing details, etc must be checked to ensure that the roof covering is suitable for a protected membrane roof specification. Single-layer roofings must be the subject of very close scrutiny, and the inspection must include an examination for perforation and for the likelihood of subsequent perforation from beneath by uneven decks, protruding nail heads, etc.

16.2 The roof covering must be clean and free from any extraneous matter.

16.3 When a single-layer, loose-laid waterproofing membrane or tanking specification is used, a cushion layer should be interposed between the membrane and the roof deck, and a filter layer should be interposed between the boards and the ballast.

16.4 When a tanking specification waterproofing membrane is used, a separation layer should be interposed between the membrane and the insulation, and a filter layer between the insulation boards and the ballast.

16.5 When the boards are installed they should be ballasted as soon as possible to protect the membrane, if loose laid, from the effects of wind uplift and to protect the boards from solar degradation.

16.6 Installers of the boards must take care not to damage the roof waterproofing, particularly in the case of thin single-layer membranes.

### Upgrading existing constructions

16.7 All the requirements detailed in sections 16.1 to 16.5 apply and the existing roofing and substructure must be examined for degradation and repairs effected.

16.8 Provision must be made to accommodate the increased depth of insulation/protection where parapets, details, services, etc have insufficient height, ie a minimum of 150 mm from the top of the gravel to the top of skirtings, etc.

16.9 Rainwater outlets will need to be replaced or modified accordingly, eg by the installation of gravel guards.

## 17 Protective finishes

17.1 To prevent flotation, wind uplift and UV degradation, the 50 mm thick boards must be loaded with a minimum 50 mm deep layer of

washed rounded gravel, nominal size 20 mm to 40 mm, or washed broken stone of similar size. Thicker boards require a greater depth of gravel, ie the same thickness as the insulation.

17.2 It is essential that the depth and size of gravel are such that complete cover and protection is afforded to the boards.

17.3 The proportion of fines in the aggregate should be kept to a minimum to prevent the risk of gullies being blocked and to discourage organic growth.

17.4 With single-membrane roof waterproof coverings or tanking specifications, only washed, well rounded aggregate of nominal diameter 20 mm to 40 mm should be used. In addition a non-woven, vapour-permeable polyester filter sheet must be placed between the aggregate and the boards to prevent fine grit getting under the boards where it might damage the membrane, or block the rainwater gullies.

17.5 The dead load imposed by 50 mm of gravel is approximately  $80 \text{ kgm}^{-2}$ , therefore the deck must be capable of withstanding this and any additional loads, static or imposed.

17.6 The gravel loading specification is used on roofs in sheltered regions or low- to medium-rise buildings up to 10 storeys. When laid in moderate exposure zones, or on buildings of up to 15 storeys, the gravel specification is permitted but the perimeter should be loaded with paving. For severe exposure zones or tall buildings, specialist advice should be sought. BRE Digest 3111 *Wind scour of gravel ballast on roofs* should be used when a calculation is required for a specific building project.

### Paving slabs

17.7 Depending on access to the roof, wind effects, etc the following arrangements should be used:

- (1) standard pressed concrete paving slabs on appropriate spacers, but see section 17.8, or
- (2) standard pressed concrete paving slabs or paving bricks on 20 mm depth of either gravel graded 4 mm to 8 mm, on a slip sheet of non-woven synthetic fibre fleece or fine polyethylene mesh, aperture 2 mm or less.

17.8 The paving should have a minimum thickness of 40 mm on boards 50 mm thick, and 50 mm on boards 75 mm thick to prevent flotation of the boards in the event of accidental blockage of the rainwater outlets.

17.9 The deck must carry safely the additional load of approximately  $100 \text{ kgm}^{-2}$  for the 40 mm thick slabs or  $125 \text{ kgm}^{-2}$  for the 50 mm thick slabs.

Figure 3 Gully detail — two-level drainage

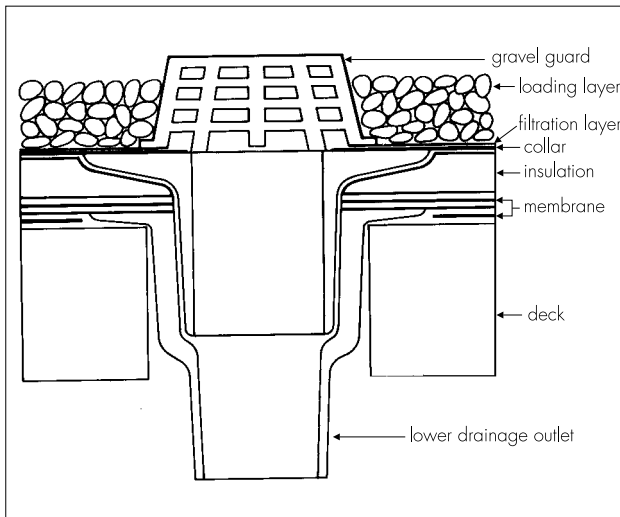


Figure 4 Parapet roof detail — tanking specification

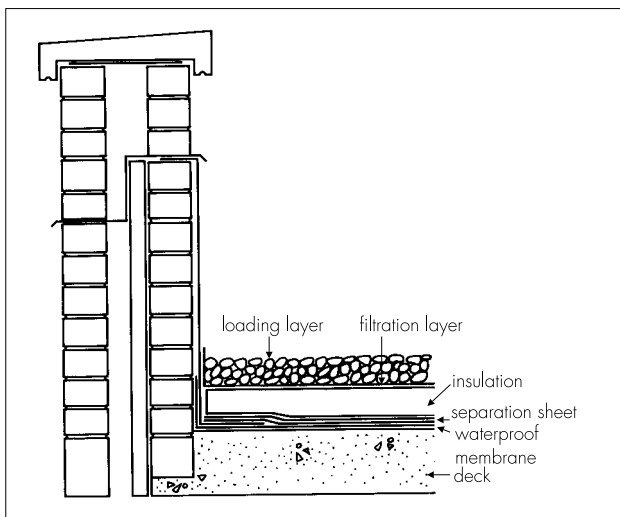


Figure 5 Parapet roof deck detail — bituminous waterproofing membrane

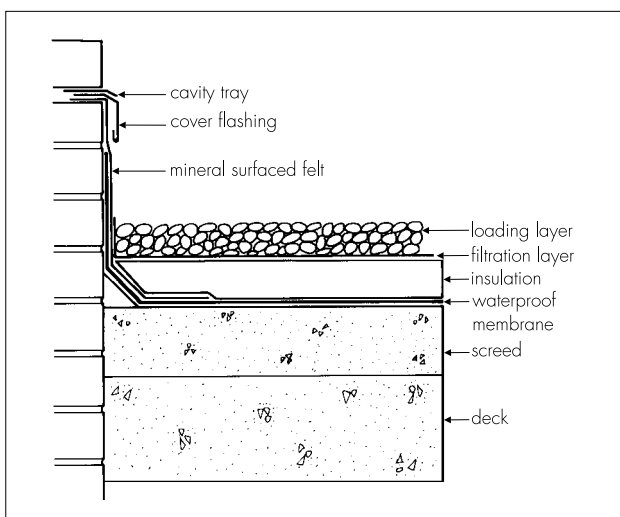
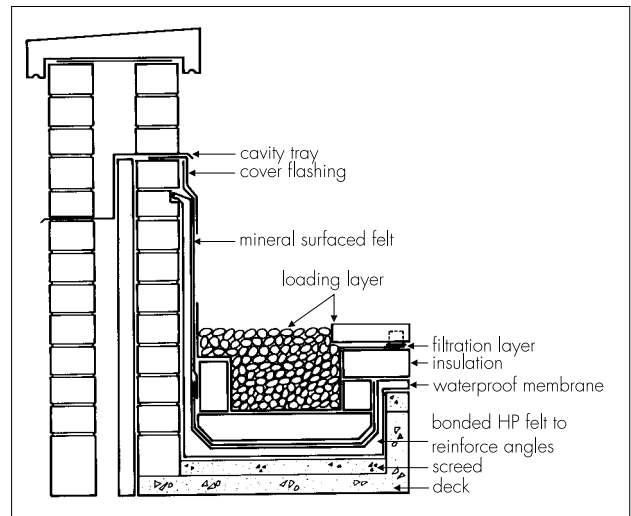


Figure 6 Parapet roof deck gutter detail (mastic asphalt)



17.10 The method of laying and bedding will depend upon the form of the roof and the manufacturer's advice should be sought.

## Concrete

17.11 A concrete screed is cast, in accordance with BS 6229 : 1982 *Code of practice for flat roofs with continuously supported coverings*, on building paper laid over a 25 mm thick drainage layer of 6 mm pea gravel on a non-woven synthetic fleece.

17.12 The additional load imposed by this protection can be calculated on the basis that every 10 mm of thickness will load the roof deck by approximately 25 kgm<sup>-2</sup>.

17.13 In addition, the drainage layer will impose a load of approximately 40 kgm<sup>-2</sup>.

## Technical Investigations

The following is a summary of the technical investigations carried out on Roofboard 220 and Roofboard 350 in the protected membrane roof system.

## 18 Tests and investigations

18.1 Tests on Roofboard 220 and Roofboard 350 were carried out to determine:

- thermal conductivity
- dimensional accuracy
- density
- compressive strength
- cohesive strength
- shear strength

# Electronic Copy

flexural strength  
coefficient of thermal expansion  
shrinkage on heating  
resistance to bowing under a thermal gradient  
moisture movement  
water vapour permeability  
moisture content  
moisture absorption.

18.2 The following tests were carried out on Roofboard 220 and Roofboard 350 subjected to heat ageing and water immersion:

compressive strength  
cohesive strength  
shear strength  
flexural strength.

18.3 Data were examined in respect of:

thermal conductivity  
compressive strength.

18.4 Tests were performed on behalf of the BBA on Roofboard 220 and Roofboard 350 to determine:

density  
thermal conductivity  
compressive strength  
flexural strength  
dimensional stability with temperature  
water vapour permeance  
burning characteristics  
water absorption.

## 19 Other investigations

19.1 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.

## Conditions of Certification

## 20 Conditions

20.1 The quality of materials and the method of manufacture have been examined and found

satisfactory by the BBA and must be maintained to this standard during the period of validity of this Certificate. This Certificate will remain valid for an unlimited period provided that:

- (a) the specification of the product is unchanged, and
- (b) the manufacturer continues to have the product checked by the BBA.

20.2 Where reference is made in this Certificate to any Act of Parliament, Regulation made thereunder, Statutory Instrument, Code of Practice, British Standard, manufacturer's instruction 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 Certificate.

20.3 In granting this Certificate, the BBA makes no representation as to the presence or absence of patent rights subsisting in the product and/or as to the legal right of Eurorof Ltd to market, install or maintain the product.

20.4 It should be noted that any recommendations relating to the safe use 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 re-state the requirements of the Health and Safety at Work etc Act 1974, or of any other statutory or Common Law duties of care, or of any duty of care which may in the future exist; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any other present or future statutory or Common Law duties of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage incurred in respect of personal injury arising as a direct or indirect result of the use of this product.



In the opinion of the British Board of Agrément, Topfoam Roofboards 220 and 350 Vacuum Extruded Polystyrene Boards are satisfactory if used as set out in the above text. This Certificate No 90/2486 is accordingly awarded to Eurorof Ltd.

On behalf of the British Board of Agrément

A handwritten signature in black ink, appearing to read 'P. C. Newson'.

Date of issue: 8th June 1990

Director

Recreated in QX 10.4.03 (sm)