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**Agrément
Certificate
No 05/4248**
Second issue*

Designated by Government
to issue
European Technical
Approvals

HARDIPANEL

Façade en ciment renforcé par fibres
Verkleidung von Faserverstärkter Zement

Product



• THIS CERTIFICATE RELATES TO HARDIPANEL⁽¹⁾, FIBRE-REINFORCED CEMENT BOARDS FOR WALL CLADDING.

• The product meets the requirements for Category A, Class 2 boards to EN 12467 : 2004 and Type A, Category 3 to ISO 8336 : 1993/Amd 1 : 2004.

• The product is for use as an exterior non-loadbearing, decorative cladding.

• The product may be fixed, via timber battens, to external timber-framed or masonry walls.

• The product has not been assessed for use as a sheathing material to provide resistance to racking forces.

continued

Regulations

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, Hardipanel, 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 product is acceptable for use as set out in sections 7.2 to 7.4 and 8.1 to 8.7 of this Certificate.
Requirement: B3(4)	Internal fire spread (structure)
Comment:	The product is classified as Class 0. Cavity barriers should be provided as required under this Requirement. See sections 9.1 to 9.5 of this Certificate.
Requirement: B4(1)	External fire spread
Comment:	The uncoated product is unrestricted by this Requirement. See sections 9.1 to 9.5 of this Certificate.
Requirement: C2(b)	Resistance to moisture
Comment:	The product does not provide a watertight or airtight facing. To achieve a weatherproof barrier, a breather membrane must be provided. See sections 7.7, 10.1 to 10.4 of this Certificate.
Requirement: Regulation 7	Materials and workmanship
Comment:	The product is acceptable. See sections 12.1 and 12.2 of this Certificate.

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.

(1) Registered trademark of the Certificate holder.

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2 The Building (Scotland) Regulations 2004



In the opinion of the BBA, Hardipanel, 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 product can contribute to a construction satisfying this Regulation. See sections 12.1 and 12.2 of this Certificate.
Regulation:	9	Building standards – construction
Standard:	1.1(a)(b)	Structure
Comment:		The product is acceptable for use, with reference to clause 1.1.1 ⁽¹⁾⁽²⁾ . See sections 7.2 to 7.4 and 8.1 to 8.7 of this Certificate.
Standard:	2.4	Cavities
Comment:		The product is a 'low risk' material. Cavity barriers should be provided as required by clause 2.4.2 ⁽¹⁾⁽²⁾ of this Standard. See sections 9.1 to 9.6 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The product is not classified as 'non-combustible' and therefore the use will be restricted under clauses 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ of this Standard. See section 9.6 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		The product is not classified as 'non-combustible' and therefore the use will be restricted under clause 2.7.1 ⁽¹⁾⁽²⁾ . See section 9.6 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The product does not form a watertight or airtight facing. To achieve a weatherproof barrier a breather membrane must be provided to meet this Standard, with reference to clause 3.10.5 ⁽¹⁾⁽²⁾ . See sections 10.1 to 10.4 of this Certificate.
Standard:	3.15	Condensation
Comment:		Provided there is provision for adequate drainage and ventilation behind the cladding, and a breather membrane is incorporated, as required, the product will comply with clause 3.15.1 ⁽¹⁾ of this Standard. See sections 7.7 and 10.1 to 10.4 of this Certificate.
Regulation:	12	Building standards – conversions
Comment:		All comments given for this product 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, Hardipanel, 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 product is acceptable. See sections 12.1 and 12.2 of this Certificate.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		The product does not form a watertight or airtight facing. To achieve a weatherproof barrier, a breather membrane must be provided. See sections 7.7, 10.1 to 10.4 of this Certificate.
Regulation:	D1	Stability
Comment:		The product is acceptable for use as set out in sections 7.2 to 7.4 and 8.1 to 8.7 of this Certificate.
Regulation:	E4	Internal fire spread – Structure
Comment:		The product is classified as Class 0. Cavity barriers should be provided as required under this Regulation. See sections 9.1 to 9.5 of this Certificate.
Regulation:	E5	External fire spread
Comment:		The product is unrestricted by this Regulation. See sections 9.1 to 9.5 of this Certificate.

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: 5 Description (5.3) and 6 Delivery and site handling (6.1 and 6.4) of this Certificate.

5 Description

5.1 Hardipanel comprises fibre-reinforced, Portland cement boards, satisfying the requirements of Category A, Class 2 to EN 12467 : 2004 and Type A, Category 3 to ISO 8336 : 1993/Amd 1 : 2004.

5.2 The boards 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.

5.3 The boards have the characteristics of:

thickness (mm)	8
width (mm)	1200
length (mm)	2400, 2700
weight/area (kgm ⁻²)	11.2
finish	smooth ⁽¹⁾

(1) Other finishes are available to special order.

5.4 The boards are supplied factory primed, ready for overcoating on site. The performance of the primer is outside the scope of this Certificate.

5.5 Ancillary materials for use with the boards include:

- Harditrim XLD⁽¹⁾ — a 25 mm thick fibre-reinforced cement board, complying with the requirements of Class 1, Category A boards to EN 12467 : 2004 and Category 2, Type A to ISO 8336 : 1993/Amd 1 : 2004 and suitable for use as decorative trim around openings. It is available in a 3050 mm length by 90 mm, 140 mm and 185 mm widths
- Type 1 breather membrane — to BS 4016 : 1997
- flexible joint sealant — selected in accordance with the recommendations given in BS 6213 : 2000
- galvanized or stainless-steel nail fixings — 40 mm long by 2.41 mm minimum shank diameter, with a minimum 5.7 mm head diameter for securing sheets to battens
- zinc-plated or stainless-steel screw fixings — 32 mm long by 4.6 mm minimum shank diameter, with a minimum 10 mm diameter head shank for securing sheets to battens
- PVC-U flashing — for horizontal joints.

(1) Registered trademark of the Certificate holder.

6 Delivery and site handling

6.1 Hardipanel and Harditrim XLD are delivered on wrapped pallets weighing up to approximately 2200 kg and 900 kg respectively. They can be offloaded by either mechanical handling equipment or by manually removing individual boards.

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


6.3 Each board is marked with the product name, unique manufacturing code and the appropriate classification to ISO 8336 : 1993/Amd 1 : 2004.

6.4 The boards include crystalline silica and reference should be made to EH40/2005 *Occupational Exposure Limits*, 2005. In particular, when cutting, drilling or sanding in confined areas, dust levels should be controlled using suitable extraction equipment.

Design Data

7 General

7.1 Hardipanel is suitable for use as an exterior wall cladding over a timber-framed or masonry wall.

 7.2 The designer should ensure that the strength and integrity of the intended substrate is commensurate with that required of the cladding system (see sections 7.3 and 7.4).

7.3 Brickwork or blockwork walls should be constructed in the conventional manner in accordance with BS 5628-1 : 2005 and BS 5628-3 : 2005 or one of the technical specifications given in the national Building Regulations:

England and Wales

Approved Document A1/2, Section 2C

Scotland

Mandatory Standards 1.1 and 1.2, clauses 1.1.1⁽¹⁾⁽²⁾ and 1.2.1⁽¹⁾⁽²⁾ respectively.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).


Northern Ireland

Technical Booklet D *Structure*.

7.4 Timber stud walls should be constructed in accordance with BS 5268-2 : 2002 and BS 5268-6.1 : 1996, and preservative treated in accordance with BS 8417 : 2003 : 1989. Studding and framing should be adequately supported by noggings to ensure rigidity.

7.5 The product should be fixed to preservative-treated, good-quality timber battens aligned vertically at 400 mm or 600 mm centres. The minimum batten thickness over timber studs is 25 mm; over masonry substrates, this should be increased to accommodate the 40 mm length of the fixings.

7.6 Care should be taken to ensure sufficient time is allowed for complete fixation or drying of the preservative before the panels are fixed.

 7.7 In accordance with BS 8200 : 1985, a minimum 10 mm ventilation pathway must be maintained behind the cladding, with minimum 5000 mm² ventilation slots per metre run at the top and bottom of the installation. This will also satisfy the NHBC requirement (see NHBC Standards, Chapter 6.2 : 1992) for a minimum

10 mm cavity behind cladding installed over timber sheathing. However, to comply with the requirement of *Zurich Building Guarantee Technical Manual Section 4 Superstructure, Sub-section External walls — render/cladding/curtain walling* (page 213), for cladding installed over timber sheathing, a minimum 19 mm cavity is required.

8 Strength and stability

Wind loading



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

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

Table 1 Maximum wind pressure

Nailing centres (mm)	Framing centres (mm)	Max wind pressure (kPa)
200	400	1.9
200	600	1.2

8.3 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.

8.4 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).

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

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

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

Resistance to impact

8.8 When tested in accordance with BBA test methods, the product performed in a satisfactory manner. It is suitable for use in areas where there is little possibility of impact or abrasion damage, ie at low levels in areas of restricted access or at higher levels in public areas (the areas described in Categories C to F of BS 8200 : 1985, or E₄ and E₅ of MOAT No 43 : 1987).

9 Performance in relation to fire



9.1 When tested to BS 476-6 : 1989, an uncoated sample of the board gave a fire propagation index (I) of 0.5 and a sub-index (i₁) of 0.1.

9.2 When tested to BS 476-7 : 1997, the board achieved a Class 1 result.

9.3 Therefore, the product is classified as Class 0 or 'low risk' as defined in the various national Building Regulations.

9.4 This performance may not be achieved when the product is overcoated and care should be taken to select a coating system with the appropriate performance in fire for the installation in question.

9.5 Cavity barriers should be provided as required by the relevant national Building Regulations. However, see section 7.7 regarding ventilation.



9.6 The product should not be used in Scotland on a wall one metre or less from a boundary.

10 Air and water penetration



10.1 The boards are not airtight, watertight or water-vaportight. When used on timber stud walls the board 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.

10.2 Where the product is used as a decorative facing attached to weathertight masonry walls, a water barrier is not necessary as the amount of water that will penetrate the cladding will be small and will not have an adverse effect on the wall.

10.3 If the product is used in the renovation of a masonry wall which is structurally sound but not fully weathertight, the use of a vapour-permeable water barrier is advisable.

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

11 Maintenance

11.1 Under normal conditions, maintenance is restricted to occasional cleaning and planned recoating as required.

11.2 Damaged boards must be replaced.

12 Durability



12.1 The boards, when installed in accordance with the Certificate holder's instructions and subjected to normal conditions of exposure and use, will have an estimated service life in excess of 30 years.

12.2 In common with other cementitious materials, eg masonry blocks, the matrix material can embrittle with time. This can be minimised by the selection of an appropriate coating and regular maintenance painting.

Installation

13 General

13.1 Hardipanel is for installation on external braced timber studs and conventional masonry, in accordance with the Certificate holder's instructions, using suitably experienced and trained personnel.

13.2 Cutting of boards can be performed by scoring a straight edge using a carbide-tipped knife, and snapping upwards along the score line.

13.3 Large cut-outs can be made using a circular saw with a carbide-tipped blade. Small holes may be drilled using a carbide-tipped masonry bit, or scored out as above and broken out with a hammer.

14 Procedure

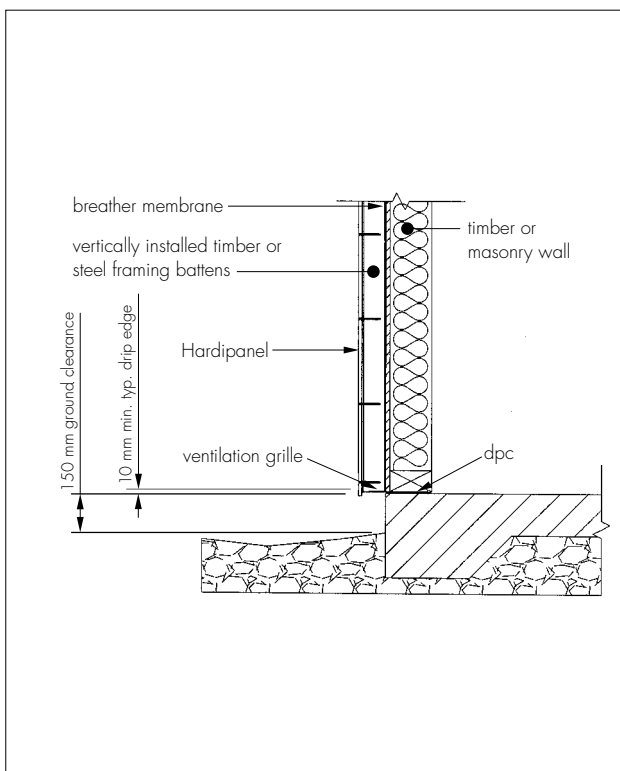
14.1 When required, a breather membrane in accordance with section 10.1 should be laid along the wall, with minimum laps of 150 mm.

14.2 Timber wall battens should be fixed over the breather membrane in accordance with sections 7.5 and 7.6 at 400 mm or 600 mm centres (see also section 8.4).

14.3 The timber thickness should not be less than 25 mm. When fixing over a masonry wall a thicker batten should be used to accommodate the 40 mm minimum length of the fixing nails.

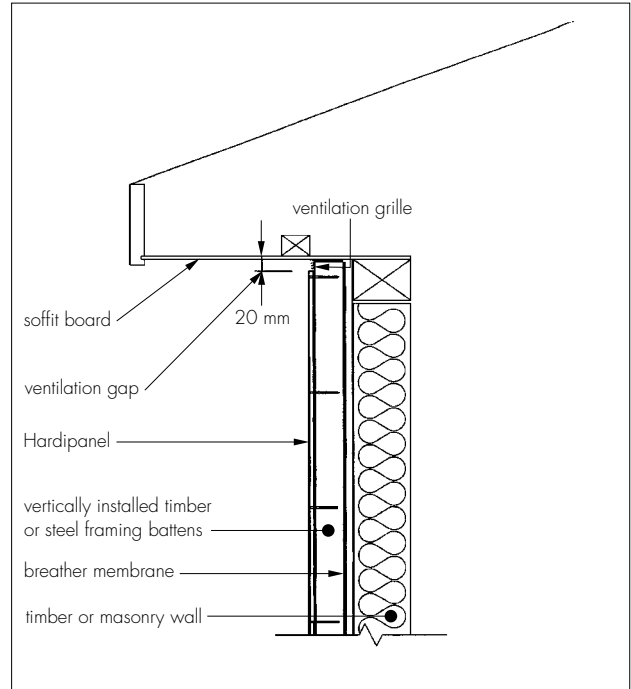
14.4 When installing the boards, a ventilation grille must be installed and provisions for a 10 mm drip edge must be made at the base of the first sheet (see Figure 1).

Figure 1 Typical framework



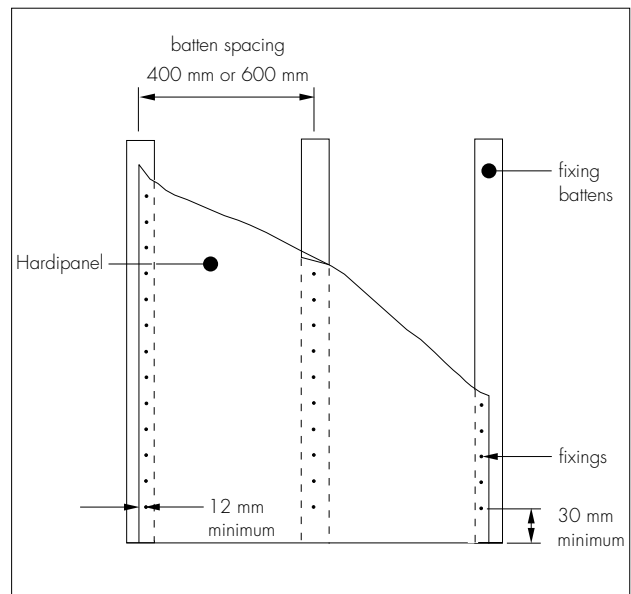
14.5 Provision for ventilation must also be made at the top of the board (see Figure 2).

Figure 2 Eaves and soffit details



14.6 The boards are fixed to the battens using nail or screw fixings as described in section 5.5 and in accordance with the Certificate holder's instructions. Fixings must be a minimum of 12 mm from vertical edges and 30 mm from the bottom and top edges (see Figure 3).

Figure 3 Fixing detail



14.7 Where vertical joints are required, the boards can be butted together in moderate contact to form a joint that can be concealed using either, an H-profile trim or Harditrim XLD board. Alternatively an 'express' joint can be provided between boards by employing a UV-resistant EPDM gasket behind the joints (see Figure 4 for options). In the latter case, the edges of the board must be painted.

14.8 Building expansion joints should be followed through the boards. Expansion joints must not be in excess of 10 m apart, or in accordance with the requirements of the substrate if less than 10 m.

14.9 Where horizontal joints are required, the boards can be butted together in moderate contact to form a joint that can be concealed using either, an H-profile trim or Harditrim XLD board. Alternatively a PVC flashing may be fixed to weatherproof horizontal joints. The joints may be concealed with Harditrim XLD fixed to the upper board only (see Figure 5).

Figure 4 Vertical jointing

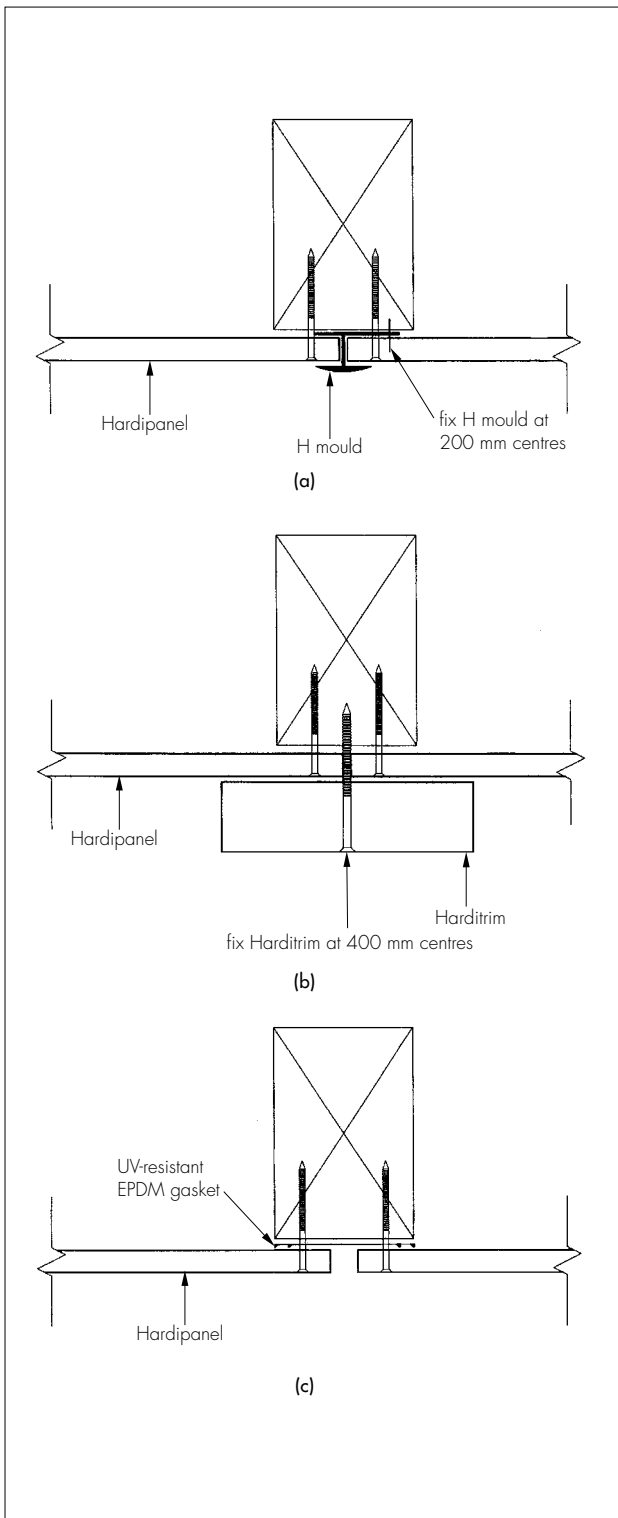
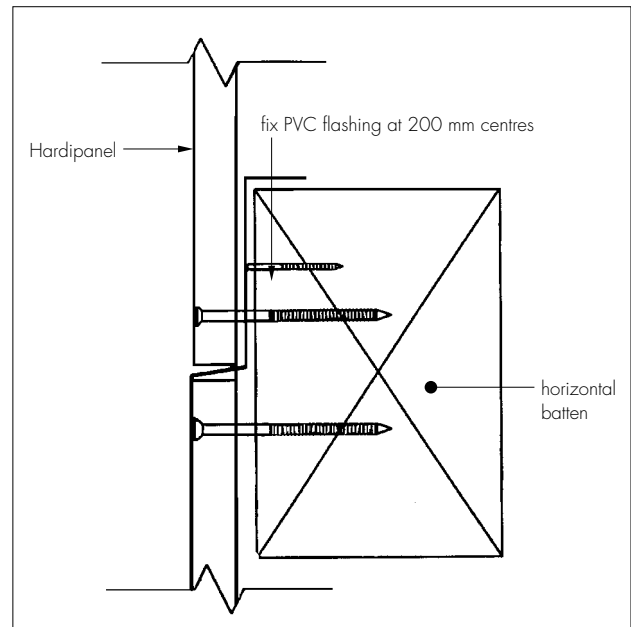


Figure 5 Horizontal jointing



14.10 At corners, the boards can be fitted and concealed with Harditrim XLD, ensuring a 10 mm gap is maintained between perpendicular boards. Alternatively, the corner may be formed using Harditrim XLD and fixing the boards to form a suitable joint that may be filled using a sealant selected in accordance with BS 6213 : 2000 (see Figure 6).

Technical Investigations

The following is a summary of the technical investigations carried out on Hardipanel.

15 Tests

Tests were carried out to determine:

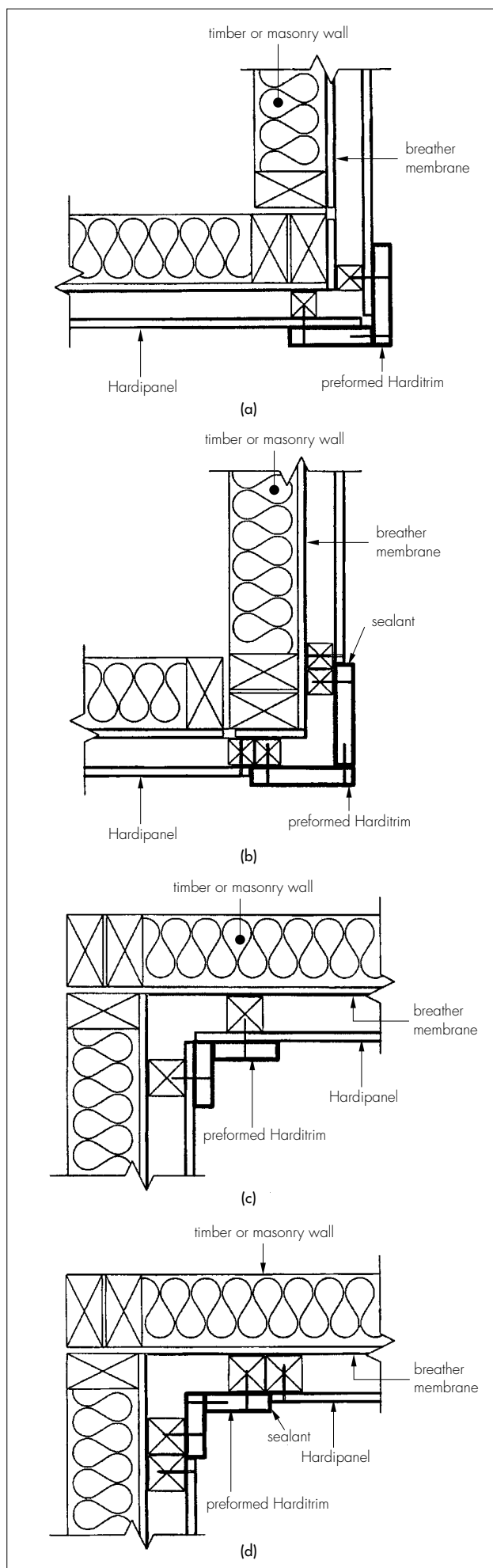
- water absorption
- water vapour permeability
- resistance to hard body impact
- resistance to soft body impact
- ease of overcoating
- adhesion of coatings.

16 Investigations

16.1 Classifications were made to EN 12467 : 2000 and ISO 8336 : 1993/Amd 1 : 2004 on the basis of test data supplied to these Standards on:

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

Figure 6 Corner detail



16.2 Examination was made of existing data relating to:

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

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

16.4 Visits were made to existing sites where the product had been in service for up to nine years.

Additional Information

The product meets the requirement for Category A, Class 2 boards to EN 12467 : 2004 and the manufacturer has declared conformity with Attestation of Conformity System 4. The product may have CE Marking, accordingly.

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 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 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*

BS 5268-6.1 : 1996 *Structural use of timber — Code of practice for timber frame walls — Dwellings not exceeding four storeys*

BS 5628-1 : 2005 *Code of practice for use of masonry — Structural use of unreinforced masonry*

BS 5628-3 : 2005 *Code of practice for use of masonry — Materials and components, design and workmanship*

BS 6213 : 2000 *Selection of construction sealants — Guide*

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 8417 : 2003 *Preservation of timber — Recommendations*

EN 12467 : 2000 *Fibre-cement flat sheets — Product specifications and test methods*

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

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ISO 8336 : 1993/Amd 1 : 2004 *Fibre-cement flat sheets*

MOAT No 43 : 1987 *UEAtc Directives for Impact Testing Opaque Vertical Building Components*

Conditions of Certification

17 Conditions

17.1 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.

17.2 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.

17.3 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.

17.4 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.

17.5 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, Hardipanel is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 05/4248 is accordingly awarded to James Hardie Building Products Ltd.

On behalf of the British Board of Agrément

Date of Second issue: 21st September 2006

A handwritten signature in black ink, appearing to read 'G. R. Cooper'.

Chief Executive

**Original Certificate issued on 25th June 2005. This amended version includes revised references to Scottish Building Regulations, a statement on CE Marking and new Conditions of Certification.*