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**Agrément
Certificate
No 06/4355**

Designated by Government
to issue
European Technical
Approvals

MARLEY ETERNIT CLADDING PANELS

Façade en ciment renforcé par fibres
Verkleidung von Faserverstärkter Zement

Product



- THIS CERTIFICATE RELATES TO MARLEY ETERNIT CLADDING PANELS, FIBRE-REINFORCED CEMENT BOARDS FOR WALL CLADDING.

- The products meet the requirements of BS EN 12467 : 2004.

- The products are for use as exterior non-loadbearing, decorative panels for wall claddings.

- The products have not been assessed for use as a sheathing material for timber-frame dwellings.

Regulations — Detail Sheet 1

1 The Building Regulations 2000 (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 cladding systems with the Building Regulations. In the opinion of the BBA, Marley Eternit Cladding Panels, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements listed below.

Requirement: **A1**

Loading

Comment:

The products are acceptable for use. See the tinted areas in the *General* section of these Front Sheets and the *Strength and stability* section of the accompanying Detail Sheets.

Requirement: **B4(1)**

External fire spread

Comment:

The products are unrestricted by this Requirement. See the tinted areas in the *Performance in relation to fire* section of the accompanying Detail Sheets.

Requirement: **C2(b)**

Resistance to moisture

Comment:

The products do not provide a watertight facing, but will resist the passage of rainwater to the supporting structure. See the tinted area of the *Air and water penetration* section of these Front Sheets.

Requirement: **Regulation 7**

Materials and workmanship

Comment:

The products are acceptable. See the tinted areas of the *Durability* section of the accompanying Detail Sheets.

continued

continued

• It is essential that the product is used in accordance with the Certificate holder's instructions and the Design Data and Installation sections of this Certificate.

These Front Sheets must be read in conjunction with the relevant accompanying Detail Sheets, which provide information specific to the panels.

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2 The Building (Scotland) Regulations 2004



In the opinion of the BBA, Marley Eternit Cladding Panels, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Mandatory Standards as listed below.

Regulation:	8	Fitness and durability of materials and workmanship
Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The products can contribute to a construction satisfying this Regulation. See the tinted areas of the <i>Durability</i> section and the <i>Installation</i> part of the accompanying Detail Sheets.
Regulation:	9	Building standards — construction
Standard:	1.1(a)(b)	Structure
Comment:		The products are acceptable for use, with reference to clause 1.1.1 ⁽¹⁾⁽²⁾ . See the tinted areas in the <i>General</i> section of these Front Sheets and the <i>Strength and stability</i> section of the accompanying Detail Sheets.
Standard:	2.4	Cavities
Comment:		The products are 'low risk' material. Cavity barriers should be provided as required by clause 2.4.2 ⁽¹⁾⁽²⁾ of this Standard. See the tinted areas in the <i>Performance in relation to fire</i> section of the accompanying Detail Sheets.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The products are unrestricted by this Standard, with reference to clauses 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ . See the tinted areas in the <i>Performance in relation to fire</i> section of the accompanying Detail Sheets.
Standard:	2.7	Spread on external walls
Comment:		The products are unrestricted by this Standard, with reference to clause 2.7.1 ⁽¹⁾⁽²⁾ . See the tinted areas in the <i>Performance in relation to fire</i> section of the accompanying Detail Sheets.
Standard:	3.10	Precipitation
Comment:		The products do not form a watertight facing, but will resist the passage of rainwater to the supporting structure, with reference to clause 3.10.3 ⁽¹⁾⁽²⁾ . See the tinted area of the <i>Air and water penetration</i> section of these Front Sheets.
Regulation:	12	Building standards — conversions
Comment:		All comments given for these products under Regulation 9, also apply to this Regulation with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).

3 The Building Regulations (Northern Ireland) 2000



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

Regulation:	B2	Fitness of materials and workmanship
Comment:		The products are acceptable. See the tinted areas of the <i>Durability</i> section of the accompanying Detail Sheets.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		The products do not form a watertight facing, but will resist the passage of rainwater to the supporting structure. See the tinted area of the <i>Air and water penetration</i> section of these Front Sheets.
Regulation:	D1	Stability
Comment:		The products are acceptable for use. See the tinted areas in the <i>General</i> section of these Front Sheets and the <i>Strength and stability</i> section of the accompanying Detail Sheets.
Regulation:	E5	External fire spread
Comment:		The products are unrestricted by this Regulation. See the tinted areas in the <i>Performance in relation to fire</i> section of the accompanying Detail Sheets.

4 Construction (Design and Management) Regulations 1994 (as amended) Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

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

See sections: 1 *Description* (1.3) and 2 *Delivery and site handling* (2.1) of the accompanying Detail Sheets.

5 General

5.1 Marley Eternit Cladding Panels are suitable for use as exterior wall claddings. It is essential that walls are designed and constructed incorporating the normal precautions to prevent moisture penetration.



5.2 The wall and support framing to which the panel is fixed should be structurally sound and constructed in accordance with the relevant Building Regulations and national Standards.

5.3 The strength and stability of the sub-frame fixings have not been assessed and are outside the scope of this Certificate.

5.4 In accordance with BS 8200 : 1985, a minimum ventilation area of 5000 mm² per metre run should be provided at the top and bottom of the cladding.

6 Air and water penetration



6.1 The panels are not airtight, watertight or water-vapourtight. When used on timber stud walls the panels must be backed by a breather membrane acting as a vapour-permeable water barrier, incorporated behind the cladding under the supporting battens. This barrier must meet the requirements of BS 4016 : 1997 and have a vapour resistance less than 0.6 MNsg⁻¹ when calculated from the results of tests carried out at a temperature of 25°C and a relative humidity of 75%, in accordance with BS 3177 : 1959.

6.2 Provision must always be made to allow water that has penetrated behind the cladding to drain away.

BS 3177 : 1959 *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*

BS 4016 : 1997 *Specification for flexible building membranes (breather type)*

BS 8200 : 1985 *Code of practice for design of non-loadbearing external vertical enclosures of buildings*

BS EN 12467 : 2004 *Fibre-cement flat sheets—Product specification and test methods*

7 Conditions

7.1 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.

7.2 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, are references to such publication in the form in which it was current at the date of this Certificate.

7.3 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.

7.4 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 or 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.

7.5 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 or in the future; nor is conformity with such information 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 manufacture, supply, installation, use and maintenance of this product/system.



In the opinion of the British Board of Agrément, Marley Eternit Cladding Panels are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 06/4355 is accordingly awarded to Marley Eternit Ltd.

On behalf of the British Board of Agrément

Date of issue: 18th September 2006

Chief Executive



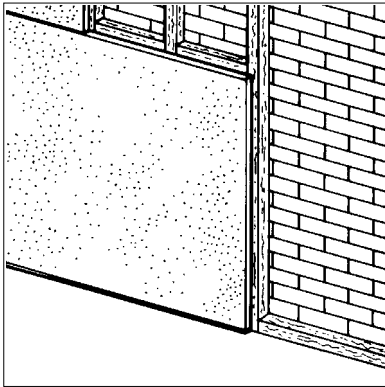
Marley Eternit Ltd

Certificate No 06/4355

MULTICLAD (PAINTED) AND PAINTBOARD (NATURAL) CLADDING PANELS

DETAIL SHEET 2

Product



- THIS DETAIL SHEET RELATES TO MULTICLAD (PAINTED) AND PAINTBOARD (NATURAL) CLADDING PANELS.
- The product is a fibre-reinforced cement board for cladding on external walls.
- It is essential that the cladding is installed in accordance with the manufacturer's instructions and the requirements of this Detail Sheet.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the Conditions of Certification and the products' position regarding Building Regulations.

Technical Specification

1 Description

1.1 Multiclad (Painted) and Paintboard (Natural) Cladding Panels comprise fibre-reinforced cement panels, satisfying the requirements of Category A, Class 2 to BS EN 12467 : 2004.

1.2 The panels are manufactured by a batch blending operation, followed by the Hatchek process and high-pressure steam autoclaving. Quality control is maintained over raw materials, during processing and on the finished product.

1.3 The panels have the characteristics of:

thickness (mm)	9
width (mm)	1220
length (mm)	2500, 3050
weight/area (kgm ⁻²)	10.8
density (kgm ⁻³)	1200

1.4 Multiclad panels are supplied with a factory-applied acrylic coating in a range of 22 colours and Paintboard in a natural finish.

2 Delivery and site handling

2.1 The panels are delivered on wrapped pallets weighing up to approximately 1200 kg. They can

be off-loaded by either mechanical handling equipment or by manually removing individual panels.

2.2 The panels should be stored flat, under cover, and on a dry, level surface. Stacks of loose panels should not exceed one metre in height.

2.3 Each panel is marked with the product name, dimensions and code on the back face.

Design Data

3 Strength and stability

Wind loading

3.1 When tested in accordance with BS EN 12467 : 2004, the Multiclad (Painted) and Paintboard (Natural) Cladding Panels have a mean wet bending strength of 10 MPa indicating a Class 2 category.



3.2 Under wind loading, the most likely mode of failure is by pull-through at the fixings due to wind suction.

3.3 Allowable wind pressures for different fixing centres and with 600 mm support rail spacing are given in Table 1.

Table 1 Allowable wind pressure

Centres (mm)	Framing centres (mm)	Wind pressure (Nm ⁻²)
600	600	850
500	600	1003
400	600	1177

3.4 Higher allowable wind pressures can be achieved by reducing the support rail spacing.

3.5 When calculating wind loads, the higher pressure coefficients applicable to corners of the building should be used.

3.6 The adequacy of a proposed installation should always be checked by a qualified engineer, who should include in the check the adequacy of the fixing of battens to the substrate (not covered by this Certificate).


3.7 As the cladding is open-jointed, the supporting wall must be able to take the full wind and any racking loads. It may be assumed that the panels do not contribute in this regard.

3.8 Wind loads should be calculated in accordance with BS 6399-2 : 1997 and EN 1991-1-4 : 2005.

Resistance to impact

3.9 The panels are susceptible to damage from hard body impacts. It is recommended that use of the panels is restricted to locations where there is some incentive to exercise care and little chance of hard body impacts, such as detailed under Categories B to F in Table 2 of BS 8200 : 1985.

4 Performance in relation to fire

 4.1 When tested to BS 476-7 : 1997, the uncoated panel achieved a Class 1 result. Therefore, the product is classified as Class 0 or 'low risk' as defined in the various national Building Regulations.

4.2 For resistance to fire, the performance of a wall incorporating the cladding can only be determined by tests from a suitably accredited laboratory and is not covered by this Certificate.

4.3 The panels have an A2-s1, d0 classification in accordance with EN 13501-1 : 2002.

5 Maintenance

5.1 Annual maintenance inspections should be carried out to ensure that rainware is complete and in good order, that flashings, seals and fastenings are in place and are secure, and to establish whether maintenance painting is necessary.


5.2 Maintenance painting should be undertaken at appropriate intervals, or when these inspections are necessary. For advice on maintenance intervals

and suitable paint systems, the Certificate holder should be consulted.

5.3 The panels are generally self-cleaning. However, for normal soiling, the surface may be cleaned with a hot water and household detergent mixture applied with a suitable cleaning pad or sponge. For more difficult chemical soiling, the Certificate holder's advice should be sought.

5.4 Damaged panels should be replaced as soon as possible, following the manufacturer's instructions.

6 Durability

 6.1 Accelerated ageing tests carried out on the uncoated fibre-reinforced calcium silicate matrix material showed no evidence of significant deterioration and indicate a performance similar to that of traditional cement-based sheet products.

6.2 The durability and service life of uncoated/coated panels will depend upon the building location, immediate environment and intended use of the building.

6.3 Providing regular maintenance is carried out, as described in section 5 and in accordance with the Certificate holder's instructions, the panel can be expected to have a life in excess of 30 years when used in normal conditions encountered in the UK.

6.4 In general, any colour change will be slight and uniform on any one elevation and the product will have a decorative life of at least 15 years.

6.5 The coating on the product is tough and durable and adheres to the substrate, but it is not resistant to continual abrasion.

Installation

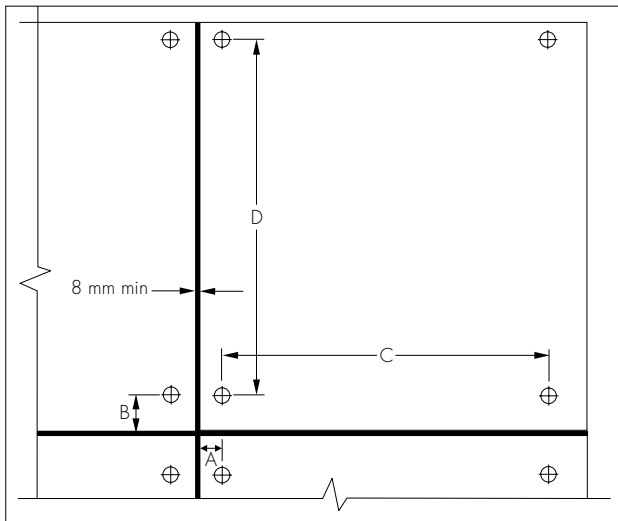
7 Procedure

7.1 Multiclad (Painted) and Paintboard (Natural) Cladding Panels should be installed in accordance with the manufacturer's instructions and the relevant recommendations of BS 8200 : 1985, and at the spacings shown in Table 2 and Figure 1.

Table 2 Fixing centres

Dimensions (mm)	Fixing centres (mm)	
	Screw fixing	Nail fixing
A	20	20
B	50	50
C	600	600
D	600	400

Figure 1 Showing dimensions and spacing



7.2 The panels must be fixed to vertical timber supports securely fixed to the substrate and levelled to give a flat fixing surface.

7.3 The panels should be fixed using screws without pre-drilling holes through the panels, using stainless steel screws (minimum 4.8 mm diameter by 38 mm long with 12 mm head) with coloured heads. If pre-drilled, holes should be 5 mm in diameter.

7.4 Fixings should be tightened sufficiently to hold the sheets in place but allow for lateral movement.

8 Cutting and drilling

8.1 Whenever possible, the panels should be cut using tungsten-carbide tipped handsaws or circular saws.

8.2 The panels should be drilled using a hard metal twist drill with a point of 60°.

9 Health and safety

9.1 Due to the presence of crystalline silica in the raw material used in the manufacture of this product, machining may lead to the release of undisturbed quartz dust. As the ingredients are bonded within the cement matrix, this does not pose a health hazard.

9.2 Where excessive concentrations of dust are generated, the dust levels should be controlled by the use of dust extraction equipment. The measures defined in Health and Safety Executive Guidance Note EH44 should be followed.

9.3 The panels are not loadbearing.

Technical Investigations

The following is a summary of the technical investigations carried out on Multiclad (Painted) and Paintboard (Natural) Cladding Panels.

10 Tests

Tests were carried out to determine:

- apparent density
- bending strength
- water absorption
- pull-through of fixings
- resistance to hard-body impact
- resistance to soft-body impact
- water-vapour permeability
- resistance to algae growth
- effect of accelerated weathering (colour stability)
- abrasion resistance
- adhesion of coating
- scratch test.

11 Investigations

11.1 Classifications were made to BS EN 12467 : 2004 on the basis of test data supplied, on:

- dimensions
- bending strength
- apparent density
- resistance to freeze/thaw
- resistance to water soak
- resistance to soak/dry cycling
- resistance to heat/rain cycling.

11.2 Examination was made of existing data relating to:

- fire propagation to BS 476-6 : 1989
- surface spread of flame to BS 476-7 : 1997.

11.3 The manufacturing process was examined, including the methods adopted for quality control.

11.4 A user survey was conducted to evaluate the performance in use.

Bibliography

BS 476-6 : 1989 *Fire tests on building materials and structures — Method of test for fire propagation for products*

BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

BS 8200 : 1985 *Code of practice for design of non-loadbearing external vertical enclosures of buildings*

BS EN 12467 : 2004 *Fibre-cement flat sheets— Product specification and test methods*

EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*

EN 13501-1 : 2002 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*



On behalf of the British Board of Agrément

Date of issue 18th September 2006

Chief Executive



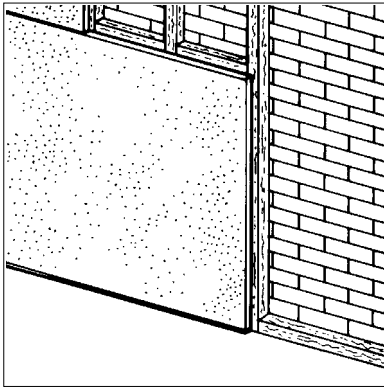
Marley Eternit Ltd

Certificate No 06/4355

DETAIL SHEET 3

PELICOLOR CLADDING PANELS

Product



- THIS DETAIL SHEET RELATES TO PELICOLOR CLADDING PANELS.
- The product is a fibre-reinforced cement board for claddings on external walls.
- It is essential that the cladding is installed in accordance with the manufacturer's instructions and the requirements of this Detail Sheet.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the Conditions of Certification and the products' position regarding Building Regulations.

Technical Specification

1 Description

1.1 Pelicolor Cladding Panels comprise fully compressed fibre-reinforced, cement panels, satisfying the requirements of Category A, Class 3 to BS EN 12467 : 2004.

1.2 The panels are manufactured by a batch blending operation, followed by the Hatchek process. Quality control is maintained over raw materials, during processing and on the finished product.

1.3 The panels have the characteristics of:

thickness (mm)	8 and 12
width (mm)	1250 and 1500
length (mm)	2000, 2500, 2800, 3100 and 3100

weight/area (kgm ⁻²)	15.4 for 8 mm
density (kgm ⁻³)	1650 for 8 mm

1.4 The panels are supplied with a factory-applied acrylic coating in a range of 18 colours and any factory-approved RAL colour, subject to minimum order quantity.

2 Delivery and site handling

2.1 The panels are delivered on wrapped pallets weighing up to approximately 1800 kg for 8 mm thick panel and 3100 mm by 1250 mm sheet size. They can be off-loaded by either mechanical

handling equipment or by manually removing individual boards.

2.2 The panels should be stored flat, under cover, and on a dry, level surface. Stacks of loose panels should not exceed one metre in height.


2.3 Each panel is marked with the product name, dimensions and code on the back face.

Design Data

3 Strength and stability

Wind loading

3.1 When tested in accordance with BS EN 12467 : 2004, Pelicolor Cladding Panels have a mean wet bending strength of 17 MPa indicating a Class 3 category in accordance with BS EN 12467 : 2000.

 3.2 Under wind loading, the most likely mode of failure is by pull-through at the fixings due to wind suction.

3.3 When installed onto battens at the appropriate spacings, the panels can withstand dynamic wind pressures given in Table 1.

Table 1 Allowable wind pressure

Centres (mm)	Framing centres (mm)	Wind pressure (Nm ⁻²)
600	600	810
500	600	956
400	600	1121

3.4 The permissible dynamic wind pressure may be increased by reducing batten spacing. This is particularly important at the corners of buildings and in exposed locations, where higher wind coefficients may be applicable.

3.5 The adequacy of a proposed installation should always be checked by a qualified engineer, who should include in the check the adequacy of the fixing of battens to the substrate (not covered by this Certificate).

3.6 For wall stability, and in particular racking effects, the contribution from the cladding may not be assumed.


3.7 The supporting wall must be capable of withstanding the full wind load on its own.

3.8 Wind loads should be calculated in accordance with BS 6399-2 : 1997 and EN 1991-1-4 : 2005.

Resistance to impact

3.9 The panels are susceptible to damage from hard body impacts. It is recommended that use of the panels is restricted to locations where there is some incentive to exercise care and little chance of hard body impacts, such as detailed under Categories B to F in Table 2 of BS 8200 : 1985.

4 Performance in relation to fire

 4.1 The uncoated panels have limited combustibility and therefore may be regarded as having a Class 0 surface or 'low risk' material as defined in the various Building Regulations.

4.2 For resistance to fire, the performance of a wall incorporating the cladding can only be determined by tests from a suitably accredited laboratory and is not covered by this Certificate.

4.3 The panels have an A2-s1, d0 classification in accordance with EN 13501-1 : 2002.


5 Maintenance

5.1 Annual maintenance inspections should be carried out to ensure that rainware is complete and in good order, that flashings, seals and fastenings are in place and are secure, and to establish whether maintenance painting is necessary.

5.2 The panels are generally self-cleaning. However, for normal soiling, the surface may be cleaned with a hot water and household detergent mixture applied with a suitable cleaning pad or sponge. For more difficult chemical soiling, the Certificate holder's advice should be sought.

5.3 Damaged panels should be replaced as soon as possible, following the manufacturer's instructions.

6 Durability

 6.1 Accelerated ageing tests carried out on the uncoated fibre-reinforced cement matrix showed no evidence of significant deterioration, and indicate a performance similar to that of traditional cement-based sheet products.

6.2 The durability and service life of uncoated/coated panels will depend upon the building location, immediate environment and intended use of the building.

6.3 Providing regular maintenance is carried out, as described in section 5 and in accordance with the Certificate holder's instructions, the panel can be expected to have a life in excess of 30 years when used in normal conditions encountered in the UK.

6.4 In general, any colour change will be slight and uniform on any one elevation and the product will have a decorative life of at least 15 years.

6.5 The coating on the product is tough and durable and adheres to the fibre-cement substrate, but it is not resistant to continual abrasion.

Installation

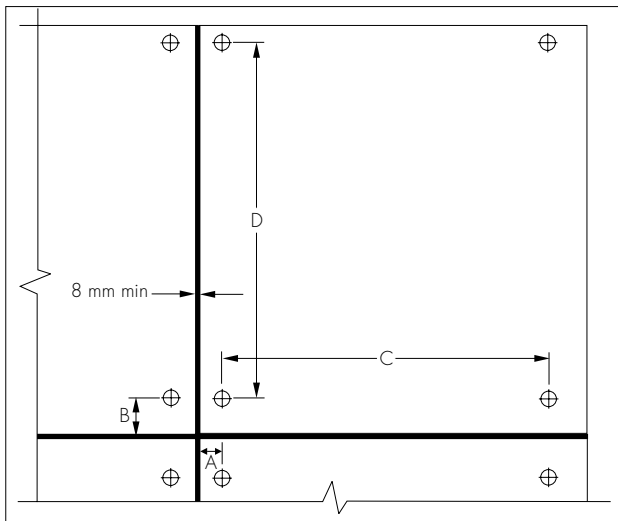
7 Procedure

7.1 Pelicolor Cladding Panels should be installed in accordance with the manufacturer's instructions and the relevant recommendations of BS 8200 : 1985 and at the spacings shown in Table 2 and Figure 1.

Table 2 Fixing centres

Dimensions (mm)	Fixing centres (mm)	
	Screw fixing	Rivet fixing
A	25	40
B	80-100	80-100
C	600	600
D	600	600

Figure 1 Showing dimensions and spacing



7.2 The panels must be fixed to vertical timber supports which must be securely fixed to the substrate and levelled to give a flat fixing surface. Panels may be fixed to metal supports using aluminium rivets into aluminium rails.

7.3 The panels should be either fixed using stainless steel screws (minimum 5.5 mm diameter by 35 mm long with 11 mm head) with coloured heads, or by using colour matched rivets (4 by 18-K15 mm).

7.4 Screw-fixings should be tightened sufficiently to hold the sheets in place whilst allowing for lateral movement.

8 Cutting and drilling

8.1 Whenever possible, the panels should be cut using tungsten-carbide tipped circular saws when cutting on site.

8.2 The panels should be drilled using a hard metal twist drill with a point of 60°.

9 Health and safety

9.1 The fibres used in the manufacture of the matrix material do not constitute a health hazard.

9.2 Under normal site working conditions, special safety precautions are not required.

9.3 In situations where excessive concentrations of dust are generated, the dust levels should be controlled by the use of dust extraction equipment. The measures defined in Health and Safety

Executive Guidance Note EH44 should be followed.

9.4 The panels are not loadbearing.

Technical Investigations

The following is a summary of the technical investigations carried out on Pelicolor Cladding Panels.

10 Tests

Tests were carried out to determine:

- apparent density
- bending strength
- water absorption
- pull-through of fixings
- resistance to hard-body impact
- resistance to soft-body impact
- water-vapour permeability
- resistance to algae growth
- effect of accelerated weathering (colour stability)
- abrasion resistance
- adhesion of coating
- scratch test.

11 Investigations

11.1 Classifications were made to BS EN 12467 : 2004 on the basis of test data supplied, on:

- dimensions
- bending strength
- apparent density
- resistance to freeze/thaw
- resistance to water soak
- resistance to soak/dry cycling
- resistance to heat/rain cycling.

11.2 The manufacturing process was examined, including the methods adopted for quality control.

11.3 A user survey was conducted to evaluate the performance in use.

11.4 Data based on DIBt Technical Approval Z-31.1-56 was assessed in relation to the product's mechanical properties, durability, behaviour in relation to fire and practicability of installation.

Electronic Copy

Bibliography

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

BS 8200 : 1985 *Code of practice for design of non-loadbearing external vertical enclosures of buildings*

BS EN 12467 : 2004 *Fibre-cement flat sheets — Product specification and test methods*

EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*

EN 13501-1 : 2002 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*



On behalf of the British Board of Agrément

Date of issue 18th September 2006

Chief Executive

British Board of Agrément

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For technical or additional information, contact the Certificate holder (see front page).
For information about the Agrément Certificate, including validity and scope, tel: Hotline 01923 665400, or check the BBA website.



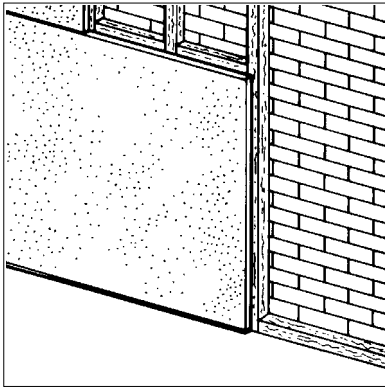
Marley Eternit Ltd

Certificate No 06/4355

**NATURA AND NATURA PLUS
CLADDING PANELS**

DETAIL SHEET 4

Product



• THIS DETAIL SHEET RELATES TO NATURA AND NATURA PLUS CLADDING PANELS.

• The product is a fibre-reinforced cement board for claddings on external walls.

• It is essential that the cladding is installed in accordance with the manufacturer's instructions and the requirements of this Detail Sheet.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the Conditions of Certification and the products' position regarding Building Regulations.

Technical Specification

1 Description

1.1 Natura and Natura Plus Cladding Panels comprise fibre-reinforced cement panels, satisfying the requirements of Category A, Class 3 to BS EN 12467 : 2004.

1.2 The panels are manufactured by a batch blending operation, followed by the Hatchek process. Quality control is maintained over raw materials, during processing and on the finished product.

1.3 The panels have the characteristics of:

thickness (mm)	8 and 12
width (mm)	1220
length (mm)	2500, 3000
weight/area (kgm ⁻²)	13.6 for 8 mm
density (kgm ⁻³)	1650

1.4 Natura panels are available in a range of three colours and the Natura Plus panels in a through-coloured finish with a choice of 21 colours.

2 Delivery and site handling

2.1 The panels are delivered on wrapped pallets weighing up to approximately 1600 kg for 8 mm thick panels. They can be off-loaded by either mechanical handling equipment or by manually removing individual boards.

2.2 The panels should be stored flat, under cover, and on a dry, level surface. Stacks of loose panels should not exceed one metre in height.


2.3 Each panel is marked with the product name, dimensions and code on the back face.

Design Data

3 Strength and stability

Wind loading

3.1 When tested in accordance with BS EN 12467 : 2004, Natura and Natura Plus Cladding Panels have a mean wet bending strength of 17 MPa indicating a Class 3 category in accordance with BS EN 12467 : 2004.

 3.2 Under wind loading, the most likely mode of failure is by pull-through at the fixings due to wind suction.

3.3 Allowable wind pressures for different fixing centres and with 600 mm support rail spacing are given in Table 1.

Table 1 Allowable wind pressure

Centres (mm)	Framing centres (mm)	Wind pressure (Nm ⁻²)
600	600	810
500	600	956
400	600	1121

3.4 Higher allowable wind pressures can be achieved by reducing the support rail spacing.

3.5 When calculating wind loads, the higher pressure coefficients applicable to corners of the building should be used.

3.6 The adequacy of a proposed installation should always be checked by a qualified engineer, who should include in the check the adequacy of the fixing of battens to the substrate (not covered by this Certificate).

3.7 As the cladding is open-jointed, the supporting wall must be able to take the full wind and any racking loads. It may be assumed that the panels do not contribute in this regard.

3.8 Wind loads should be calculated in accordance with BS 6399-2 : 1997.

Resistance to impact

3.9 The panels are susceptible to damage from hard body impacts. It is recommended that use of the panels is restricted to locations where there is some incentive to exercise care and little chance of hard body impacts, such as detailed under Categories B to F in Table 2 of BS 8200 : 1985.

4 Performance in relation to fire



4.1 The uncoated panels have limited combustibility and therefore may be regarded as having a Class 0 surface or a 'low risk' material as defined in the various Building Regulations.

4.2 For resistance to fire, the performance of a wall incorporating the cladding can only be determined by tests from a suitably accredited laboratory and is not covered by this Certificate.

4.3 The panels have an A2-s1, d0 classification in accordance with EN 13501-1 : 2002.

5 Maintenance

5.1 Annual maintenance inspections should be carried out to ensure that rainware is complete and in good order, that flashings, seals and fastenings are in place and are secure, and to establish whether maintenance painting is necessary.

5.2 The panels are generally self-cleaning. However, for normal soiling, the surface may be cleaned with a hot water and household detergent mixture applied with a suitable cleaning pad or sponge. For more difficult chemical soiling, the Certificate holder's advice should be sought.

5.3 Damaged panels should be replaced as soon as possible, following the manufacturer's instructions.

6 Durability



6.1 Accelerated ageing tests carried out on the uncoated fibre-reinforced calcium silicate matrix showed no evidence of significant deterioration, and indicate a performance similar to that of traditional cement-based sheet products.

6.2 The durability and service life of uncoated/coated panels will depend upon the building location, immediate environment, and intended use of the building.

6.3 Providing regular maintenance is carried out, as described in section 5 and in accordance with the Certificate holder's instructions, the panel can be expected to have a life in excess of 30 years when used in normal conditions encountered in the UK.

6.4 In general, any colour change will be slight and uniform on any one elevation and the product will have a decorative life of at least 15 years.

6.5 The coating on the product is tough and durable and adheres to the substrate but it is not resistant to continual abrasion.

Installation

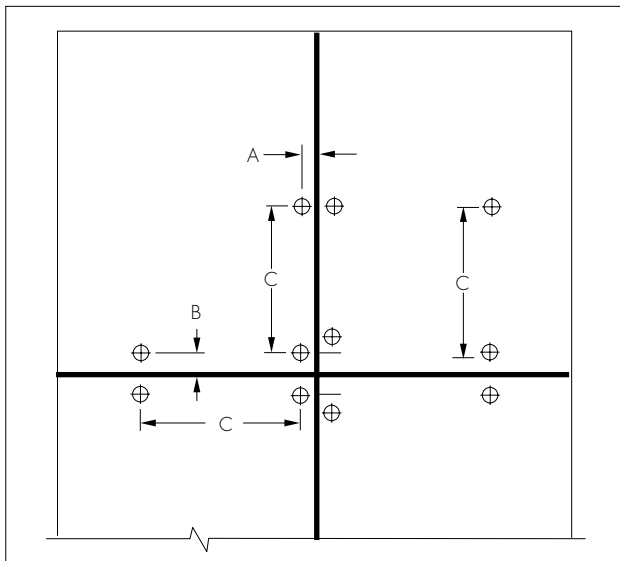
7 Procedure

7.1 Natura Cladding Panels should be installed in accordance with the manufacturer's instructions and the relevant recommendations of BS 8200 : 1985 and at the spacings shown in Table 2 and Figure 1.

Table 2 Fixing centres

Dimensions (mm)	Fixing centres (mm)	
	Screw fixing	Rivet fixing
A	25	40
B	80-100	80-100
C	600	600

Figure 1 Showing dimensions and spacing



7.2 The panels must be fixed to vertical timber supports which must be securely fixed to the substrate and levelled to give a flat fixing surface. Panels may be fixed to metal supports using aluminium rivets into aluminium rails.

7.3 The panels should be fixed using screws through 5.5 mm pre-drilled holes in the panels, using stainless steel screws (minimum 4.8 mm diameter by 38 mm long) with coloured heads. When using Natura colour matched rivets (4 by 18-K15 mm), pre-drilled holes in the panels should be 9.5 mm.

7.4 Screw fixings should be tightened sufficiently to hold the sheets in place whilst allowing for lateral movement.

7.5 The panels require the application of a sealant 'Luko' to the cut edges to avoid moisture ingress. Advice should be sought from the Certificate holder regarding this.

8 Cutting and drilling

8.1 Whenever possible, the panels should be cut using tungsten-carbide tipped saws when cutting on site.

8.2 The panels should be drilled using a hard metal twist drill with a point of 60°.

9 Health and safety

9.1 The fibres used in the manufacture of the matrix material do not constitute a health hazard.

9.2 Under normal site working conditions, special safety precautions are not required.

9.3 In situations where excessive concentrations of dust are generated, the dust levels should be controlled by the use of dust extraction equipment. The measures defined in Health and Safety Executive Guidance Note EH44 should be followed.

9.4 The panels are not loadbearing.

Technical Investigations

The following is a summary of the technical investigations carried out on Natura and Natura Plus Cladding Panels.

10 Tests

Tests were carried out to determine:

- apparent density
- bending strength
- water absorption
- pull-through of fixings
- resistance to hard-body impact
- resistance to soft-body impact
- water-vapour permeability
- resistance to algae growth
- effect of accelerated weathering (colour stability)
- abrasion resistance
- adhesion of coating
- scratch test.

11 Investigations

11.1 Classifications were made to BS EN 12467 : 2004 on the basis of test data supplied, on:

- dimensions
- bending strength
- apparent density
- resistance to freeze/thaw
- resistance to water soak
- resistance to soak/dry cycling
- resistance to heat/rain cycling.

11.2 Examination was made of existing data relating to:

- fire propagation to BS 476-6 : 1989
- surface spread of flame to BS 476-7 : 1997.

11.3 The manufacturing process was examined, including the methods adopted for quality control.

11.4 A user survey was conducted to evaluate the performance in use.

Bibliography

BS 476-6 : 1989 *Fire tests on building materials and structures — Method of test for fire propagation for products*

BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

BS 8200 : 1985 *Code of practice for design of non-loadbearing external vertical enclosures of buildings*

BS EN 12467 : 2004 *Fibre-cement flat sheets— Product specification and test methods*

EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*

EN 13501-1 : 2002 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*



On behalf of the British Board of Agrément

Date of issue 18th September 2006

Chief Executive



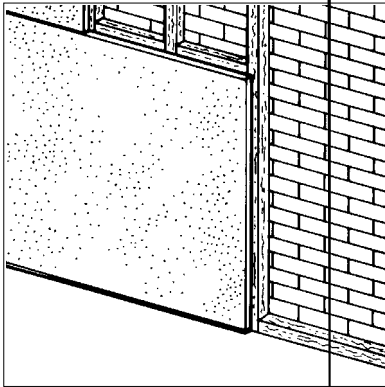
Marley Eternit Ltd

Certificate No 06/4355

DETAIL SHEET 5

GLASAL CLADDING PANELS

Product



- THIS DETAIL SHEET RELATES TO GLASAL CLADDING PANELS.
- The product is a fibre-reinforced cement board for claddings on external walls.
- It is essential that the cladding is installed in accordance with the manufacturer's instructions and the requirements of this Detail Sheet.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the Conditions of Certification and the product's position regarding Building Regulations.

Technical Specification

1 Description

1.1 Glasal Cladding Panels comprise autoclaved and fully compressed fibre-reinforced cement panels, satisfying the requirements of Category A, Class 4 to BS EN 12467 : 2004.

1.2 The panels are manufactured by a batch blending operation, followed by the Hatchek process and high-pressure steam autoclaving. Quality control is maintained over raw materials, during processing and on the finished product.

1.3 The panels have the characteristics of:

thickness (mm)	7.5
width (mm)	1220
length (mm)	2500, 3050
weight/area (kgm ⁻²)	13.5
density (kgm ⁻³)	1600

1.4 The panels are supplied in a range of 18 mineral enamel colours.

2 Delivery and site handling

2.1 The panels are delivered on wrapped pallets weighing up to approximately 1500 kg. They can be off-loaded by either mechanical handling equipment or by manually removing individual boards.

2.2 The panels should be stored flat, under cover, and on a dry, level surface. Stacks of loose panels should not exceed one metre in height.

2.3 Each panel is marked with the product name, dimensions and code on the back face.

Design Data

3 Strength and stability

Wind loading

3.1 When tested in accordance with BS EN 12467 : 2004, Glasal Cladding Panels have a mean wet bending strength of 24 MPa indicating a Class 4 category in accordance with BS EN 12467 : 2004.

3.2 Under wind loading, the most likely mode of failure is by pull-through at the fixings due to wind suction.

3.3 Allowable wind pressures for different fixing centres and with 600 mm support rail spacing are given in Table 1.

Table 1 Allowable wind pressure

Centres (mm)	Framing centres (mm)	Wind pressure (Nm ⁻²)
600	600	903
500	600	1066
400	600	1250

3.4 Higher allowable wind pressures can be achieved by reducing the support rail spacing.

3.5 When calculating wind loads, the higher pressure coefficients applicable to corners of the building should be used.

3.6 The adequacy of a proposed installation should always be checked by a qualified engineer, who should include in the check the adequacy of the fixing of battens to the substrate (not covered by this Certificate).

3.7 As the cladding is open-jointed, the supporting wall must be able to take the full wind and any racking loads. It may be assumed that the panels do not contribute in this regard.

3.8 Wind loads should be calculated in accordance with BS 6399-2 : 1997 and EN 1991-1-4 : 2005.

Resistance to impact

3.9 The panels are susceptible to damage from hard body impacts. It is recommended that use of the panels is restricted to locations where there is some incentive to exercise care and little chance of hard body impacts, such as detailed under Categories B to F in Table 2 of BS 8200 : 1985.

4 Performance in relation to fire



4.1 The panels have limited combustibility and may therefore be regarded as having a Class 0 surface or a 'low risk' material as defined in the various Building Regulations.

4.2 For resistance to fire, the performance of a wall incorporating the cladding can only be determined by tests from a suitably accredited laboratory and is not covered by this Certificate.

4.3 The panels have an A2-s1, d0 classification in accordance with EN 13501-1 : 2002.

5 Maintenance

5.1 Annual maintenance inspections should be carried out to ensure that rainware is complete and in good order, that flashings, seals and fastenings are in place and are secure, and to establish whether maintenance painting is necessary.

5.2 The panels are generally self-cleaning. However, for normal soiling, the surface may be cleaned with a hot water and household detergent mixture applied with a suitable cleaning pad or

sponge. For more difficult chemical soiling, the Certificate holder's advice should be sought.

5.3 Damaged panels should be replaced as soon as possible, following the manufacturer's instructions.

6 Durability



6.1 Accelerated ageing tests carried out on the uncoated fibre-reinforced calcium silicate matrix material showed no evidence of significant deterioration, and indicate a performance similar to that of traditional cement-based sheet products.

6.2 The durability and service life of uncoated/coated panels will depend upon the building location, immediate environment, and intended use of the building.

6.3 Providing regular maintenance is carried out, as described in section 5 and in accordance with the Certificate holder's instructions, the panel can be expected to have a life in excess of 30 years when used in normal conditions encountered in the UK.

6.4 In general, any colour change will be slight and uniform on any one elevation and the product will have a decorative life of at least 15 years.

6.5 The coating on the product is tough and durable and adheres to the substrate, but is fairly resistant to continual abrasion.

Installation

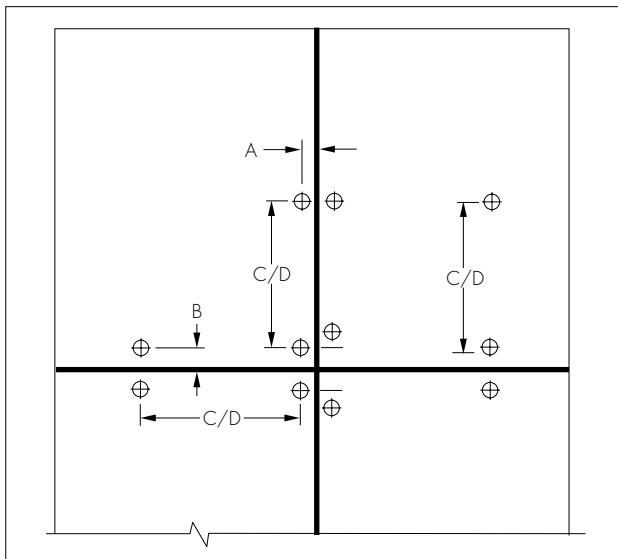
7 Procedure

7.1 Glasal Cladding Panels should be installed in accordance with the manufacturer's instructions and the relevant recommendations of BS 8200 : 1985 and at the spacings shown in Table 2 and Figure 1.

Table 2 Fixing centres

Dimensions (mm)	Fixing centres (mm)	
	Screw fixing	Rivet fixing
A	25	40
B	50-100	50-100
C	600	600
D	600	400

Figure 1 Showing dimensions and spacing



7.2 The panels must be fixed to timber supports which must be securely fixed to the substrate and levelled to give a flat fixing surface. Panels may be fixed to metal supports using aluminium rivets fixed to aluminium rails.

7.3 The panels should be fixed using colour-head stainless steel screws (4.8 mm diameter by 38 mm long with 12 mm head) with pre-drilled holes, or the Astro Rivet System.

7.4 Screw-fixings should be tightened sufficiently to hold the sheets in place whilst allowing for lateral movement. A minimum gap of from 6 mm to 8 mm should be allowed between all panels.

8 Cutting and drilling

8.1 Whenever possible, the panels should be cut using diamond dusted circular saws when cutting on site.

8.2 The panels should be drilled using a hard metal twist drill with a point of 60°.

9 Health and safety

9.1 Due to presence of crystalline silica in the raw material used in the manufacture of this product, machining may lead to the release of undisturbed quartz dust. As the ingredients are bonded within the cement matrix, this does not pose a health hazard.

9.2 In situations where excessive concentrations of dust are generated, the dust levels should be

controlled by the use of dust extraction equipment. The measures defined in Health and Safety Executive Guidance Note EH44 should be followed.

9.3 The panels are not loadbearing.

Technical Investigations

The following is a summary of the technical investigations carried out on Glasal Cladding Panels.

10 Tests

Tests were carried out to determine:

- apparent density
- bending strength
- water absorption
- pull-through of fixings
- resistance to hard-body impact
- resistance to soft-body impact
- water-vapour permeability
- resistance to algae growth
- effect of accelerated weathering (colour stability)
- abrasion resistance
- adhesion of coating
- scratch test.

11 Investigations

11.1 Classifications were made to BS EN 12467 : 2004 on the basis of test data supplied, on:

- dimensions
- bending strength
- apparent density
- resistance to freeze/thaw
- resistance to water soak
- resistance to soak/dry cycling
- resistance to heat/rain cycling.

11.2 Examination was made of existing data relating to:

- fire performance.

11.3 The manufacturing process was examined, including the methods adopted for quality control.

11.4 A user survey was conducted to evaluate the performance in use.

Bibliography

BS 476-6 : 1989 *Fire tests on building materials and structures — Method of test for fire propagation for products*

BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

BS 8200 : 1985 *Code of practice for design of non-loadbearing external vertical enclosures of buildings*

BS EN 12467 : 2004 *Fibre-cement flat sheets— Product specification and test methods*

EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*

EN 13501-1 : 2002 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*



On behalf of the British Board of Agrément

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Chief Executive