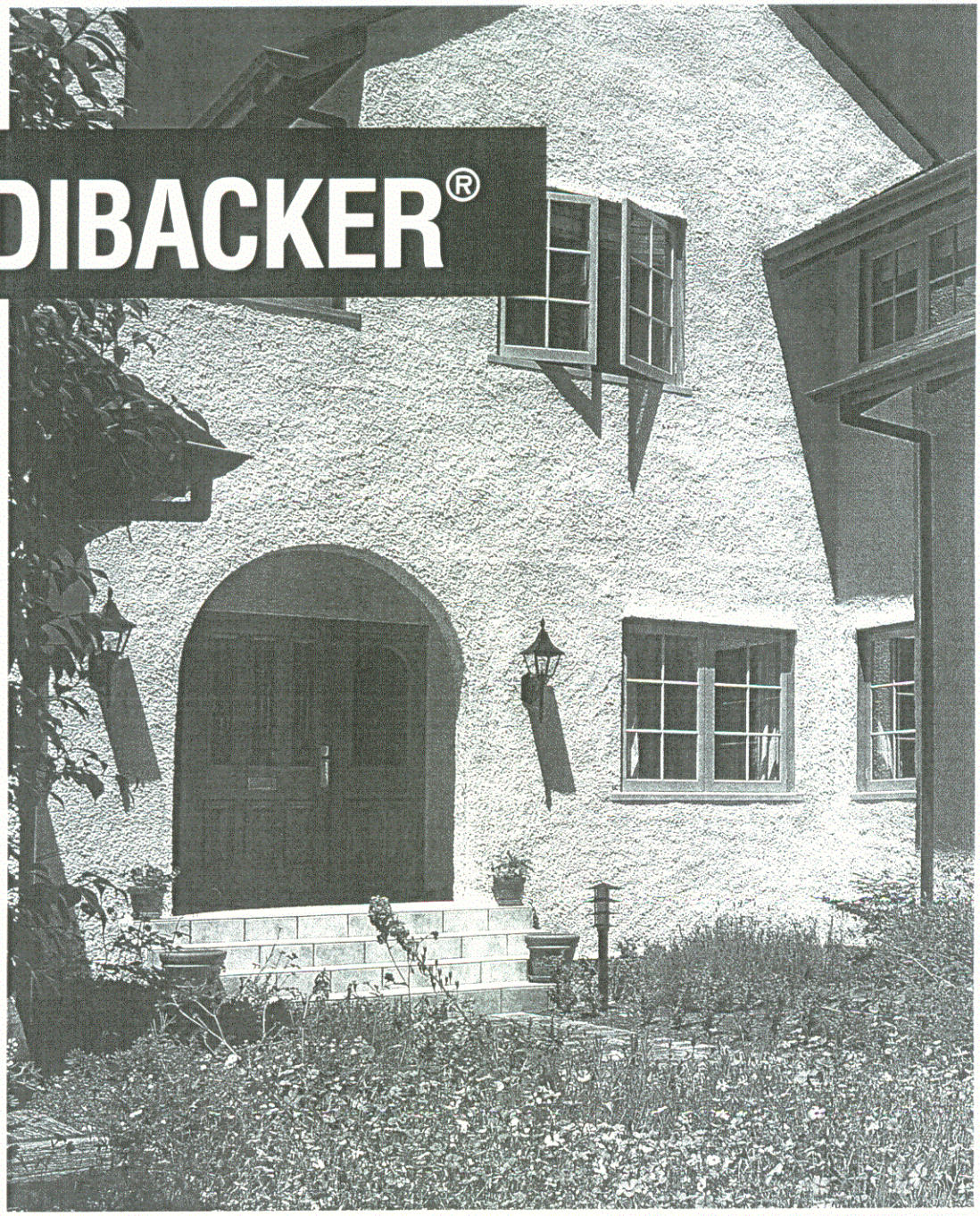
James Hardie
Building Products

HARDIBACKER®



June 1996

Hardibacker® is the superior substrate for solid plaster – structurally stable and with excellent bracing performance

JAMES HARDIE TECHNICAL INFORMATION

Contents

Introduction

Innovative design challenges the performance of structural materials, frequently extending their application beyond traditional realms. The use of solid plaster is a fashionable and flexible method of exerting individuality in building design.

Hardibacker® not only provides the ideal backing sheet for solid plaster but has the added advantage of giving excellent bracing performance.

Hardibacker's® BRANZ appraisal certificate confirms its exceptional resistance to wind and earthquake forces. By providing the specifier with a sound structural environment, Hardibacker® acts as the basis for creating visually compelling designs.

Dimensional stability is a key benefit as Hardibacker® has a high level of tolerance to moisture movement, resistance to shrinking and swelling, essential for exterior cladding. For your convenience, Hardibacker® comes in two standard sheet sizes. It can be identified by its pale blue colouring and the Hardibacker® name imprinted on the sheet surface.

Hardibacker® meets the performance requirements necessary for 50 years serviceable life. Therefore Hardibacker® can be expected to meet the design life of the building and protect the owner's investment.

These attributes make Hardibacker® the solution of choice for all solid plaster substrate requirements.

This document is divided into three distinct sections:

SECTION 1: The framing and installation of the Hardibacker® sheets.

SECTION 2: Requirements for complying with the New Zealand Building Code including bracing ratings.

- Providing the sheets are installed in strict accordance with this specification the Hardibacker® sheet performance will be warrantied by James Hardie in terms of the New Zealand Building Code of 15 years.
- The specifications given under Section 1 must be followed to warranty the sheet performance of the Hardibacker® sheets.

SECTION 3: This section outlines solid plastering practice. The information is provided in response to demand from the building industry for basic guidelines in this area. As James Hardie's expertise does not extend to solid plastering, the recommendations in Section 3 have been provided by Able Building Consultants (and not by James Hardie).

It is acknowledged that regional variations throughout New Zealand exist with respect to raw materials and standards of practice. Similarly, knowledge and experience of various solid plastering contractors has led to the development of a range of solutions.

The plastering and coating procedures are outside the control of James Hardie, therefore all warranties for performance must be given by the independent plastering tradesmen and coating manufacturers and their licensed applicators.

SECTION 1: INSTALLATION

General information

Product description

Hardibacker® is a sheet material manufactured by James Hardie from fibre cement which is a composition of treated cellulose fibre, Portland cement, finely ground sand and water. Following forming into sheets the product is cured by high-pressure steam autoclaving.

The product is identified by its name 'Hardibacker®' embossed on the face of the sheets and also by a blue colour tint.

New Zealand Standard

Hardibacker® is manufactured to conform to NZS/AS 2908.2:1992 Cellulose Cement Products – Flat Sheets.

Hardibacker® uses

Hardibacker® is a durable multi-purpose external wall cladding used for:

Timber frame

- All or part of the external wall bracing required by NZS 3604:1990. Hardibacker® can be used as a bracing sheet for non-plastered buildings. It can also be used in conjunction with 6mm Hardiflex® for enhanced bracing ratings.

Timber or steel frame

- A rigid backing (a substrate) for solid plaster exterior wall covering.
- A substrate for alternative proprietary high-build plaster coatings.
- A backing sheet when stone veneers are used as the external cladding (refer page 16 for details).
- The construction of arches, buttresses, columns, parapets, spandrels and many other architectural features that are to be subsequently plastered.
- Hardibacker® can also be used under lightweight, flexible claddings needing a backing to reduce impact damage, reduce noise of rain or hail on the cladding or to resist wind and/or rain penetration.

Impact resistance

Hardibacker® in conjunction with a solid plaster system has adequate resistance to hard and soft body impacts likely to occur during normal residential use.

Bracing

Hardibacker® will provide bracing for buildings designed and constructed in accordance with NZS 3604. For full details of Hardibacker® bracing systems refer to pages 10-12.

Loads

The total cladding system (Hardibacker® and solid plaster) with nominal 21mm plaster weighs approximately 45-50 kg/m^2. Providing these weights are adhered to, the system can be classified as a lightweight cladding by the requirements of NZS 3604:1990.

Temporary weathering

Hardibacker® can be used to provide temporary weather protection of the walls, allowing internal work and finishing to be undertaken before the completion of the solid plaster. The building paper must be erected over the Hardibacker® during this temporary weathering period.

To enhance the weathering during the winter months an additional layer of building paper can be erected under the Hardibacker®. This is not a mandatory requirement.

The plaster must be finished and coated within 3 months of the Hardibacker® sheet erection.

Installation – technical details

Hardibacker® must be fixed in accordance with the details of this specification.

Product information

The Hardibacker® sheet is a lightweight fibre cement substrate which is resistant to permanent moisture damage, and which will not rot or burn. The sheet is securely fixed to the timber or steel framing by nailing or screwing.

Any special conditions or unusual applications must be referred to the technical staff of James Hardie Building Products Ltd. Phone the James Hardie Helpline: 0800 808 868.

Sheet sizes

Hardibacker® sheets are 4.5mm thick. Lengths and widths of sheets are given in the table below.

NOTE: All dimensions are nominal.

Width (mm)	Length (mm)	
	2400	2700
1200	✔	✔

Sheet moisture content

Hardibacker® sheets must be dry before fixing to framing.

NOTE: Dry Hardibacker® sheets vary in moisture content with the seasons and prevailing weather conditions. As a guide, a dry sheet can vary between 6% moisture content in summer and 14% in winter.

The sheets are also defined as having an equilibrium moisture content (EMC). The sheet is at EMC under conditions of 25°C and 55% relative humidity.

Moisture content at EMC	7%
Moisture content at saturation	33%

Hardibacker® is strongest when dry but wetting is not generally of concern under the following intended conditions of use:

- Temporarily exposed/partially protected by building paper with some alternate wetting and drying during construction.
- In a dry state in completed walls, OR with reasonable expectation that any design, covering or installation defect (or improper maintenance) resulting in wetting or damage to other materials or finishes … will be seen, investigated and remedied long before Hardibacker® is significantly affected.

Sheet weights at EMC

Size (mm)	Sheet weight (kg)	Weight (kg/m²)
1200 x 2400	20.1	7
1200 x 2700	22.6	7

The sheet is 2mm under the nominal width and length to allow for accurate fixing when narrow-width kiln-dried timber frame or steel frame is used.

Fire properties

Hardibacker® will not burn and has the following Early Fire Hazard Indices (tested to AS1530 Part 3, 1982).

Ignition Index	0
Flame Spread Index	0
Heat Evolved Index	0
Smoke Developed Index	0

Note: Zero is the best possible result.

Working instructions

Handling and storage

The sheets must be stacked on a smooth level surface. Edges and corners must be protected from damage. Storage must be under cover and the sheets kept dry prior to fixing. The sheets must be carried on edge.

On site, sheets must be kept dry and protected from soiling, damage and bowing.

Cutting

Safety precautions

When cutting, drilling or grinding, safety glasses and a dust mask should always be worn. This can be either a disposable P2 dust mask or a half mask with a disposable cartridge.

The mask should fit properly and be approved for use with dust. The mask should be repaired or replaced as necessary and cleaned often.

All dry power-cutting operations must be carried out in open-air situations or in well ventilated spaces and dust-extraction equipment must be fitted to the dry-cutting tool.

All aspects of wet and dry cutting must comply with the latest regulations of the Occupational Safety and Health (OSH) division of the Labour Department.

The James Hardie publication 'Working Safer with Silica-based Products' is available on request and should be read before commencing work.

Score-and-snap

Hardibacker® is readily cut using a scoring knife available from James Hardie stockists.

- Position the straight-edge along the line to be cut.
- Score against the straight-edge and repeat the action to obtain adequate depth for a clean break (normally one-third of sheet thickness).
- With the straight-edge firmly in place along the score-line, snap the sheet upwards.
- If necessary clean up the edges with a rasp and/or coarse sandpaper.

Hand guillotine

Alternatively, cut with a hand guillotine. These are available from James Hardie stockists or hire centres. Pack the sheet clear of the ground to allow for the hand guillotine operation. Make the guillotine cut on the off-cut side of the line to allow for the thickness of the blade.

Hardishear™ power cutter

A Hardishear™ power-cutting tool can be used for 4.5mm Hardibacker®. For details and availability of the Hardishear™, enquire at a James Hardie sales office.

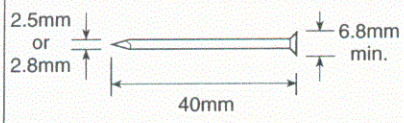
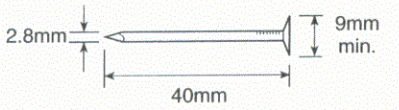
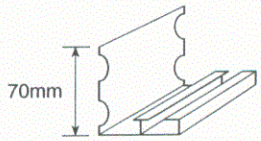
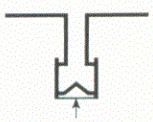
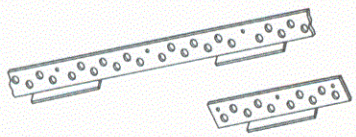
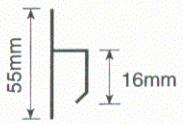
Penetrations

Penetrations for services pipes etc. are simply made by drilling a series of holes around the opening – tap out the waste and clean up with a rasp.

Alternatively, straight-sided penetrations can be made in the sheet before it is applied to the wall. Mark out the penetration on the reverse side of the sheet. Drill holes at each corner and join using a key hole or jig saw.

Alternatively, score, joining the holes, turn the sheet over and repeat the process on the face side, then tap out the waste. Care should be taken to score to an adequate depth (at least two-thirds of the sheet).

Table 1: Accessories for James Hardie Hardibacker®

	Accessory	Lengths (mm)	Material / Appearance
	Hardiflex® nails 40mm x 2.5mm galvanised flat head 40mm x 2.8mm 316 stainless steel	40 40	Hot-dipped galvanised steel 316 stainless steel
	Large-head clout galvanised nail 40mm x 2.8mm (for fixing spacer angle and reinforcing mesh)	40	Hot-dipped galvanised steel
	Base moulding	2700	PVC / White
	Control joint moulding	2700	PVC / White
	Spacer angle	50-metre coil and 150mm lengths	PVC / White
	6mm horizontal flashing	3000	PVC / Bone

Framing and fixing

General requirements

The Hardibacker® bracing systems described on pages 10-12 apply only to timber frame construction, and are not to be used for steel frame construction.

Correct design of the framework and careful consideration of the sheet set-out will significantly contribute to the long-term success of all plaster wall systems. Allowance must be made for the provision of both horizontal and vertical control joints and expansion joints at the design stage.

Sheet and frame fixing tolerances are at a minimum when 35mm kiln-dried timber or steel frame is used, therefore setting out must be accurate when using this framing.

Always ensure the sheet join is on the centre line of the stud to achieve the fixing as detailed.

The studs for steel and timber frame must be spaced at 600mm maximum centres, between continuous top and bottom plates with nogs at 800mm maximum centres.

NOTE: The nogs are required for securing the reinforcing mesh. For some reinforcing meshes three rows of nogs may be required.

Commence fixing from the centre of all sheets and work outwards to ensure sheets are hard against the framing to eliminate any drumminess.

Battening specification

Battening is required over blockwork, polystyrene or hot-rolled steel sections.

- Timber battening is to have a minimum thickness of 40mm to give adequate sheet nail penetration.
- Steel battens are to be a minimum of 72mm wide x 23mm deep x 0.55mm thick and to have a bearing surface of 37mm. Battens are to be exterior-quality galvanised steel and fixed to the manufacturer's specifications.

All battening centres and sheet fixing are to be strictly in accordance with the framing and fixing required by this specification. Care must be taken to ensure the battens are packed and aligned to give a true even surface for the sheets to be fixed. Check the face of the battens with a long straight-edge before fixing the sheets.

Curved applications

Hardibacker® can be used for curved applications. The minimum recommended radius for convex or concave fitted sheets of 4.5mm thickness is 1500mm. The sheets must be bent only along the length.

NOTE: The framing is to be closed up to 400mm centres for curved applications to give extra support to the curve. Commence fixing from the centre of the sheet and work outwards to avoid any possibility of drumminess.

Jointing locations/specifications

Control joints are provided to take up any shrinkage or movement of the plaster finish.

Expansion joints are provided to panelise elements to allow for long-term frame movement that occurs because of component shrinkage and temperature-related expansion and contraction.

Control and expansion joints must be determined at the design stage.

Vertical control joints

Vertical control joints must be located so the maximum distance between joints is 4 metres as required by NZS 3604:1990. Refer to BRANZ Good Stucco Practice (Feb. 1996) for further information.

At all internal and external corners the mesh and plaster is to be continuous around the corner; control joints are not required.

Control joints must be located at 4-metre centres from internal and external corners.

When a window or door opening is in the vicinity of a control joint then the edge of the opening is the ideal location for the control joint. Where possible use full-height openings to panelise the plasterwork.

Position the vertical control joints so they are hidden by building features where possible.

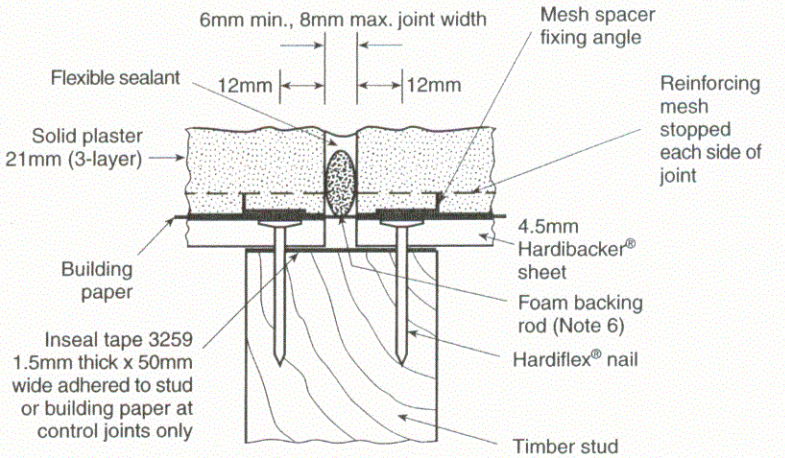
Alternatively, they can be located behind down pipes or vent pipes. Short joints in line with window and door jambs can be provided or they can be concealed by other design features.

Cut or form vertical control joints as shown in Fig. 1. Prime and fill with suitable sealant in accordance with the manufacturer's instructions. Protect with plaster finish over the sealant, or alternatively, leave the sealant exposed.

NOTE: The skim plaster over the sealant can crack with long-term movement.

When chicken-mesh-type reinforcing is used the mesh can be

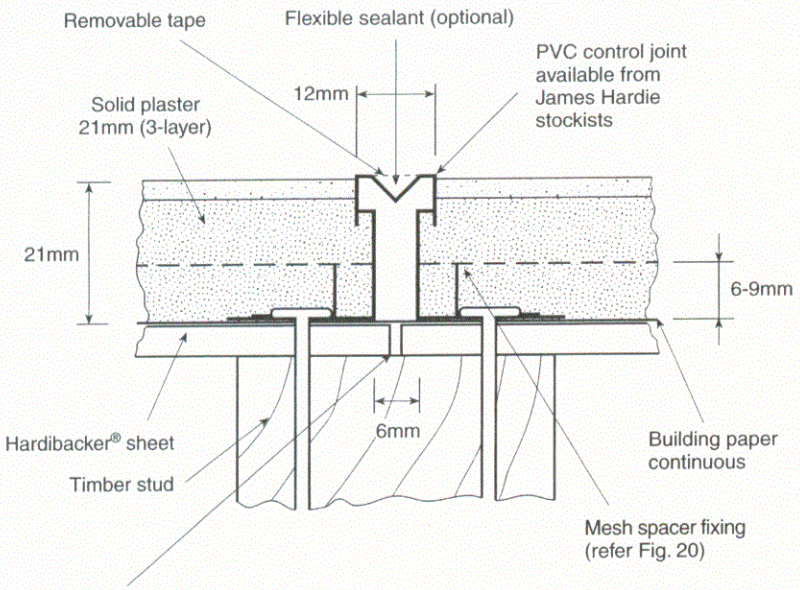
Fig. 1 *VERTICAL SOLID PLASTER CONTROL JOINT*



Notes:

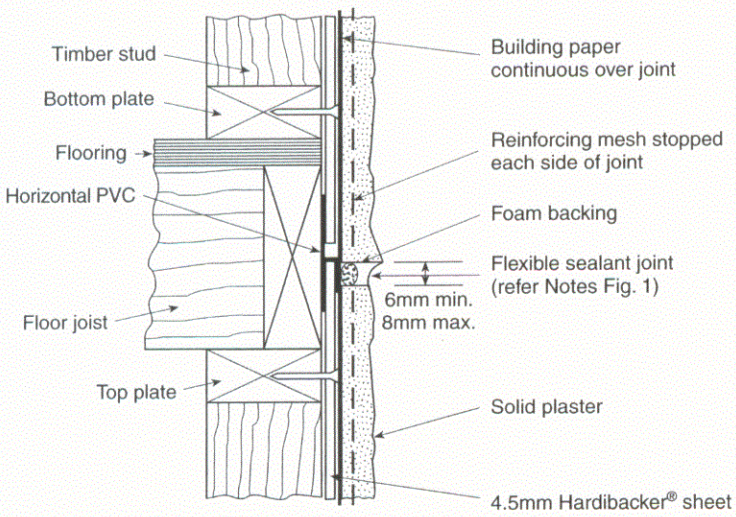
1. Vertical joints can be either formed or cut when the plastering is complete.
2. Seal control joints with good-quality flexible paintable silicone sealant such as Fosroc Silaflex MS.
3. Clean and prime the joints and apply the sealant strictly in accordance with the manufacturer's instructions.
4. The building paper must be continuous through the joint.
5. The Hardibacker® sheet joint does not have to coincide with the control joint.
6. Foam backing rods are available from Bostik, Fosroc and Ramset.

Fig. 2 *ALTERNATIVE VERTICAL CONTROL JOINT DETAIL*



Note: Hardibacker® sheet joint does not need to coincide with control joint

Fig. 3 *HORIZONTAL SOLID PLASTER CONTROL JOINT (TO ALLOW FOR VERTICAL SHRINKAGE)*



Note: For multi-storey construction locate the horizontal control joint adjacent to the floor joist as shown in drawing. This is because the floor joists can have significant drying shrinkage. Do not fix the Hardibacker® sheet to the floor joist when floor joist shrinkage is anticipated.

continuous through the joint and the plaster raked out. Refer to BRANZ Good Stucco Practice (Feb. 1996), page 18.

An alternative pre-formed PVC vertical control joint detail can be used (refer Fig. 2). The PVC control joints are available from James Hardie stockists.

Horizontal control joints

Horizontal control joints must be located so the maximum distance between joints is 4 metres as required by NZS 3604:1990.

When conventional timber framing (non-kiln dried) is used in two-storey construction, vertical shrinkage can be anticipated. To allow for this movement use the control joint shown in Fig. 3.

When kiln-dried timber or steel frame is specified the detail shown in Fig. 4 can be used.

Expansion joints

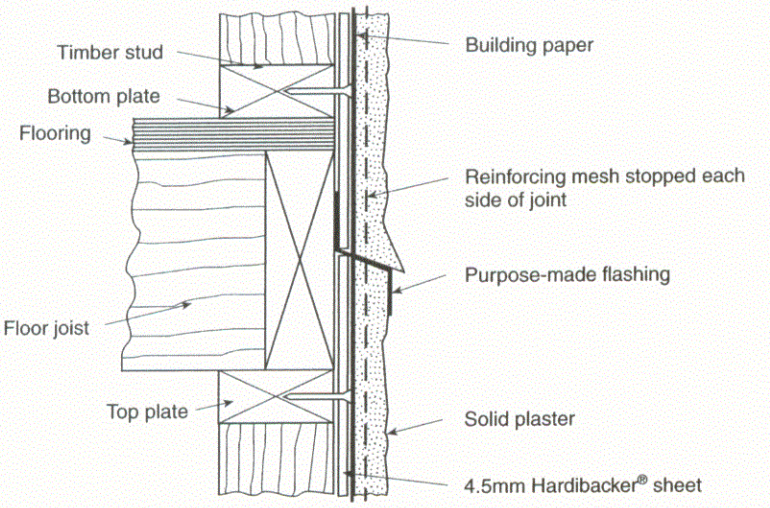
Vertical structural expansion joints must be provided where walls exceed 12 metres in length. These expansion joints must be correctly designed structural joints. They must have total framing, including top and bottom plate, lining and cladding separation to allow for the structural framing expansion and contraction that can occur.

A well designed long wall will therefore have full expansion joints at 12-metre centres with intermediate control joints at 4-metre centres maximum from an expansion joint or internal or external corner.

NOTE: These expansion joints must be used on commercial and industrial applications where long wall lengths are frequently required. This can be achieved by panelising the plaster support framework off the main structural frame. These details are difficult to achieve on domestic construction therefore walls longer than 12 metres should be avoided.

The vertical expansion joints must be formed as shown in Figs. 1 and 2 and double studs separated by a 6mm gap must be used. The Hardibacker® sheet, mesh and plaster must be separated at these expansion joints.

***Fig. 4** HORIZONTAL SOLID PLASTER CONTROL JOINT (VERTICAL SHRINKAGE NOT ANTICIPATED)*



Note: Use when vertical shrinkage is not anticipated, i.e. when kiln-dried framing and floor joists or steel frame is used.

Timber frame

Timber framing must be in accordance with NZS 3604:1990 Code of Practice for Light Timber Frame Buildings Not Requiring Specific Design.

Narrow-width kiln-dried timber framing can be used for both bracing and non-bracing constructions and the full bracing values shown in Table 2, page 11, can be used.

Timber must be selected to minimise shrinkage. Framing must not have a moisture content in excess of 18%. Kiln-dried timber framing is now a desirable option.

For framing and fixing requirements for bracing applications refer to page 10.

For non-bracing applications Hardibacker® sheets can be fixed vertically or horizontally.

On walls more than one sheet in height, the sheets are to be laid in an offset pattern.

Fix all Hardibacker® sheets to timber framing with 40 x 2.5mm hot-dipped galvanised Hardiflex® nails.

Nail at 200mm centres to sheet edges and to intermediate framing and nogs. Nails must be driven a minimum of 12mm from the sheet edge and 50mm from corners. The sheets must be held hard against the framing during nailing to minimise nail break-out.

Drive all nails flush with the Hardibacker® sheet surface. Do not punch as this can weaken the nails' holding.

Steel frame

Steel frame construction can be used for non-bracing solid plaster applications and can be load bearing or non-load bearing.

Load-bearing steel studs must have sufficient strength and thickness to resist all vertical and horizontal loads.

Steel framing members must be fabricated from light-gauge sheet steel 0.55mm to 1.6mm thick.

When the Hardibacker® sheets are fixed vertically a minimum flange width of 36mm is required to adequately fix the sheets with the correct edge distances. (Refer Fig. 5.)

Hardibacker® sheet must not be fixed directly to drawn steel or hot-rolled sheet sections which must first be battened out. (Refer 'Battening specification', page 6.)

When flange widths less than 36mm are used the sheets must be laid horizontally (as shown in Fig. 6) or alternatively they can be fixed vertically to one of the following requirements:

- Use double studs at all joints
- Use the additional landing angle (as shown in Fig. 7) for all sheet joints.

When the horizontal fixing method is used a widening angle must be fixed to the studs and nogs at sheet end and side joints. (Refer Figs 6 and 7.)

***Fig. 5** FIXING TO STEEL FRAME*

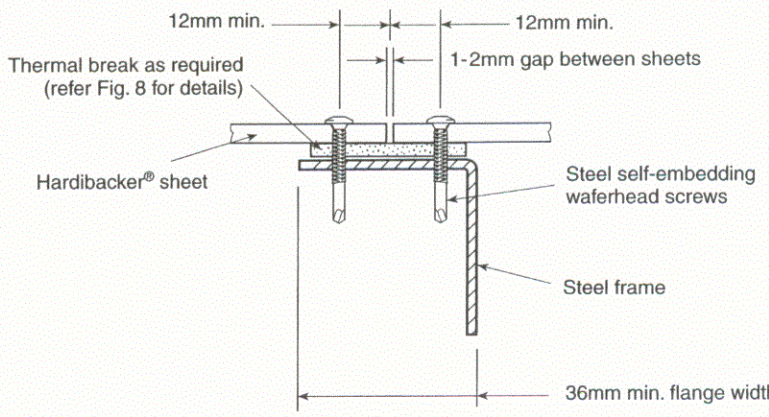
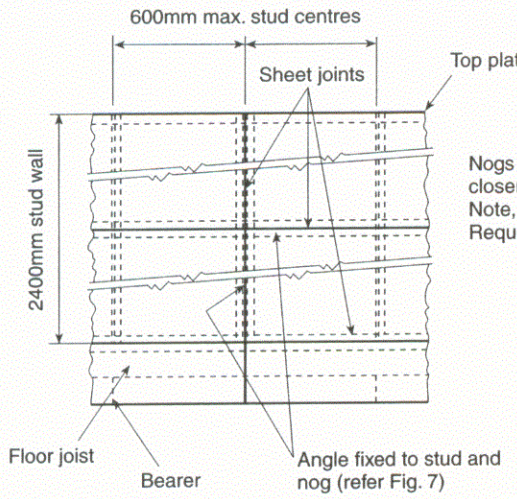
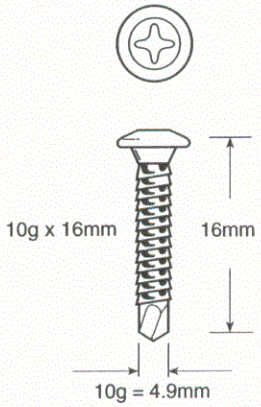


Fig. 6 *HORIZONTAL FRAME AND SHEET SET-OUT TO NARROW-FLANGE STEEL FRAMING*



Notes:
1. Offsetting of sheet joints is not required for this method.
2. The angle is required at all sheet end joints and at horizontal sheet joints at nogs.

Fig. 9 *WAFERHEAD TEKS SCREW*



Notes:
1. For fixing 4.5mm Hardibacker® directly to steel frame use 10g x 16mm Waferhead Teks screws.
2. For fixing 4.5mm Hardibacker® over 12mm Triple S or12mm polystyrene use 10g x 30mm Waferhead Teks.

Fig. 7 *FIXING TO NARROW STEEL FLANGES*

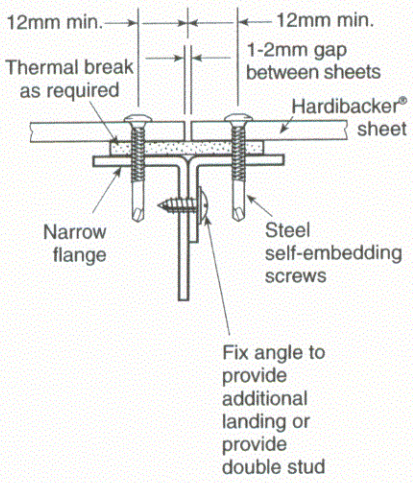
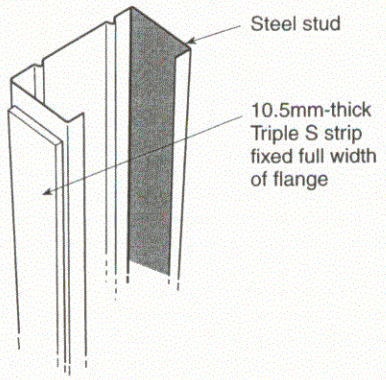


Fig. 8 *THERMAL BRIDGING TO STEEL STUDS*



Notes:
1. The strips of thermal bridging can be adhesive bonded to the steel-frame.
2. 12mm high-density 'S' grade polystyrene can also be used as an alternative to Triple S.

Thermal bridging

A steel-framed wall clad with 4.5mm-thickness Hardibacker® and 21mm of solid plaster will require a thermal break fixed between the steel and the Hardibacker® to achieve the 1.5 R value required by the NZ Building Code. (Refer Fig. 8.)

Fixings for steel frame

Use only waferhead-type screws for fixing Hardibacker® to steel frame. (Refer Fig. 9.)

NOTE: Because the fixings for Hardibacker® are not accessible the NZ Building Code requires a durability of 50 years. In severe and very severe climatic locations galvanised fixings have a durability of 15 and 10 years, respectively. Therefore, alternative fixings such as stainless steel must be considered.

Screw-driving technique

Drive the Teks screw through the Hardibacker® and into the steel at high speed (2500 rpm maximum). Use a variable-speed and variable-torque screw gun.

As soon as the screw penetrates the steel the revs must be dropped to very slow (10-100 rpm) to bed the fixing onto the Hardibacker®. Also use an adjustable depth-locating nose piece to stop over-driving.

NOTE: It is important that slow revs are used to bed the screw onto the Hardibacker® otherwise sheet damage can occur. This technique is essential when the Triple S or polystyrene thermal bridging is used under the Hardibacker®.

SECTION 2: NZ BUILDING CODE COMPLIANCE

New Zealand Building Code (NZBC)

Hardibacker® must be used in accordance with this specification. It will then meet the relevant provisions of the following NZBC Clauses:

B1 Structure
B2 Durability
E2 External Moisture
F2 Hazardous Building Materials (Hardibacker® is not hazardous in terms of clause F2).

It will also contribute towards the provisions of H1 Energy Efficiency when insulation is placed in the stud cavity (refer Fig. 10).

Hardibacker® is often used on both faces of barriers to decks as a substrate to meet NZBC F4 safety needs (and allow finishes to blend with the building).

Durability

The Hardibacker® cladding and bracing system meets the performance requirements of NZBC Clause B2.3.(a) of 50 years as long as the integrity of the coating system is maintained. This is particularly relevant to the performance of the fixing and jointing systems.

Serviceable life

Hardibacker® is not susceptible to long-term moisture damage and when the jointing, sealing, flashing and coating details are maintained the Hardibacker® is expected to have a serviceable life of at least 50 years.

BTL (BRANZ) appraisal

Hardibacker® has gained the following BTL Appraisal Certificates: No. 229 (1995) James Hardie Wall Bracing Systems No. 240 (1995) Hardibacker® - Substrate for Solid Plaster Walls.

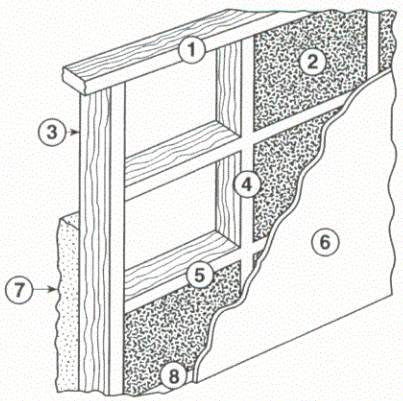
Maintenance

Routine maintenance of the solid plaster, jointing and coating systems is essential to ensure water ingress is prevented over the life of the building. In particular the following will need careful attention and maintenance – sealants, coatings and any cracks in the solid plaster.

Energy efficiency

An insulated timber-framed wall clad with 4.5mm Hardibacker® and 21mm of solid plaster (refer Fig. 10) will exceed the 1.5°Cm2/W requirement of clause H1 Energy Efficiency as cited by Acceptable Solution E3/AS1.

Fig. 10 *TIMBER-FRAMED WALL WITH FIBREGLASS BATTS*



CONSTRUCTION

1. Top plate
2. Fibreglass Wall Pink Batts R1.8
3. Hardibacker® sheet 4.5mm thickness
4. Studs ex (100 x 50) at 600mm centres
5. 2 rows nogs (800mm centres)
6. Internal lining (9.5mm Gib board)
7. Building paper, reinforcing mesh and solid plaster over 4.5mm Hardibacker® sheet
8. Bottom plate

Note:
The construction shown above will give an R value of 1.77°Cm2/W.

Bracing systems

Framing and fixing requirements

This specification is used to install and determine the bracing ratings of Hardibacker® as a backing sheet for plaster to timber-framed walls.

Bracing ratings have all been determined by BTL (BRANZ) tests and are suitable for use in conjunction with NZS 3604:1990.

Hardibacker® meets the wall-bracing element requirements of NZS 3604. (NZS 3604 is cited in Approved Document B1/AS1 Clause 4.0).

Hardibacker® when used as the required bracing must also be used with the appropriate fixings as set out in Table 2. Refer also to Figs 11 to 15 for Hardibacker® sheet-bracing details.

Hardibacker® sheets for bracing applications must be fixed vertically with all sheet edges on framing.

To achieve the bracing ratings shown in Table 2, full-height sheets without joints must be used. Jointing sheets in the horizontal direction is permissible to make up the element length. Jointing must be kept to the minimum, for example an 1800mm element length must be a 1200mm and 600mm-wide sheet or two 900mm-wide sheets.

Always ensure the sheet joint is on the centre line of the stud to achieve the fixing as detailed.

There is no limit to the length of bracing elements.

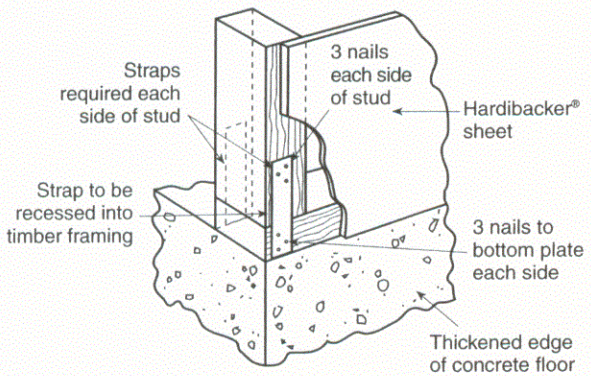
Certain bracing applications require the use of end strap fixing. The end straps must be rebated into the framing behind the sheets. (Refer Table 2 and Figs 11 and 12.)

When end fixing straps are used, the strap and the holding-down bolt must be used at the end of each element length as required by NZS 3604.

Table 2: Bracing ratings for Hardibacker® 4.5mm thick

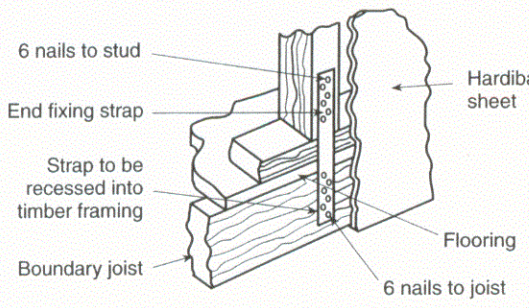
System number	Bracing element length (mm)	End straps	Bracing details	NZS 3604:1990 rating in bracing units per metre of element length	
				Wind	Earthquake
HBK1	1200 or more	Not required	Refer Figs 13 and 14	85	70
HBK2	1800 or more	Not required	Refer Figs 13 and 14	90	75
HBK3	2400 or more	Not required	Refer Figs 13 and 14	105	80
HBK4	900 or more	Required (refer Figs 11 and 12)	Refer Figs 13 and 14	110	85

Fig. 11 *END FIXING STRAP TO BOTTOM PLATE ON CONCRETE FLOOR*



Notes:
1. The 2 straps combined must be capable of carrying a tension force of 6KN (capacity load as defined in NZS 3604). This is achieved by a 25mm x 1mm strap each side, each of 3KN capacity. (3 nails each end of a 25mm x 1mm strap give 3KN capacity and 6 nails each end of strap give 6KN capacity.)
2. Strap nails must be 40 x 2.5mm diameter galvanised flat-heads.

Fig. 12 *END FIXING STRAP TO TIMBER FLOOR*



Notes:
1. The strap must be 25mm x 1mm galvanised steel capable of carrying a tension force of 6KN (capacity load as defined in NZS 3604:1990)
2. Strap nails must be 40 x 2.5mm diameter galvanised flat-heads.

The bracing values given in Table 2 are derived from the Hardibacker® sheet only and do not utilise any bracing contribution from the solid plaster or from the internal linings.

When increased bracing ratings are required, 6mm Hardiflex® can be used in conjunction with the Hardibacker®.

The Hardiflex® can be substituted for the Hardibacker® sheet and the increase in thickness can be taken up in the mesh placement and the plaster.

Sheets stopped below top plate

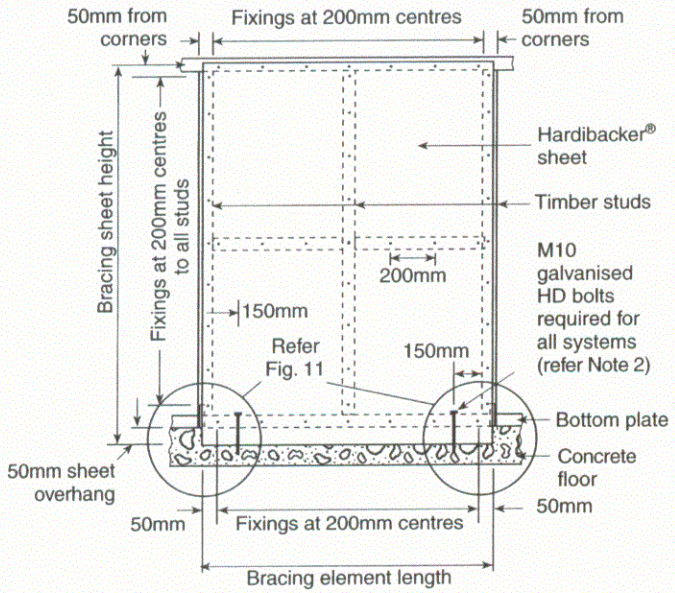
Where bracing sheets are stopped below the level of the top plate refer to Fig. 15 for details.

Bracing panel height

Bracing panel height is normally 2400mm and all bracing ratings given in Table 2 are for this panel height. When other heights are required refer to Clause K.7 NZS 3604:1990.

The maximum height for these bracing panels is 4800mm.

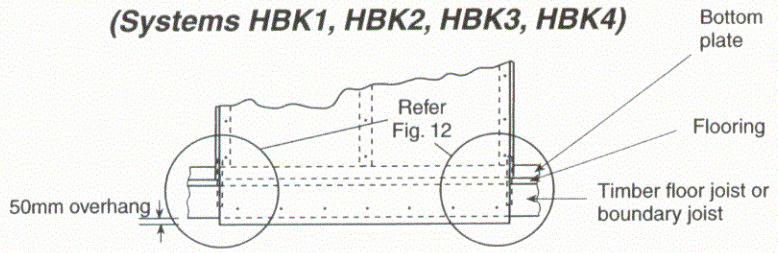
Fig. 13 HARDIBACKER® ON CONCRETE SLAB WITH AND WITHOUT STRAPS
(Systems HBK1, HBK2, HBK3, HBK4)



Notes:

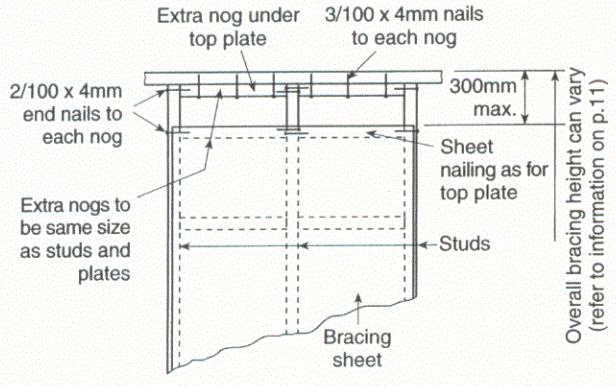
1. For Hardibacker® bracing ratings refer Table 2.
2. HD bolts must be M12 hot-dipped galvanised with 50 x 50 x 3mm galvanised washers fixed as shown in Fig. 4.17 NZS 3604:1990.

Fig. 14 HARDIBACKER® TO TIMBER FLOOR WITH AND WITHOUT STRAPS
(Systems HBK1, HBK2, HBK3, HBK4)



Note: All fixings centres to be as shown in Fig. 13

Fig. 15 DETAIL WHEN BRACING SHEET STOPPED BELOW TOP PLATE



Notes:

1. All sheet nailing must be as shown for the various bracing systems.
2. The full bracing values for full-height sheets for each system can be used when this detail is followed.
3. This detail must be used instead of the detail shown in Fig. K1 NZS 3604:1990.

SECTION 3: SOLID PLASTER FINISHING AND DETAILING

Solid plaster finishes

Hardibacker® is a popular rigid backing for solid plaster and proprietary plaster coatings and has the following advantages:

- Provides the most reliable substrate for solid plaster
- Economy and ease of fixing to timber or steel frame
- Provides sheet bracing
- Gives a true straight backing to plaster
- Application of wet plaster is easier than on non-rigid backings
- Ease of construction to form arches, columns, parapets, spandrels and other architectural features
- Satisfies 50-year durability requirements of the NZ Building Code.

Apply solid plaster finishing coats only after all framing and internal linings have been completed.

An approved plastering system is to be applied which is either proprietary or in accordance with NZS 4251:1974.

For successful plastering a sound knowledge of materials is essential. Of particular importance is the selection and fixing of reinforcement, the selection of plaster mixes, the location of control joints, and curing. Dry timber framing is also an important factor (refer to page 3).

The solid plaster must be finished and detailed to be waterproof. Useful guidance can be found in BS 5262:1991 and BRANZ Good Stucco Practice (Feb. 1996).

Building paper

Used in accordance with Acceptable Solution E2/AS1 Paragraph 2.3, Hardibacker® is an alternative to the 'rigid backings' specified in Paragraph 2.3.3. of the NZBC, i.e. building paper over the face of the sheets must be fixed before the mesh and plaster is applied.

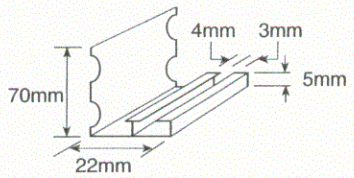
NOTE: An additional layer of building paper is not required under the sheet, but may be added for extra temporary weathering.

A suitable building paper must comply with NZS 2295. The building paper must be run horizontally and lapped 75mm at joints, with the direction of lap ensuring water is shed to the outer face of the paper.

Adequately mark the position of the framing lines on the face of the building paper to later assist the reinforcement fixing.

Some proprietary plaster systems require the plaster to adhere to the Hardibacker®. In these cases check with the proprietary system whether building paper is required under the Hardibacker® sheet.

Fig. 17 *PVC BASE MOULD*



Note: PVC base mould available from James Hardie stockists.

Base mould

A PVC base mould is available to finish the plaster against. Fix the base mould to the bottom plate or bearer and over the Hardibacker® before plastering commences (refer Fig. 16).

Reinforcement

Fix reinforcement for solid plaster in accordance with NZS 3604:1990 and NZS 4251:1974 Code of Practice for Solid Plaster. Alternative proprietary solid plaster reinforcing mesh systems can be used.

Fig. 16 *HARDIBACKER® FOR BASE DETAIL*

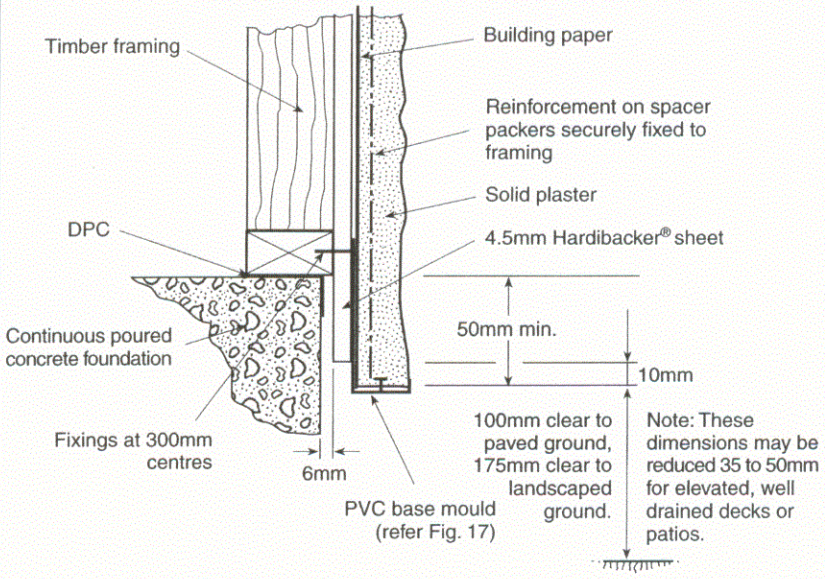
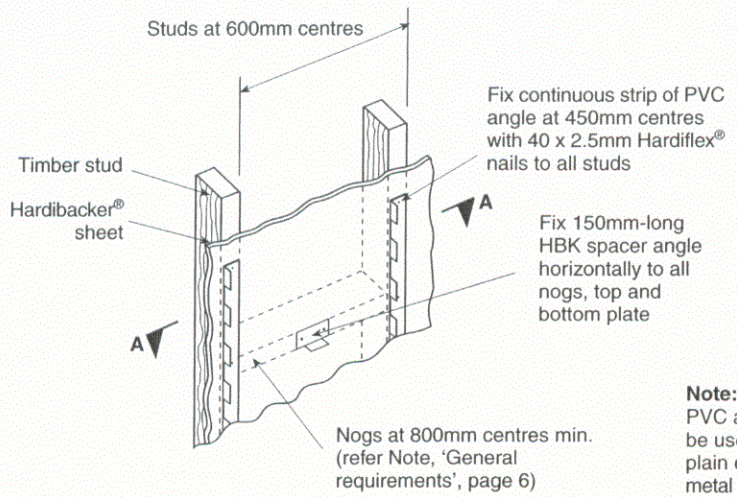


***Fig. 18** FIXING HBK PVC SPACING ANGLE*

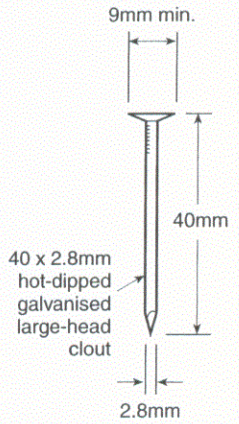


The mesh must be spaced in the plaster between 6mm and 9mm from the Hardibacker® surface as required by Clause 7.4.4 NZS 4251:1974.

To achieve this spacing and to adequately tension the mesh, use the HBK PVC angle. Refer to Fig. 18 for fixing details.

The HBK PVC angle is fixed in a continuous strip vertically down each stud line at 600mm centres. The 150mm spacers are fixed to the centre of each nog line (refer Fig. 18). Fix to reference marks previously set out on the building paper face as all mesh fixings must penetrate the timber frame.

***Fig. 19** LARGE-HEAD CLOUT FIXING*



Note: These fixings are available from James Hardie stockists.

Fixing of reinforcement

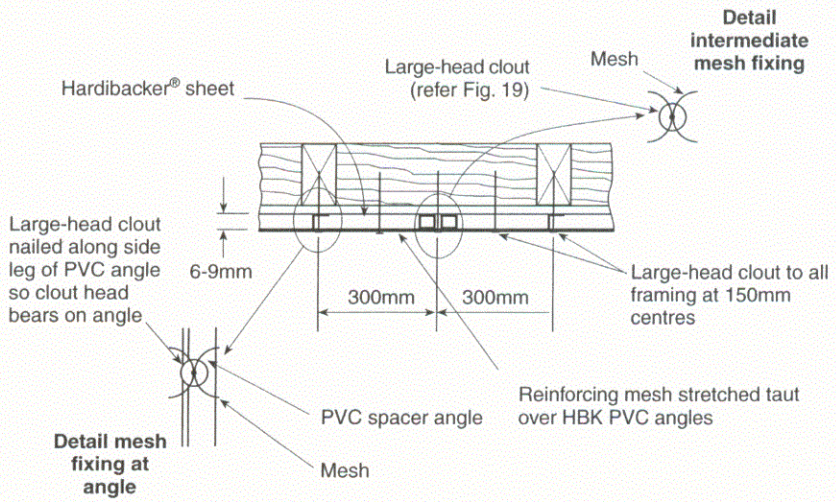
Use 40mm x 2.8mm galvanised large-head clouts (refer Fig. 19) with 9mm-diameter flat heads, to secure the reinforcing. Nail through or alongside every fourth hole in the spacers (150mm spacing) down each stud line and nail-fix the mesh at 150mm along the nogs. Slightly skew the nail from the centre of the sheet outwards to make taut. (Refer Figs 18 and 20.)

Laps in reinforcing must be 75mm minimum, with vertical laps offset. Securely nail together over timber or wire every 150mm if not on a timber line. (Ribs in lath, if any, must be nested.)

Do not join the mesh as above at an internal or external vertical corner of a building. Bend the mesh around the corner at least 480-600mm to allow the lap to be located one standard stud spacing away from the corner.

The corners of openings must have extra reinforcement, as Clauses 7.4.6 and 7.5.2 NZS 4251:1974. This is not required when a relief or

***Fig. 20** PLAN A-A FIXING AND TENSIONING REINFORCING MESH*



Note: The HBK spacer gives good support to plain reinforcing and makes it easier to fix taut. The long spacers are corrosion resistant and save much time obtaining (or making) and fixing small spacers and avoid a tendency to use insufficient individual small spacers.

control joint is located at the side of the opening.

Refer to BRANZ Good Stucco Practice (Feb. 1996), page 45, for diagrams of this extra diagonal mesh.

Plaster mixes and application mixes

For a guide to mix components, mixing and plaster application, and surface finishes, refer to BRANZ Good Stucco Practice (Feb. 1996).

Paint systems

Use only quality 100% acrylic high-build paints. Economy paints are not recommended because generally they are less well bound, less moisture resistant and more prone to mould growth.

In all cases the manufacturer's specification for the selected paint and number of coats must be followed. Note that some paints require an undercoat before applying finish coats.

Damp, shady situations, proximity to bush, agricultural paddocks or sea-spray environments may induce an extra tendency for mould growth. Use mould-inhibiting undercoats and consult the paint manufacturer for maximum mould-resistant paints.

Before painting, remove any surface dirt, grime or other contaminants and ensure the plaster surface is dry and well cured. Paint must not be applied when the air temperature is below 10°C.

The painted plaster surface requires regular maintenance and recoating to ensure the system remains waterproof as is required to meet the durability provisions.

Window and flashing details

The following are suggested details for timber and aluminium windows.

Fig. 21 *TIMBER WINDOW HEAD DETAIL*

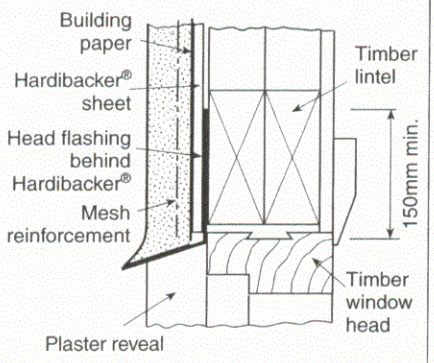


Fig. 22 *TIMBER WINDOW JAMB DETAIL*

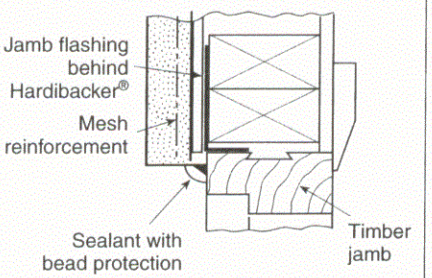


Fig. 24 *TIMBER WINDOW SILL DETAIL*

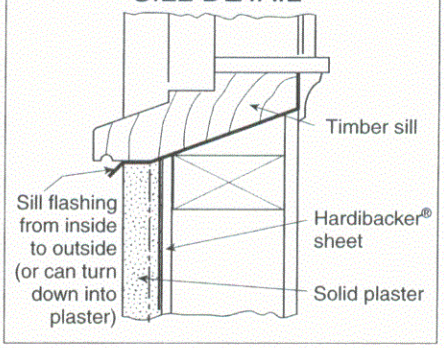


Fig. 25 *ALTERNATIVE BAND DETAIL AT JAMB*

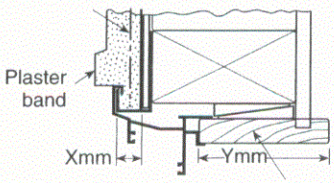


Fig. 26 *ALTERNATIVE FLUSH JAMB DETAIL*

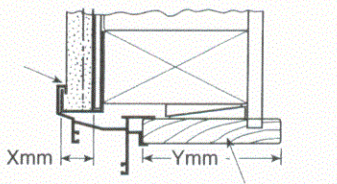
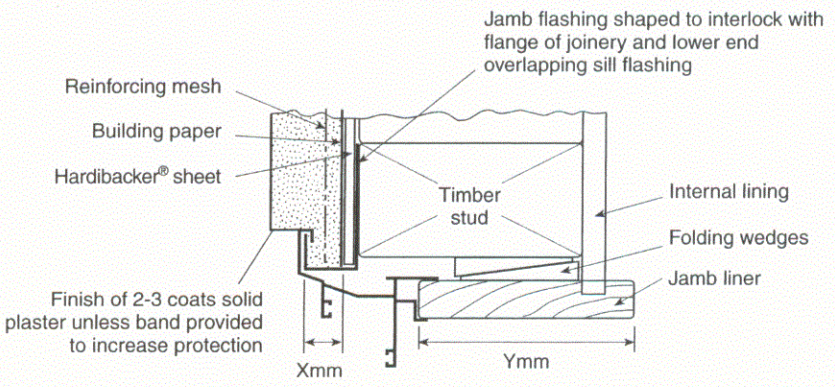


Fig. 23 *ALUMINIUM WINDOW JAMB DETAIL*



Note: Dimension X needs to be provided to the joinery manufacturer to allow for the accurate location of all joinery as this dimension will vary the width Y of the jamb liner.

Fig. 27 ALUMINIUM WINDOW HEAD DETAIL

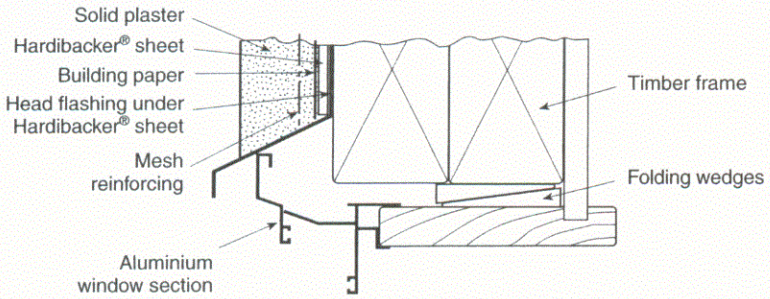
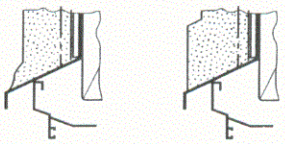


Fig. 28 ALTERNATIVE HEAD DETAILS



Note: The head flashing is extended out to better protect the windowhead by addition of (a) bellcast or (b) band.

Fig. 29 ALUMINIUM SILL DETAIL

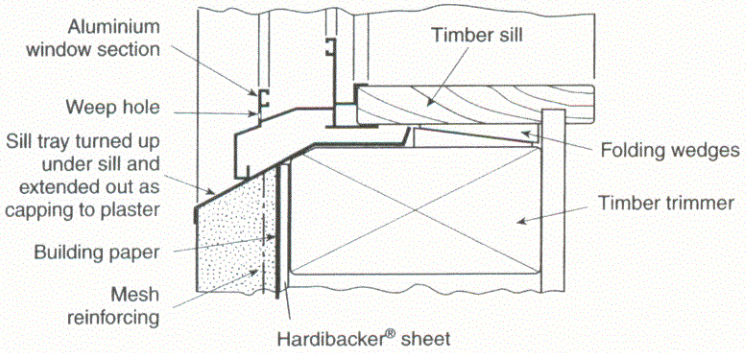
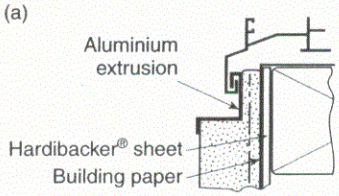


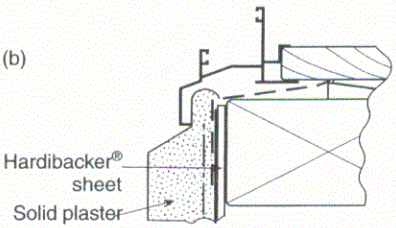
Fig. 30 ALTERNATIVE SILL DETAILS

(a)



Alternative (a): Plaster taken up to underside of extrusion interlocked into flange of joinery.

(b)



Alternative (b): Minimum of polythene flashing stapled to underside of sill and allowed to turn down 50mm over building paper during joinery installation and before fixing reinforcing mesh.

Fig. 31 NATURAL STONE VENEER