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BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Designated by Government to issue European Technical Approvals

Agrément Certificate No 93/2914
*Third issue**

SWISSLAB EXTERNAL WALL INSULATION SYSTEMS

Système d'isolation pour murs extérieurs
Wärmedämmung für Außen-wand

Product

- *THIS CERTIFICATE REPLACES AND EXTENDS CERTIFICATE No 88/2042 AND RELATES TO THE SWISSLAB EXTERNAL WALL INSULATION SYSTEMS.*
- *The systems comprise insulation material, glass-fibre reinforcing mesh or stainless steel metal lathing and MR polymer modified fibre reinforced cement render finishes as described in the accompanying Detail Sheets.*
- *The systems are applied to the outside of external walls of masonry, dense or no-fines concrete construction and are suitable for use on new or existing buildings.*

continued

Regulations — Detail Sheet 1

1 The Building Regulations 2000 (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 external wall insulation with the Building Regulations. In the opinion of the BBA, the Swisslab External Wall Insulation Systems, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement: A1 — Loading
Comment: Dynamic wind suction tests conducted by the BBA show that the product can meet this Requirement. See the marked sections of the appropriate accompanying Detail Sheets.

Requirement: B4(1) — External fire spread
Comment: Data obtained by the BBA show that the systems are classified Class 0 and therefore meet this Requirement. Full scale multi-storey fire tests have been conducted in accordance with the Building Research Establishment (BRE) Fire Note 9 *Assessing the fire performance of external cladding systems: a test method.* See Approved Document B, Section 13.5 and the marked sections of the appropriate accompanying Detail Sheets.

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• Application and maintenance must be carried out by operatives trained and approved by Alumasc Exterior Building Products Limited, strictly in accordance with the Design Data *and* Installation *parts of the Detail Sheets and the marketing company's instructions.*

• The systems are marketed by Alumasc Exterior Building Products Limited.

• All materials and components are approved by the BBA and must be obtained from the Certificate holder.

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

Requirement:	C4	Resistance to weather and ground moisture
Comment:		Tests by the BBA indicate that walls insulated with the Swisslab systems will meet this Requirement. See the marked sections of the appropriate accompanying Detail Sheets.
Requirement:	L1	Conservation of fuel and power
Comment:		The systems will enable, or contribute towards enabling, a wall to meet the U value requirement. See the marked sections of the appropriate accompanying Detail Sheets.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The Swisslab systems are acceptable. See the marked sections of the appropriate accompanying Detail Sheets.

2 The Building Standards (Scotland) Regulations 1990 (as amended)

In the opinion of the BBA, the Swisslab External Wall Insulation Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Technical Standards as listed below.

Regulation:	10	Fitness of materials
Standards:	B2.1 and B2.2	Selection and use of materials and components
Comment:		The Swisslab systems are acceptable.
Regulation:	11	Structure
Standard:	C2.1	Stability
Comment:		Dynamic wind suction tests conducted by the BBA show that the product can meet this Standard. See the marked sections of the appropriate accompanying Detail Sheets.
Regulation:	12	Structural fire precautions
Standard:	D2.2	Non-combustibility
Comment:		The use of the Swisslab systems may be restricted by this Standard in some instances but see the marked sections of the appropriate accompanying Detail Sheets.
Standard:	D6.8	External Wall Claddings
Comment:		The Swisslab systems have a Class 0 surface, as defined in Appendix to Part D of the Technical Standards, and are unrestricted by this Standard. See the marked sections of the appropriate accompanying Detail Sheets.
Regulation:	17	Resistance to moisture
Standard:	G3.1	Resistance to precipitation
Comment:		Tests by the BBA indicate that walls insulated with the Swisslab systems will satisfy this Standard. See the marked sections of the appropriate accompanying Detail Sheets.
Regulation:	22	Conservation of fuel and power
Standard:	J2.1	Standards for buildings in purpose group 1
Comment:		The systems will enable, or contribute to enabling, a wall to satisfy the requirement of this Standard. See the marked sections of the appropriate accompanying Detail Sheets.
Standard:	J3.1	Standards for buildings in purpose groups 2 to 7
Comment:		The systems will enable, or contribute to enabling, a wall to satisfy the requirements of this Standard. See the marked sections of the appropriate accompanying Detail Sheets.

3 The Building Regulations (Northern Ireland) 1994 (as amended)

In the opinion of the BBA, the Swisslab External Wall Insulation Systems, 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 Swisslab systems are acceptable. See the marked sections of the appropriate accompanying Detail Sheets.
Regulation:	C5	Resistance to ground moisture and weather
Comment:		Walls insulated with the Swisslab systems will satisfy this Regulation. See the marked sections of the appropriate accompanying Detail Sheets.
Regulation:	D1	Stability
Comment:		Dynamic wind suction tests conducted by the BBA show that the product can meet this Requirement. See the marked sections of the appropriate accompanying Detail Sheets.
Regulation:	E8	External fire spread
Comment:		The Swisslab systems have a Class 0 surface and can satisfy this Regulation. See the marked sections of the appropriate accompanying Detail Sheets.

continued

continued

Regulation:	F2	Building fabric
Comment:		The systems will enable, or contribute to enabling, a wall to meet this Regulation. See the marked sections of the appropriate accompanying Detail Sheets.

4 Construction (Design and Management) Regulations 1994

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

See sections: 11 *Health and safety* of this Front Sheet and section 2 *Delivery and site handling* of the relevant Detail Sheets.

Design Data

5 General

5.1 The Swisslab External Wall Insulation Systems, when installed in accordance with this Certificate, are effective in reducing the thermal transmittance (U value) of the walls of new and existing buildings. It is essential that the detailing techniques specified in this Certificate are carried out to a high standard if the ingress of water into the insulation is to be avoided and the full thermal benefit obtained from treatment with the system.

5.2 The systems will improve the weather resistance of a wall and provide a new decorative finish. However, they may be installed only where other routes for moisture penetration have been dealt with separately. The systems can be used to overcome condensation associated with the internal surface.

5.3 Existing buildings subject to the national Building Regulations should have wall surfaces in accordance with the relevant sections of the Detail Sheets.

5.4 New buildings subject to the national Building Regulations should be constructed in accordance with the relevant recommendations of BS 5628-3 : 1985. In particular Clause 21 *Exclusion of moisture*, of the Code of practice should be followed in that the designer should select a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used. The relevant recommendation of Section 3 of BS 5390 : 1976(1984) should be followed where the walls incorporate stone or cast stone.

5.5 Other new buildings, not subject to any of the previous requirements, should also be built in accordance with BS 5628-3 : 1985 and/or BS 5390 : 1976(1984).

6 Moisture penetration

The assessment has shown that the systems will resist the passage of moisture.

7 Risk of interstitial condensation

7.1 The components of the systems have a water vapour resistance such that, under the adverse conditions likely to be found in dwellings in the United Kingdom, interstitial condensation should not occur within the insulation.

7.2 If a system is to be used on the external walls of rooms expected to have continuous high humidities, additional measures may need to be taken to avoid possible problems from the formation of interstitial condensation in the wall.

8 Maintenance

8.1 Regular checks should be made on the installed system, particularly at joints, to ensure that ingress of water does not occur. Necessary repairs should be effected immediately.

8.2 Damaged areas must be repaired using the appropriate Swisslab components and the procedures detailed in the Swisslab installation instructions.

Installation

9 Site survey and preliminary work

9.1 A pre-installation survey of the property is carried out to determine suitability for treatment and any repairs necessary to the building structure before application of a Swisslab external wall insulation system. A specification is prepared for each elevation of the building indicating:

the position of beads
additional mesh at corners of openings and reinforcement
detailing around windows, doors and at eaves
dpc level
exact position of expansion joints
areas where flexible sealants must be used
any alterations to external plumbing
where required, the position of fire barriers.

9.2 The survey should include tests conducted on the walls of the building by Alumasc Exterior Building Products Limited or their approved suppliers to determine the pull-out resistance of the proposed mechanical fixings. An assessment and recommendation is made on the type and number of fixings required to withstand the building's expected wind loading based on calculations using the site test data, the relevant wind speed data for the site, and in the absence of a formal requirement, a safety factor of 3 should be used.

9.3 All necessary repairs to the building structure are completed before installation of the system is started.

9.4 Surfaces should be sound, clean, and free from loose material. The flatness of surfaces must be checked; this may be achieved using a straight edge spanning the storey height. Any excessive irregularities, ie greater than 10 mm, must be made good using MRS3 or MRS5F dubbing render prior to installation to ensure that the insulation boards are installed with a smooth, in-plane finished surface.

9.5 Where surfaces are covered with an existing rendering it is essential that the bond between the background and the render is adequate. All loose areas should be hacked off and made good using MRS3 or MRS5F dubbing render.

9.6 On existing buildings, purpose-made sills must be fitted to extend beyond the finished face of the system. New buildings should incorporate suitably deep sills.

9.7 It is recommended that external plumbing be removed and alterations made to underground drainage, where appropriate, to accommodate repositioning on the finished face of the systems.

9.8 New buildings should be of sound masonry, dense or no-fines concrete construction.

9.9 Internal wet work, eg screeding or plastering, should be completed and allowed to dry prior to the application of a Swisslab system.

9.10 Where possible, independent scaffolding should be used to avoid the need to subsequently make good putlog holes and other breaks in the wall. Where scaffolding is required to be tied back to the building it is normal to recommend 'box-outs' to reduce the incidence of patches left by putlogs and to provide access points for future scaffolding that may be required for maintenance, inspection and repairs.

9.11 The scaffolding must be arranged to allow sufficient access to the whole face of the building. Sufficient clearance for working should be provided between the scaffolding and the finished surface of the system. An allowance should be included for the thickness of the finished system on the face of the building.

10 Approved applicators

Application of a Swisslab system, within the context of this Certificate, is carried out by approved applicators, an approved applicator being a company which:

(1) is registered by Alumasc Exterior Building Products Limited to apply the systems

(2) is employing operatives who have been trained by Alumasc Exterior Building Products Limited to apply the systems and who have been issued with appropriate identity cards by Alumasc Exterior Building Products Limited

(3) has undertaken to comply with Alumasc Exterior Building Products Limited's application procedures which contain the requirement for each application team to include at least one member with an identity card, and

(4) is monitored by Alumasc Exterior Building Products Limited. This includes unannounced site inspections.

11 Health and safety

11.1 The fibres as used in MRS renders may irritate the skin. Protective clothing should be worn to avoid contact with both dry, unmixed material and with wet mortar. Great care must be taken to avoid contact with eyes.

11.2 When mixing MR adhesives and renders a filter respirator should be worn.

11.3 Where excessive concentrations of dust may accumulate, the contractor should make an assessment of the risk, in accordance with the Control of Substances Hazardous to Health Regulations 1994.

Additional Information

The management systems of Alumasc Exterior Building Products Limited have been assessed and registered as meeting the requirements of BS EN ISO 9001 : 1994 by the British Standard Institution Quality Assurance.

Bibliography

BS 5390 : 1976(1984) *Code of practice for stone masonry*

BS 5628 *Code of practice for use of masonry*
BS 5628-3 : 1985 *Materials and components, design and workmanship*

BS EN ISO 9001 : 1994 *Quality systems — Model for quality assurance in design, development, production, installation and servicing*

Conditions of Certification

12 Conditions

12.1 This Certificate:

(a) relates only to the product that is described, installed, used and maintained as set out in this Certificate;

(b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;

(c) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;

(d) is copyright of the BBA.

12.2 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, shall be construed as references to such publication in the form in which it was current at the date of this Certificate.

12.3 This Certificate will remain valid for an unlimited period provided that the product and the manufacture and/or fabricating process(es) thereof:

(a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) continue to be checked by the BBA or its agents; and

(c) are reviewed by the BBA as and when it considers appropriate.

12.4 In granting this Certificate, the BBA makes no representation as to:

(a) the presence or absence of any patent or similar rights subsisting in the product or any other product;

(b) the right of the Certificate holder to market, supply, install or maintain the product; and

(c) the nature of individual installations of the product, including methods and workmanship.

12.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do not purport in any way to 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 recommendations 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 installation and use of this product.

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

In the opinion of the British Board of Agrément, the Swisslab External Wall Insulation Systems are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 93/2914 is accordingly awarded to Alumasc Exterior Building Products Limited.

On behalf of the British Board of Agrément

Date of Third issue: 15th February 2001

Chief Executive

**Original Front Sheet issued 10th June 1993. This revised version includes changes to Certificate holder's name, address and telephone and facsimile numbers, amendment of the* Installation *section, updated Building Regulations and* Conditions of Certification *and the addition of CDM Regulations.*

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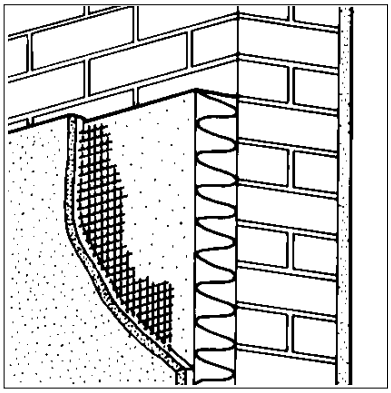
BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Certificate No 93/2914

SWISSLAB EPS EXTERNAL WALL INSULATION SYSTEMS

DETAIL SHEET 2
*Third issue**

Product



- *THIS DETAIL SHEET RELATES TO SWISSLAB EPS EXTERNAL WALL INSULATION SYSTEMS, EMPLOYING EXPANDED POLYSTYRENE INSULATION BOARDS, REINFORCING MESH OR LATH, AND SPAR-DASH OR PLAIN RENDER FINISHES.*
- *The systems are applied to the outside of external walls of masonry, dense or no-fines concrete construction and are suitable for new or existing buildings.*
- *It is essential that the Swisslab systems are installed and maintained in accordance with the conditions set out in the* Design Data *and* Installation *parts of this Detail Sheet.*
- *See the Appendix for system summary.*

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

Technical Specification

1 Description

1.1 Swisslab EPS Wall Insulation Systems (see Figure 1) comprise:

(1) Swisslab expanded polystyrene insulation boards — 1200 mm by 600 mm in a range of thicknesses between 15 mm and 150 mm, with a nominal density of 16 kgm^{-3} and a minimum compressive strength of 70 kNm^{-2}. Boards are manufactured to comply with the requirements for Grade SD (standard duty), type FRA (flame retardant additive) material to BS 3837-1 : 1986(1996).

(2) MR mechanical fixings — approved by the BBA and Alumasc Exterior Building Products Limited. Details of approved fixings may be obtained from the BBA.

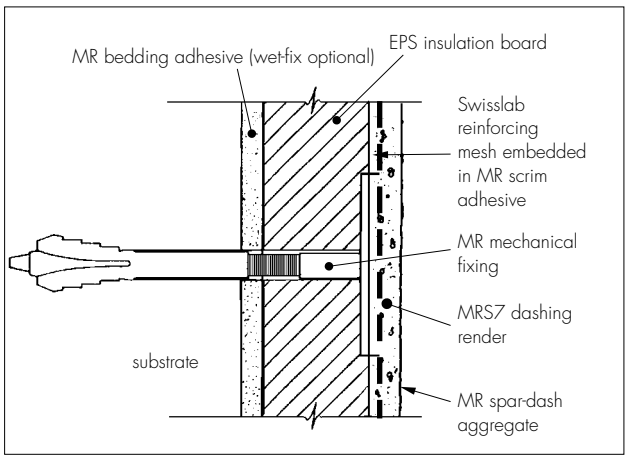
(3) MR bedding and scrim adhesives — polymer-modified cement-based adhesives, supplied as powders to which water is added.

(4) Swisslab reinforcing mesh — a one metre wide mesh of multi-stranded alkali-resistant glass fibres, having a polymer coating and a nominal weight of 150 gm^{-2} or 200 gm^{-2}.

(5) MRS7 dashing render — a polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available coloured white, extra white, salmon, terracotta red, red, burgundy, gold, yellow, peach, grey, Scotland brown, light cream, cream, pink or extra pink. Other colours are available to order.

(6) MR spar-dash aggregate — available in a range of colours to suit the MRS7 render.

Figure 1 Components



(7) Ancillary materials:

MRS3 and MRS5F dubbing coat — a polymer-modified fibre-reinforced cement-based mortar, supplied as a powder to which water is added.

Alumasc profiles — a range of standard profiles for use at details such as wall base, end stop, corner mesh, expansion joint. Profiles are available in organic polyester-coated galvanized steel or stainless steel and are provided to the specifier's requirements and approved by the BBA and Alumasc Exterior Building Products Limited

Alumasc profile fixings — driven pins with plastic expansion sleeves as approved by the BBA and Alumasc Exterior Building Products Limited

Alumasc sealant — silicone mastic as approved by the BBA and Alumasc Exterior Building Products Limited; and

MR plastic thickness gauge

MR fungicidal wash

MR stabilising solution/bonding agent

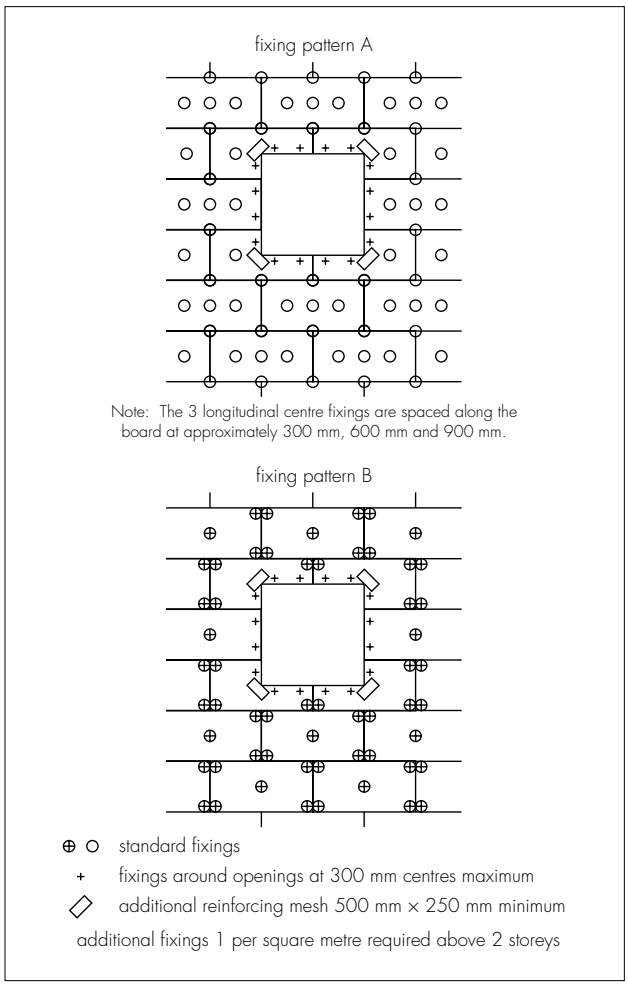
MR fir-tree fixings.

1.2 Swisslab expanded polystyrene (EPS) insulation boards may be mechanically fastened to the external surfaces of walls (dry-fix system). Alternatively, where it is necessary to provide a levelling coat (see section 8.8), insulation boards may be bonded to the external surfaces of walls using MR bedding adhesive and secured with mechanical fixings (wet-fix system).

1.3 There are two choices of fixing pattern (see Figure 2). When all the boards have been secured to the wall, MR scrim adhesive is applied by trowel or a machine spray to the insulation in a minimum thickness of 3 mm, and the reinforcing mesh is embedded in the adhesive. For installations above two storeys additional stainless steel fixings are applied through the reinforcing mesh and insulation boards and into the background at approximately one metre centres. The additional fixings are covered with square pieces of mesh embedded in more adhesive. MR plastic thickness gauges are pressed into the wet adhesive to ensure a correct coverage of MRS7 dashing render. When dry an 8 mm to 10 mm layer of the MRS7 dashing render is applied by trowel or a machine spray and dry-dashed with MR aggregate.

1.4 All components are subject to routine in-factory quality control.

Figure 2 Insulation boards fixing pattern



2 Delivery and site storage

2.1 The insulation boards are delivered to site wrapped in polythene. Each pack carries the product identification and batch numbers.

2.2 Components are delivered to site in the packages and quantities as listed in Table 1. Each package carries the product identification, manufacturer's batch number and the BBA identification mark incorporating the number of this Certificate.

Table 1 Component supply details

Component	Quantity and package
MR bedding and scrim adhesives	25 kg or 40 kg bags
MRS renders dubbing or undercoat	25 kg or 40 kg bags
MR spar-dash aggregate	25 kg or 40 kg bags
MR mechanical fixings	boxed by manufacturer
MR stabilising solution/bonding agent	5 litre drum
MR fungicidal wash	5 litre drum
MR plastic thickness gauge	boxed by manufacturer
MR fir-tree fixing	boxed by manufacturer

2.3 The Swisslab reinforcing mesh, one metre wide, is supplied in rolls of 50 metres.

2.4 The expanded polystyrene insulation boards should be stored on a firm, clean, level base, off the ground and must be protected from prolonged exposure to sunlight either by storing opened packs under cover or re-covering with opaque polythene sheeting.

2.5 Care must be taken when handling the insulation boards to avoid damage and to avoid contact with solvents or materials containing volatile organic components such as coal tar, pitch, timber newly treated with creosote, etc. The boards must not be exposed to open flame or other ignition sources.

2.6 The decorative MR spar-dash aggregate should be stored off the ground and protected with opaque polythene sheeting.

2.7 The MR polymer cement adhesives are cementitious materials and must be stored in dry conditions, off the ground, and be protected from frost at all times.

Design Data

3 Strength and stability

3.1 Swisslab EPS External Wall Insulation Systems have adequate resistance to impact and abrasion where walls are exposed and have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the systems may be exposed to severe impact, eg mechanical or malicious, precautions may be required to reduce the risk of damage. Heavyweight alkali-resistant glass-fibre mesh can be used in high risk areas. Further guidance may be obtained from the Certificate holder and Building Research Establishment (BRE) Current Paper CP 6 : 81 *Assessment of external walls — Hard body impact resistance.*

3.2 For systems using MR standard fixings with 50 mm diameter heads, dynamic wind suction tests conducted by the BBA confirm that the dry-fix system (pattern A) can withstand wind loads up to 2.5 kPa when installed in accordance with the manufacturer's instruction and the installation sections of this Certificate. The same dry-fix system using MR fixings with 90 mm diameter heads can withstand wind loads up to 3.5 kPa; with MR standard fixings with 50 mm diameter heads arranged in fixing pattern B (see Figure 2), it can withstand wind loads up to 2.0 kPa. Application of MR bedding adhesive to bond the insulation boards to the substrate (wet-fix system) will considerably increase the resistance of the system to dynamic wind suction loads.

3.3 For the dry-fix system (pattern A) with 50 mm or 90 mm diameter fixing heads, the wind suction forces to be resisted on any particular site calculated in accordance with BS 6399-2 : 1997 or CP 3 : Chapter V-2 : 1972, including any required safety factor, would be less than 2.5 kPa and 3.5 kPa, respectively. See section 5 of the Appendix to this Certificate, which includes example calculations based on general site assumptions.

4 Properties in relation to fire

4.1 In the opinion of the BBA the use of the system will not introduce any additional hazard in respect of behaviour in fire when compared with a system using traditional sand/cement render finishes.

4.2 The system is classified Class 0 as described in the national Building Regulations:

England and Wales

Approved Document B, Appendix A, paragraph 12

Scotland

Technical Standards, *deemed to satisfy provisions*, Part E, Table 2 to (E6.1)a

Northern Ireland

Technical Booklet E, paragraph 2.4.

4.3 Full scale multi-storey fire tests have been conducted in accordance with BRE Fire Note 9 *Assessing the fire performance of external cladding systems: a test method.*

4.4 The behaviour in fire of external wall insulation systems is the subject of recommendations by BRE which, for this system, make no restriction on the height of building to be treated provided that:

(a) fire barriers, eg mineral fibre 150 mm high and of the same thickness as the insulation, are included at every floor level from the third storey;

(b) the fire barriers are installed by bonding the mineral fibre slab using MR Bedding Adhesive with a stainless steel fixing at the centre of each length (1200 mm). MR Bedding Adhesive is applied approximately 4 mm thick along the full length and width of the top of the mineral fibre slabs and the insulation boards are installed above. The MR Scrim Adhesive is applied over the surface of the fire barrier 250 mm either side of the horizontal centre line and MR Reinforcing Scrim (minimum 500 mm in height) is embedded in the adhesive and secured to the background using MR stainless steel fixings inserted at 300 mm centres along the centre line of the fire barrier.

(c) additional stainless steel fixings, one per square metre, are inserted through the reinforcing mesh and insulation and driven firmly into the background (see section 8.19).

5 Proximity of flues

When a system is installed in close proximity to certain flue pipes in buildings subject to the national Building Regulations, the following provisions should be met:

England and Wales

Approved Document J

Scotland

Technical Standards, Part F

Northern Ireland

Technical Booklet L.

6 Thermal insulation

6.1 For the purpose of U value calculations to determine if the requirements of the Building, or other statutory, Regulations are met, the thermal conductivity (λ value) of the insulation may be taken as 0.036 $Wm^{-1}K^{-1}$.

6.2 The requirement for limiting the heat loss through the building fabric will be satisfied if the U values of the building elements do not exceed the maximum values in the relevant Elemental Approach given in the national Building Regulations:

England and Wales

Approved Document L. The effect of thermal bridges should be taken into account.

Scotland

Technical Standards, Part J.

Northern Ireland

Technical Booklet F.

6.3 Guidance is also given in these documents on selecting the thickness of insulation required to enable a wall to achieve the desired U value. Alternative approaches are also described which allow for some flexibility in design of U values for individual constructional elements.

6.4 Where insulation boards have not been continued into window or door reveals due to a lack of clearance there will be a risk of cold bridging at these points. Where door and window frames are to be replaced it is recommended that their size be adjusted to permit the reveals to be insulated.

6.5 Depending on constructional details, cold bridging can also occur at the eaves and at ground-floor level, and care should be taken to minimise this, eg roof or loft insulation should continue over the wall head, ensuring that ventilation openings are not obstructed.

7 Durability

7.1 The results of accelerated ageing tests in accordance with MOAT No 22 : 1988 indicate that the system is durable. The system should remain effective for at least 30 years, provided any damage to the surface finish is repaired immediately, and regular maintenance is undertaken including checks on joints in the system and on external plumbing fitments to identify leakage of rainwater into the system, enabling steps to be taken to correct the defects.

7.2 MRS7 dashing render has been certificated for use over masonry substrates (since 26th August 1988) and as part of the Swisslab External Wall Insulation Systems (since 1st September 1988).

7.3 Reference should be made to the BBA's website for the validity status of the relevant Certificates.

7.4 MRS7 spar-dash finish will break up the flow of water on the surface and reduce the risk of discolouration by water runs.

7.5 The decorative finishes may become discoloured with time, the rate depending on the initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discolouration by algae and lichens may occur in particularly wet areas. The appearance of MRS7 can be restored by using traditional cleaning methods suitable for sand/cement renders (such as by brushing and washing).

7.6 Render containing Portland cement may be subject to lime bloom. The occurrence of this may be reduced by avoiding application in adverse weather conditions. The effect is transient and less noticeable on lighter colours.

Installation

8 Procedure

General

8.1 Application is carried out in accordance with Alumasc Exterior Building Products Limited's current installation instructions.

8.2 The MR bedding adhesive, scrim adhesive, dubbing and render coats must not be applied in rain or mist, at temperatures below 5°C or above 30°C, if exposure to frost is likely to occur during drying, or if the boards or background are already wet or frostbound.

8.3 All rendering should be in accordance with the relevant recommendations of BS 5262 : 1991 and BS 8000-10 : 1995.

8.4 MR adhesives and renders are mixed using a paddle mixer. Conventional concrete mixers are unsuitable.

Positioning and securing insulation boards

8.5 One coat of MR fungicidal wash followed, if required, by one coat of MR stabilising solution/bonding agent is applied by brush, roller or knapsack spray to the entire wall surface.

8.6 The Alumasc wall base profile is secured to the external wall above the damp-proof course using the approved profile fixings at approximately 300 mm centres (see Figure 3).

8.7 Stop beads are positioned vertically, eg at party wall positions where the adjoining house does not require treatment (see Figure 4).

8.8 To compensate for minor variations in the backing wall flatness, if required, MR bedding adhesive (wet-fix system only) is prepared for use by mixing the contents of each 40 kg bag with 7 to 8 litres of cold, clean water. An electrically driven paddle mixer is used for a minimum of five minutes until a smooth, workable consistency is achieved. The material is left to stand for at least five minutes and again mixed for a further two minutes. A bed coat of MR bedding adhesive is applied to the entire surface to a minimum thickness of 6 mm and finished with a serrated trowel or comb.

8.9 The first run of insulation boards is positioned on the base profile. When using the wet-fix system boards are pressed firmly into the adhesive. Subsequent rows of boards are positioned so that the board joints are staggered and overlapped at the building corners and in such a manner that board joints do not occur within 200 mm of the corners of openings (see Figure 2). If required, the boards may be arranged with the longer edge positioned vertically.

8.10 For both dry- and wet-fix systems, the insulation boards are mechanically fastened to the wall using either fixing pattern A or B (see Figure 2). Mechanical fixings are positioned 300 mm apart around door and window details and 300 mm vertical centres at building corners. At corners, fixings should be positioned inwards by 75 mm plus the thickness of the insulation. Holes are drilled into the substrate to a minimum depth of 50 mm and the mechanical fixings are inserted and tapped firmly into place, securing the insulation board to the substrate.

8.11 Above two storeys, horizontal fire barriers are installed in accordance with the requirements of section 4.

8.12 Care must be taken to ensure that all board edges are butted tightly together, and alignment should be checked as work proceeds. Any high

spots or irregularities should be removed by lightly planing with a rasp.

Figure 3 Typical section at base level

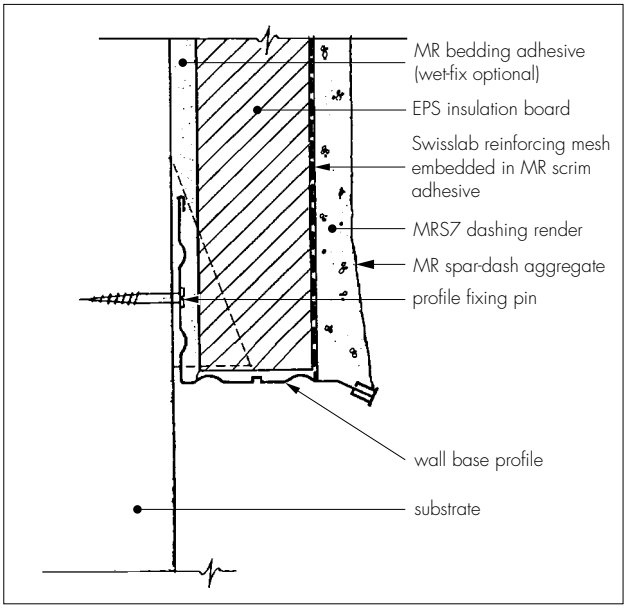
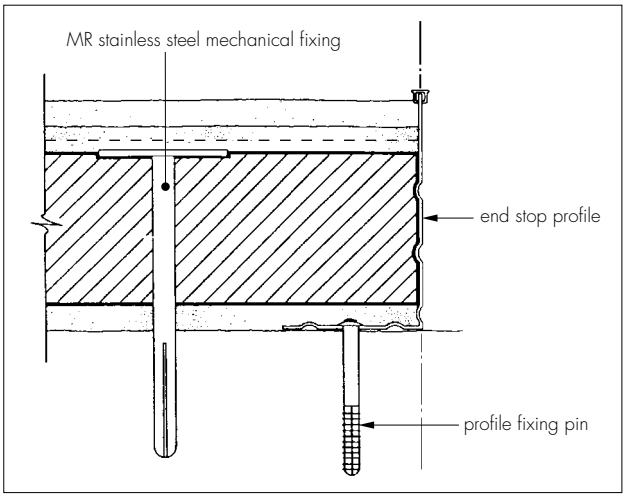


Figure 4 Typical end stop detail



8.13 To fit around details such as doors and windows, insulation boards may be cut with a sharp knife or a fine-tooth saw. If required, purpose-made window sills are fitted. They are designed to prevent water ingress and incorporate drips to shed water clear of the system.

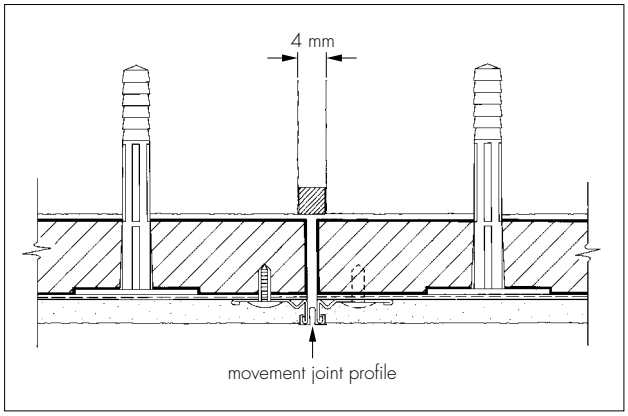
8.14 Installation continues until the whole wall is completely covered, including the building soffits where appropriate.

Movement joints and profiles

8.15 Movement joints in the substrate must be continued through the system. The joint detail using purpose-made metal trims is illustrated in Figure 5.

8.16 Expansion bead locations are marked vertically at agreed positions. These beads are positioned at approximately 7 m centres along a building, the centres depending on the individual requirements of each job.

Figure 5 Vertical movement joint detail



Reinforcing

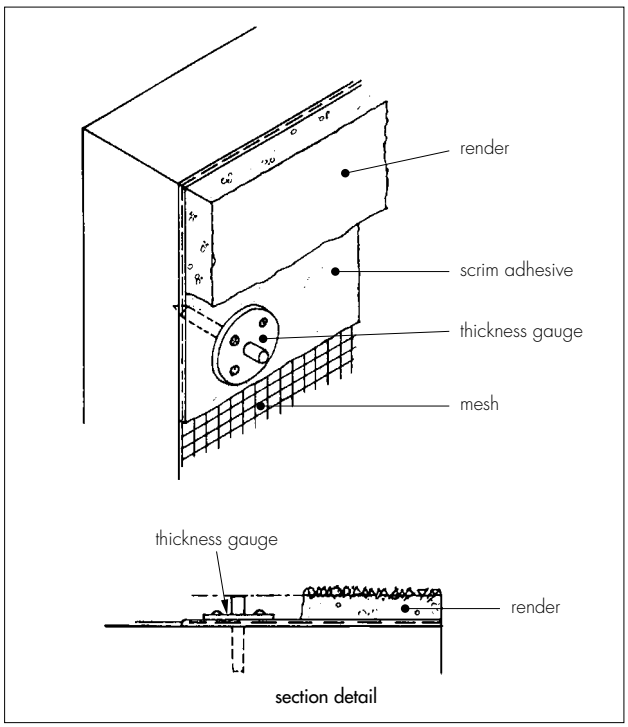
8.17 The MR scrim adhesive is prepared as described in section 8.8 and a bed coat is trowel-applied to the surface of dry insulation boards to a minimum thickness of 3 mm.

8.18 An alkali-resisting glass-fibre mesh is bedded into the adhesive with 75 mm laps at joints. Extra mesh is used around openings (see Figure 2).

8.19 For installations above two storeys, additional holes are drilled at one metre centres before the scrim adhesive hardens and stainless steel fixings are inserted through the mesh and tapped firmly home. The fixings are covered with MR scrim adhesive and square pieces of mesh measuring no less than 150 mm by 150 mm.

8.20 A thickness gauge is pressed into the mesh and scrim adhesive while the adhesive is still wet. The gauge is used to determine the thickness of the following render coat. It is designed so that the disc sits on the surface with a small amount of adhesive compressed into the holes (see Figure 6).

Figure 6 Render thickness gauge



Rendering and finishing

8.21 Expansion beads are fixed at agreed positions. Angle beads are fixed to all building corners and to door and window heads and jambs. The beads are fixed using MR fir-tree fixings at maximum 300 mm centres.

8.22 Prior to the render coat, a bead of silicone rubber mastic is gun-applied at window and door frames, overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

8.23 The drying period of any render will depend on weather conditions; however, each coat must be left to harden for as long as possible in good drying conditions but before application of the subsequent coat.

8.24 To prevent the renders from drying too rapidly they should not be applied in direct sunlight. Continuous surfaces must be completed without a break.

8.25 After application care must be taken to protect the renders from direct sunlight, drying winds, rain, mist and cold (less than 5°C on a falling thermometer) to prevent the drying time from being too rapid or excessively prolonged.

8.26 The scrim adhesive must be allowed to harden and dry for at least one day before application of the MRS7 dashing render.

8.27 The MRS7 dashing render is prepared using the same procedures as for the bedding adhesive (see section 8.8) by mixing the contents of each 40 kg bag with approximately 8 to 9 litres of water. Care must be taken to ensure an even dispersion of the resin and fibre reinforcement.

8.28 One coat of MRS7 is trowel-applied to a minimum thickness of 8 mm. A minimum of three bags of suitable spar-aggregate should be emptied into a clean wheelbarrow or tub and any excess water allowed to drain before being mixed thoroughly. While the render is still soft, the aggregate is thrown or sprayed onto the surface. On completion, the surface must be checked to ensure an even coverage of spar dash has been achieved. Where necessary, the aggregate should be lightly tamped to ensure that a good bond is achieved.

8.29 At the tops of walls, the system must be protected by an adequate overhang or by an adequately sealed purpose-made flashing (see Figure 7).

8.30 Care must be taken in the detailing of the system around openings and projections (see Figures 8, 9 and 10).

8.31 On completion of the installation, external fittings, eg rainwater goods, are re-fixed through the system into the substrate.

8.32 For all rendering and application of finishing coats, continuous surfaces should be completed without a break.

Figure 7 Typical eaves detail

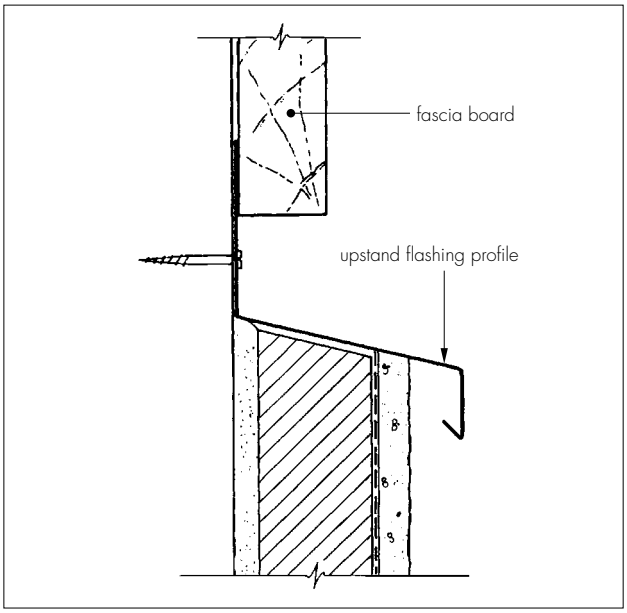


Figure 8 External corner or reveal detail

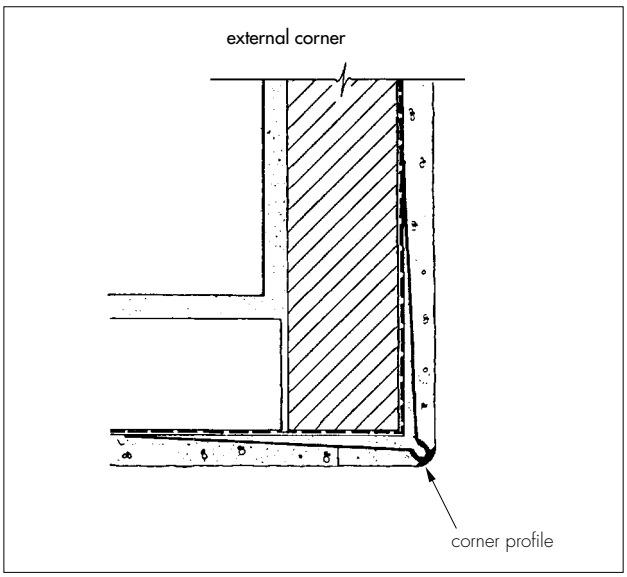


Figure 9 Insulated window or door reveal

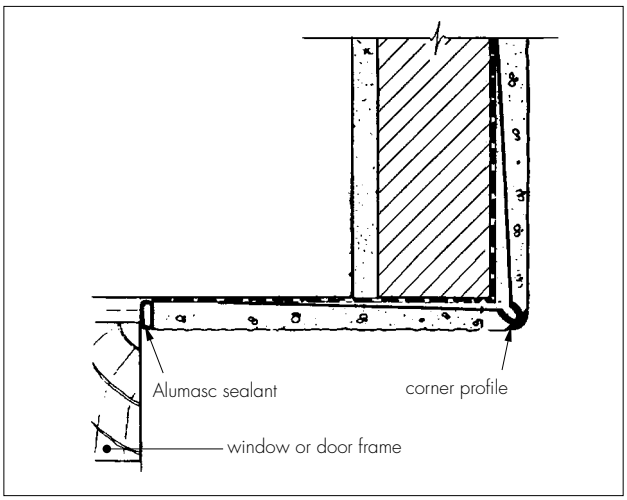
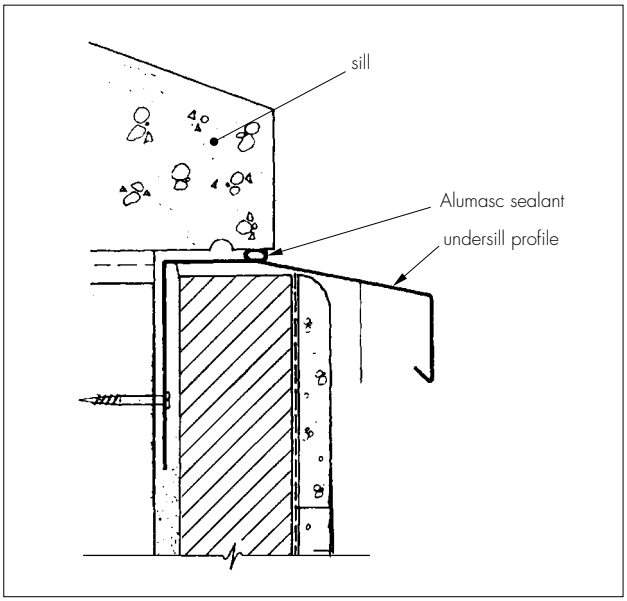


Figure 10 Typical sill detail



Technical Investigations

The following is a summary of the technical investigations carried out on Swisslab EPS External Wall Insulation Systems.

9 Tests

9.1 Tests were carried out in accordance with MOAT No 22 : 1988 to determine:

component characterisation
heat/spray cycling
resistance to freeze/thaw
impact resistance
water absorption of render
permeability
water vapour permeability.

9.2 An examination was made of data relating to:

resistance to dynamic wind uplift[1]
flexural and compressive strength of renders
multi-storey fire tests conducted in accordance with BRE Fire Note 9
fire propagation tests to BS 476-6 : 1989
surface spread of flame tests to BS 476-7 : 1987
pull-out strength of fixings
durability of finish
thermal conductivity to BS 874-2.1 : 1986
bond strength of MRS3, MRS5F and MRS7.

(1) Tests were conducted by the BBA generally in accordance with European Organisation for Technical Approvals draft ETAG *Guidelines for External Thermal Insulation Composite Systems with rendering*.

10 Other investigations

10.1 The manufacturing process, the methods adopted for quality control of manufacture and bought-in components and details of the quality and composition of the materials used, were examined.

10.2 A computer simulation of the risk of interstitial condensation was undertaken.

10.3 The practicability of installation and the effectiveness of detailing techniques were examined.

Bibliography

BS 476 *Fire tests on building materials and structures*
BS 476-4 : 1970(1984) *Non-combustibility test for materials*
BS 476-6 : 1989 *Method of test for fire propagation for products*
BS 476-7 : 1987 *Method for classification of the surface spread of flame of products*

BS 874 *Methods for determining thermal insulating properties*
BS 874-2 *Tests for thermal conductivity and related properties*
BS 874-2.1 : 1986 *Guarded hot-plate method*

BS 3837 *Expanded polystyrene boards*
BS 3837-1 : 1986 *Specification for boards manufactured from expandable beads*

BS 5262 : 1991 *Code of practice for external renderings*

BS 6399 *Loading for buildings*
BS 6399-2 : 1995 *Code of practice for wind loads*

BS 8000 *Workmanship on building sites*
BS 8000-10 : 1995 *Code of practice for plastering and rendering*

CP 3 *Code of basic data for the design of buildings*
CP 3 : Chapter V *Loadings*
CP 3 : Chapter V-2 : 1972 *Wind loads*

MOAT No 22 : 1988 *Directives for the Assessment of External Insulation Systems for Walls (Expanded Polystyrene Insulation Faced with a Thin Rendering)*

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

Date of Third issue: 15th February 2001

Chief Executive

**Original Detail Sheet issued 10th June 1993. This revised version includes change of Certificate holder's name and additional assessments of data in relation to dynamic wind uplift (suction) and multi-storey fire tests.*

Appendix — System summary — Swisslab EPS External Wall Insulation Systems

1 System

Insulation
Expanded polystyrene insulation boards, dimensions 1200 mm × 600 mm in a range of thicknesses between 15 mm and 100 mm. Nominal density 16 kgm^{-3} and minimum compressive strength 70 kNm^{-2}.

Fixings
Mechanical fixings approved by Alumasc Exterior Building Products Limited and the BBA.

MR bedding and scrim adhesives
Polymer-modified cement-based adhesives, supplied as powders to which water is added.

Reinforcing mesh
One metre wide mesh of multi-stranded alkali-resistant glass fibres, having a polymer coating and nominal weights of 150 gm^{-2} or 200 gm^{-2}.

MRS7 dashing render
A polymer-modified and fibre-reinforced cement-based mortar, supplied as a powder to which water is added, and available in a variety of colours as listed in section 1.1(5) of this Detail Sheet.

MR spar-dash aggregate
A spar-dash aggregate available in a range of colours to suit MRS7 render.

2 Thermal properties

Thermal conductivity of Swisslab polystyrene insulation boards
0.036 $Wm^{-1}K^{-1}$

U values
Using the values given in Table A15 of Approved Document L1 (1995 edition) to the Building Regulations 2000 (England and Wales), the thermal insulation values for a typical 225 mm brick external wall (density 1700 kgm^{-3}) with 10 mm plasterboard:

Insulation thickness (mm)	U value ($Wm^{-2}K^{-1}$)
15	0.96
20	0.84
30	0.69
40	0.58
50	0.50
60	0.44
70	0.39
80	0.35
90	0.32
100	0.29

3 Impact resistance

The Swisslab system is suitable for use where walls are exposed but have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the system may be exposed to severe impact, eg mechanical or malicious damage, precautions may be required to reduce the risk of damage.

4 Properties in relation to fire

The Swisslab system is not non-combustible to BS 476-4 : 1970(1984).

The system is classified Class 0 as defined in the appropriate Building Regulations.

Full scale multi-storey fire tests were conducted in accordance with BRE Fire Note 9.

5 Design wind loading and resistance to wind suction*

Assuming a sound substrate which will prohibit pull-out of the fixings below the maximum load achieved through dynamic wind load testing for pattern A (2.5 kPa and 3.5 kPa). An example of loads applied to the dry-fix system at 10 metres and 50 metres can be calculated as explained below:

Previously, wind loading on a particular wall could be calculated in accordance with CP 3 : Chapter V-2 : 1972 *Wind loads*. This code of practice has been replaced by BS 6399-2 : 1995 *Code of practice for wind loads*. The new procedures involve specific site information and do not facilitate generalisations, or 'worst case' calculations. For this reason, this example is based on CP 3 : Chapter V-2. The pressure created by the action of the wind can be calculated from the following formulae:

$P = (C_{pe} - C_{pi})q$ . . . . . (i)

$q = K(V_s)^2$ . . . . . (ii)

$V_s = VS_1 S_2 S_3$ . . . . . (iii)

Where:

P = pressure

C_{pe} = external pressure coefficient . . . . (–1.0 at 10 m height . . . . . –1.1 at 50 m height)

C_{pi} = internal pressure coefficient . . . . (0.2 for both 10 m and . . . . . 50 m heights)

K = a constant

V_s = design wind speed

V = basic wind speed

S_1 = topography value . . . . . (from CP 3 = 1.0)

S_2 = ground roughness . . . . . (from CP 3 = 1.0 for 10 m height . . . . . and 1.4 m for 50 m height)

S_3 = statistical factor . . . . . (from CP 3 = 1.0)

q = the dynamic pressure

Using the above values and equation (i), (ii) and (iii) maximum wind suctions of 1.474 kPa at 10 m and 2.005 kPa at 50 m were calculated using a basic wind speed of 44 Ms^{-1}. The value obtained from dynamic wind load testing on the Swisslab dry-fix system was 2.5 kPa and 3.5 kPa which would indicate a minimum safety factor of 1.7 and 1.3 using 50 mm diameter fixing heads, and 2.4 and 1.8 using 90 mm diameter fixing heads respectively.

*Inclusion of MR bedding adhesive (wet-fix) between the insulation and the background will considerably increase the resistance to wind suction.

6 Durability

Age of oldest installation — 9 years.

Assessed life — At least 30 years (with normal maintenance).

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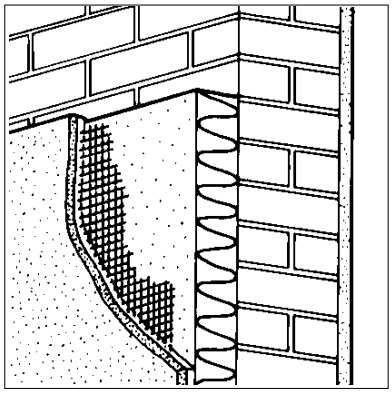
Certificate No 93/2914

SWISSLAB PIR-MODIFIED URETHANE (CFC- AND HCFC-FREE) AND MRS FINISHES, EXTERNAL WALL INSULATION SYSTEMS

DETAIL SHEET 6
*Third issue**

Product



- *THIS DETAIL SHEET RELATES TO SWISSLAB PIR-MODIFIED URETHANE (CFC- AND HCFC-FREE) AND MRS FINISHES, EXTERNAL WALL INSULATION SYSTEMS, SYSTEMS WHICH EMPLOY PIR-MODIFIED URETHANE INSULATION BOARDS, AND GLASS-FIBRE REINFORCING MESH WITH RENDER FINISHES.*
- *The systems are applied to the outside of external walls of masonry, dense or no-fines concrete construction and are suitable for new or existing buildings.*
- *It is essential that the Swisslab systems are installed and maintained in accordance with the conditions set out in the* Design Data *and* Installation *parts of this Detail Sheet.*
- *See the Appendix for system summary.*

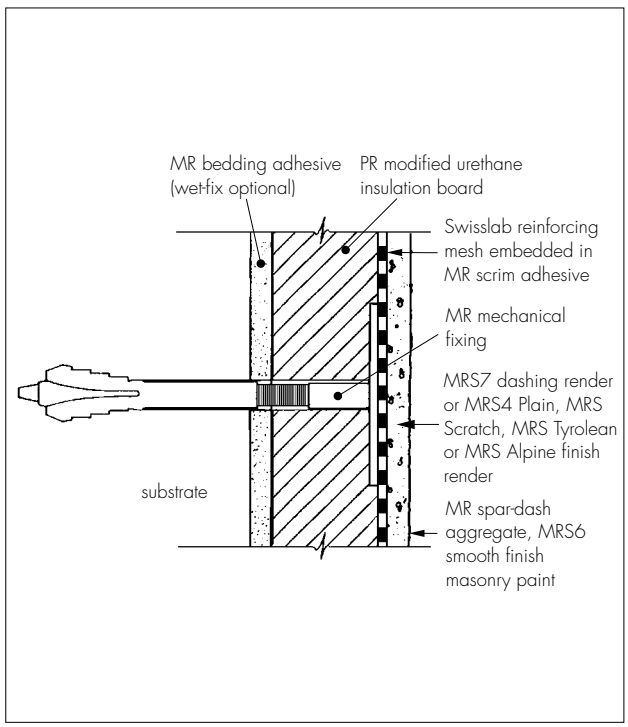
This Detail Sheet must be read in conjunction with the Front Sheets, which give the system's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification.

Technical Specification

1 Description

1.1 The Swisslab PIR-Modified Urethane (CFC- and HCFC-Free) MRS Finishes, External Wall Insulation Systems (see Figure 1) comprise:

Figure 1 Components of the system



(1) Swisslab PIR-modified urethane insulation boards — 1200 mm by 600 mm in a range of thicknesses between 20 mm and 150 mm, with a nominal density of 32 kgm^{-3} and a minimum compressive strength of 150 kNm^{-2}. Boards of 15 mm thickness are also available for use in window reveals.

(2) MR mechanical fixings — mechanical fixings approved by the BBA and Alumasc Exterior Building Products Limited. Details of approved fixings may be obtained from the BBA.

(3) MR bedding and scrim adhesives — polymer-modified cement-based adhesives, supplied as powders to which water is added.

(4) Swisslab reinforcing mesh — a one metre wide mesh of multi-stranded alkali-resistant glass fibres, having a polymer coating and a nominal weight of 150 gm^{-2} or 200 gm^{-2}.

(5) MRS7 dashing render — a polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available coloured white, extra white, salmon, terracotta red, red, burgundy, gold; yellow, peach, grey, Scotland brown, light cream, cream, pink or extra pink. Other colours are available to order.

(6) MR spar-dash aggregate — available in a range of colours to suit the MRS7 render.

(7) MRS4 Plain, MRS Scratch, MRS Tyrolean and MRS Alpine finish render — a polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available in the colours listed in section 1.1(5).

(8) MRS6 smooth finish masonry paint — a polymer-based smooth finish decorative coating applied by brush or roller and available in a range of colours to suit MRS4 Plain, MRS Scratch, MRS Tyrolean and MRS Alpine renders.

(9) Ancillary materials:

Alumasc profiles — a range of standard profiles for such details as wall base, end stop, corner mesh, expansion joint. Profiles are available in organic polyester-coated galvanized steel or stainless steel and are provided to the specifier's requirements and approved by the BBA and Alumasc Exterior Building Products Limited

MR fir-tree fixings

Alumasc profile fixings — driven pins with plastic expansion sleeves as approved by the BBA and Alumasc Exterior Building Products Limited

Alumasc sealant — silicone mastic as approved by the BBA and Alumasc Exterior Building Products Limited

MR plastic thickness gauge

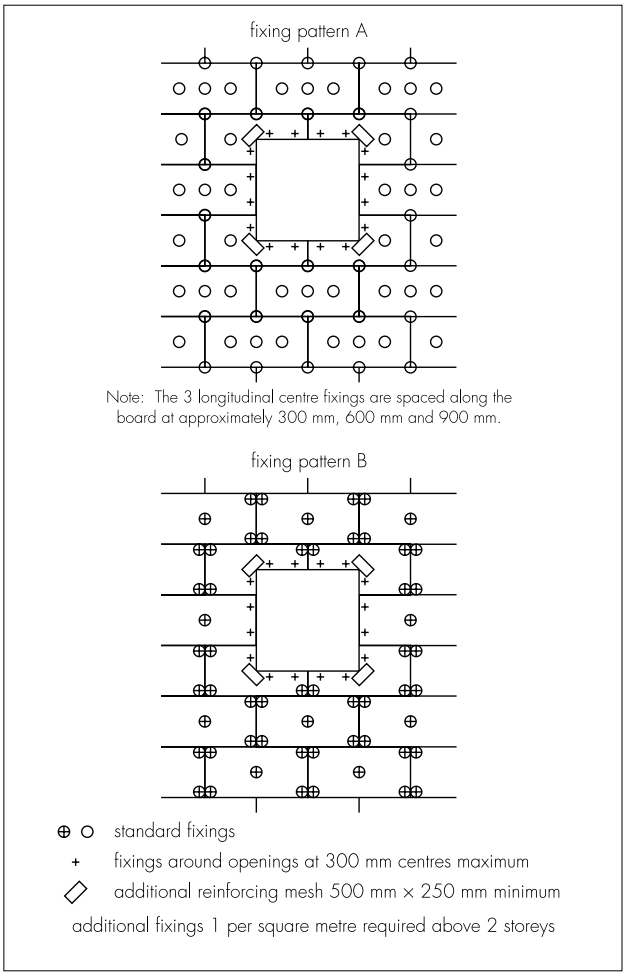
MR fungicidal wash

MR stabilising solution/bonding agent.

1.2 Swisslab PIR-modified urethane insulation boards may be mechanically fastened to the external surfaces of walls (dry-fix system). Alternatively, where it is necessary to provide a levelling coat (see section 8.8), insulation boards may be bonded to the external surfaces of walls using MR bedding adhesive and secured with mechanical fixings (wet-fix system). For both wet- and dry-fix systems there are two choices of fixing pattern (see Figure 2). When all the boards have been secured to the wall, MR scrim adhesive is applied by travel or a machine spray to the insulation in a minimum thickness of 3 mm, and the reinforcing mesh is embedded in the adhesive. For installations above two storeys additional stainless steel fixings are applied through the reinforcing mesh and insulation boards and into the background at approximately one metre centres. The additional fixings are covered with square pieces of mesh embedded in more adhesive. The adhesive coat is allowed to dry prior to the application of the render coats and selected finishes.

1.3 All components are subject to routine in-factory quality control.

Figure 2 Insulation boards fixing patterns



2 Delivery and site storage

2.1 The insulation boards are delivered to site wrapped in polythene. Each pack carries the product identification and batch numbers.

2.2 Components are delivered to site in the packages and quantities as listed in Table 1. Each package carries the product identification, manufacturer's batch number and the BBA identification mark incorporating the number of this Certificate.

Table 1 Component supply details

Component	Quantity and package
MRS3 and MRS5F dubbing render	25 kg or 40 kg bags
MR bedding and scrim adhesives	25 kg or 40 kg bags
MRS renders	25 kg or 40 kg bags
MRS6 smooth finish masonry paint	10 litre drum
MR spar-dash aggregate	25 kg or 40 kg bags
MR mechanical fixings	boxed by manufacturer
MR plastic thickness gauge	boxed by manufacturer
MR fir-tree fixings	boxed by manufacturer
MR stabilising solution/bonding agent	5 litre drum
MR fungicidal wash	5 litre drum

2.3 The Swisslab reinforcing mesh, one metre wide, is supplied in rolls of 50 metres.

2.4 The PIR-modified urethane insulation boards should be stored on a firm, clean, level base, off the ground, and must be protected from prolonged

exposure to sunlight or rain either by storing in a safe area under cover or re-covering with opaque polythene sheeting. Opened packs must be protected from the weather.

2.5 Care must be taken when handling the insulation boards to avoid damage. The boards must not be exposed to open flame or other ignition sources.

2.6 The MR adhesives and renders are cementitious materials and must be stored in dry conditions, off the ground, and be protected from frost at all times.

2.7 The decorative MR spar-dash aggregate should be stored off the ground and protected with opaque polythene sheeting.

2.8 The MRS6 smooth finish masonry paint and should be stored in a safe area under cover and protected from excessive heat and frost at all times.

Design Data

3 Strength and stability

3.1 The Swisslab PIR-modified Urethane (CFC- and HCFC-Free) and MRS Finishes, External Wall Insulation Systems have adequate resistance to impact and abrasion where walls are exposed and have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the systems may be exposed to severe impact, eg mechanical or malicious, precautions may be required to reduce the risk of damage. Heavyweight alkali-resistant glass-fibre mesh can be used in high risk areas. Further guidance may be obtained from the Certificate holder and Building Research Establishment (BRE) Current Paper CP 6 : 81 *Assessment of external walls — Hard body impact resistance.*

3.2 Dynamic wind suction tests conducted by the BBA confirm that the dry-fix system (pattern A) using MR standard fixings with 50 mm diameter heads can withstand wind loads up to 2.5 kPa when installed in accordance with the manufacturer's instruction and the installation sections of this Certificate. The same dry-fix system using 90 mm diameter fixing heads can withstand wind loads up to 3.5 kPa. Fixing pattern B (see Figure 2) using MR standard 50 mm diameter fixing heads can withstand wind loads up to 2.0 kPa. Application of MR bedding adhesive to bond the insulation boards to the substrate (wet-fix system) will considerably increase the resistance of the system to dynamic wind suction loads.

3.3 For dry-fix system (pattern A) with 50 mm or 90 mm diameter fixing heads, the wind suction forces to be resisted on any particular site calculated in accordance with BS 6399-2 : 1997 or CP 3 : Chapter V-2 : 1972, including any required safety factor, would be less than 2.5 kPa and 3.5 kPa respectively (see section 5 of the Appendix to this Certificate, which includes example calculations based on general site assumptions).

4 Properties in relation to fire

4.1 In the opinion of the BBA, use of the systems will not introduce any additional hazard in respect of behaviour in fire when compared with a system using traditional sand/cement render finishes.

4.2 The systems are classified Class 0 as described in the national Building Regulations:

England and Wales

Approved Document B, Appendix A, paragraph 12

Scotland

Technical Standards, *deemed to satisfy provisions*, Part E, Table 2 to (E6.1)a

Northern Ireland

Technical Booklet E, paragraph 2.4.

4.3 Full scale multi-storey fire tests have been conducted in accordance with BRE Fire Note 9 *Assessing the fire performance of external cladding systems: a test method.*

4.4 The behaviour in fire of external wall insulation systems is the subject of recommendations by BRE. For this system, there are no recommendations for fire barriers or a height restriction of the building to be treated provided that:

(a) there are no cavities between the rear of the face of the insulation and the background, and

(b) additional stainless steel fixings, one per square metre, are inserted through the reinforcing mesh and insulation and driven firmly into the background (see section 8.19).

5 Proximity of flues

When systems are installed in close proximity to certain flue pipes the relevant provisions of the national Building Regulations should be met:

England and Wales

Approved Document J

Scotland

Technical Standards, Part F

Northern Ireland

Technical Booklet L.

6 Thermal insulation

6.1 For the purpose of U value calculations to determine if the requirements of the Building, or other statutory, Regulations are met, the thermal conductivity (λ value) of the insulation may be taken as 0.025 $Wm^{-1}K^{-1}$.

6.2 The requirement for limiting the heat loss through the building fabric will be satisfied if the U values of the building elements do not exceed the maximum values in the relevant Elemental

Approach given in the national Building Regulations:

England and Wales

Approved Document L. The effect of thermal bridges should be taken into account

Scotland

Technical Standards, Part J

Northern Ireland

Technical Booklet F.

6.3 Guidance is also given in these documents on selecting the thickness of insulation required to enable a wall to achieve the desired U value. Alternative approaches are also described which allow for some flexibility in design of U values for individual constructional elements.

6.4 Where insulation boards have not been continued into window or door reveals due to a lack of clearance there will be a risk of cold bridging at these points. Where door and window frames are to be replaced it is recommended that their size be adjusted to permit the reveals to be insulated.

6.5 Depending on constructional details, cold bridging can also occur at the eaves and at ground-floor level, and care should be taken to minimise this, eg roof or loft insulation should continue over the wall head, ensuring that ventilation openings are not obstructed.

7 Durability

7.1 The results of accelerated ageing tests in accordance with MOAT No 22 : 1988 indicate that the systems are durable. The systems should remain effective for at least 30 years, provided any damage to the surface finish is repaired immediately, and regular maintenance is undertaken including checks on joints in the system and on external plumbing fitments to identify leakage of rainwater into the system, enabling steps to be taken to correct the defects.

7.2 MRS7 dashing render has been certificated for use over masonry substrates (since 26th August 1988) and as part of the Swisslab External Wall Insulation Systems (since 1st September 1988).

7.3 MRS4 render with MRS6 smooth finish masonry paint have been certificated for use as part of the Swisslab External Wall Insulation Systems (since 1st September 1988). MRS6 has been certificated as a smooth finish masonry paint for use over specified masonry or render substrates (since 23rd September 1988).

7.4 Reference should be made to the BBA's website for the validity status of the relevant Certificates.

7.5 The spar-dash finish will break up the flow of water on the surface and reduce the risk of discolouration by water runs.

7.6 The decorative finishes may become discoloured with time, the rate depending on the initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discolouration by algae and lichens may occur in particularly wet areas. The appearance of MRS7 can be restored using traditional cleaning methods (such as by brushing or washing) suitable for sand/cement renders. The appearance of MRS6 can be restored by a further application. The advice of the Certificate holder should be sought.

7.7 Render containing Portland cement may be subject to lime bloom. The occurrence of this may be reduced by avoiding application in adverse weather conditions. The effect is transient and less noticeable on lighter colours.

Installation

8 Procedure

General

8.1 Application is carried out in accordance with Alumasc Exterior Building Products Limited's current installation instructions.

8.2 The MR adhesives and render coats must not be applied in rain or mist, at temperatures below 5°C or above 30°C, if exposure to frost is likely to occur during drying, or if the background or boards are already wet or frostbound.

8.3 All rendering should be in accordance with the relevant recommendations of BS 5262 : 1991 and BS 8000-10 : 1995.

8.4 MR adhesives and renders are mixed using a paddle mixer. Conventional concrete mixers are unsuitable.

Positioning and securing insulation boards

8.5 One coat of MR fungicidal wash followed, if required, by one coat of MR stabilising solution/bonding agent is applied by brush, roller or knapsack spray to the entire wall surface.

8.6 The Alumasc wall base profile is secured to the external wall above the damp-proof course using the approved profile fixings at approximately 300 mm centres (see Figure 3).

8.7 Stop beads are positioned vertically, eg at party wall positions where the adjoining house does not require treatment (see Figure 4).

Figure 3 Typical section at base level

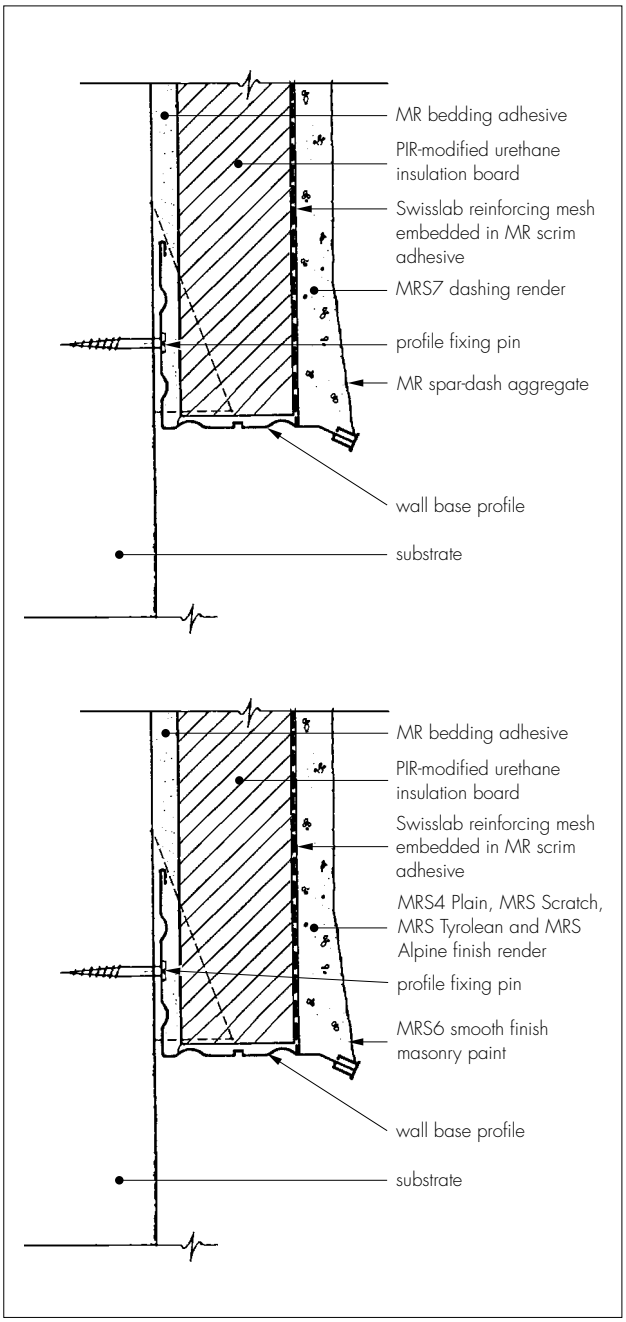
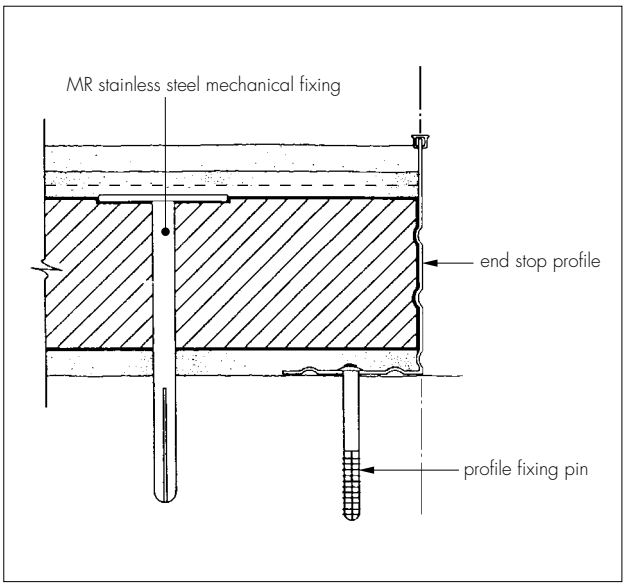


Figure 4 Typical end stop detail



8.8 To compensate for minor variations in the backing wall flatness, if required, MR bedding adhesive (wet-fix system only) is prepared for use by mixing the contents of each 40 kg bag with 7 to 8 litres of cold, clean water. An electrically driven paddle mixer is used for a minimum of five minutes until a smooth, workable consistency is achieved. The material is left to stand for at least five minutes and again mixed for a further two minutes. A bed coat of MR bedding adhesive is applied to the entire surface to a minimum thickness of 6 mm and finished with a serrated trowel or comb.

8.9 The first run of insulation boards is positioned on the base profile. When using the wet-fix system boards are pressed firmly into the adhesive. Subsequent rows of boards are positioned so that the board joints are staggered and overlapped at the building corners and in such a manner that board joints do not occur within 200 mm of the corners of openings (see Figure 2). If required, the boards may be arranged with the longer edge positioned vertically.

8.10 For both dry- and wet-fix systems, the insulation boards are mechanically fastened to the wall using either fixing pattern A or B (see Figure 2). Holes are drilled into the substrate to a minimum depth of 50 mm and the mechanical fixings are inserted and tapped firmly into place, securing the insulation board to the substrate. Insulation boards may also be installed using the Swisslab Universal Fixing Pattern (see Detail Sheet 15).

8.11 Care must be taken to ensure that all board edges are butted tightly together, and alignment should be checked as work proceeds. Any high spots or irregularities should be removed by lightly planing with a rasp.

8.12 To fit around details such as doors and windows, insulation boards may be cut with a sharp knife or a fine-tooth saw. If required, purpose-made window sills are fitted. They are designed to prevent water ingress and incorporate drips to shed water clear of the system.

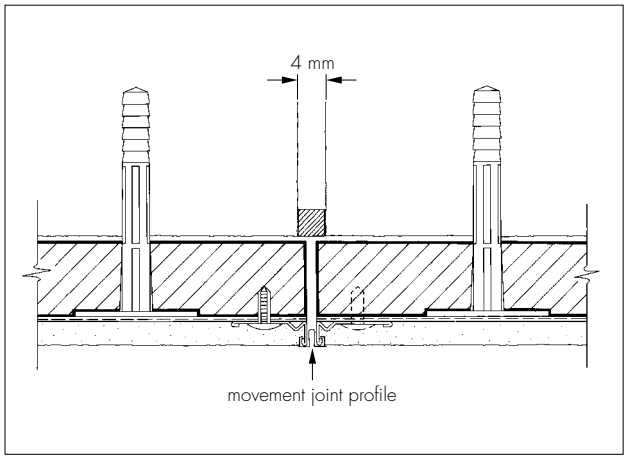
8.13 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits.

8.14 Mechanical fixings are positioned 300 mm apart around door and window details and 300 mm vertical centres at building corners. At corners, fixings should be positioned inwards at a distance of 75 mm plus the thickness of the insulation from building corners.

Movement joints and profiles

8.15 Movement joints in the substrate must be continued through the system. The joint detail using purpose-made metal trims is illustrated in Figure 5.

Figure 5 Vertical movement joint detail



8.16 Expansion bead locations are marked vertically at agreed positions. These beads are positioned at approximately 7 m centres along a building, the centres depending on the individual requirements of each job.

Reinforcing

8.17 The MR scrim adhesive is prepared as described in section 8.8 and a bed coat is trowel-applied to the surface of dry insulation boards to a minimum thickness of 3 mm.

8.18 An alkali-resisting glass-fibre mesh is bedded into the adhesive with 75 mm laps at joints. Extra mesh is used around openings (see Figure 2).

8.19 For installations above two storeys additional holes are drilled at one metre centres before the scrim adhesive hardens and stainless steel fixings are inserted through the mesh and tapped firmly home. The fixings are then covered with MR scrim adhesive and square pieces of mesh measuring no less than 150 mm by 150 mm.

8.20 If a spar-dash finish is required, a thickness gauge is pressed into the mesh and scrim adhesive while the adhesive is still wet. The gauge is used to determine the thickness of the following render coat. It is designed so that the disc sits on the surface with a small amount of adhesive compressed into the holes (see Figure 6).

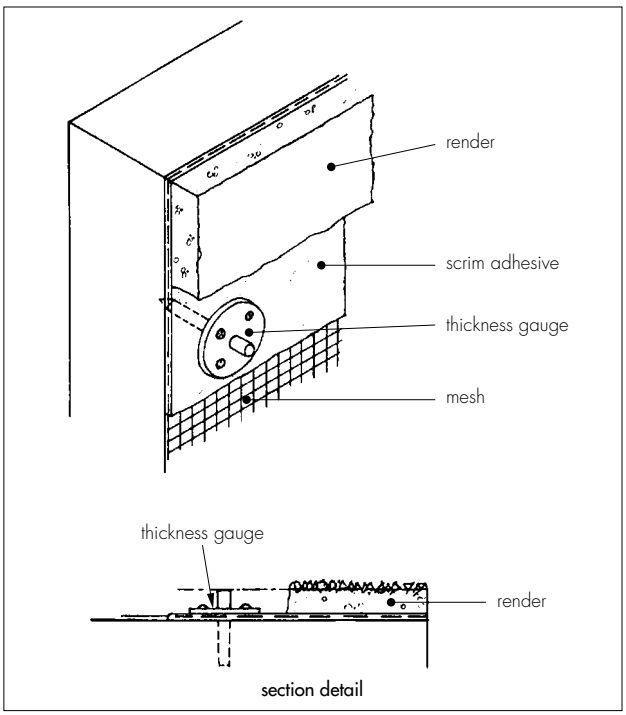
8.21 Prior to the render coat, a bead of silicone rubber mastic is gun-applied at window and door frames, overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

Rendering and finishing

8.22 Expansion beads are fitted at agreed positions. Angle beads are fixed to all building corners and to door and window heads and jambs. The beads are fixed using MR fir-tree fixings at a maximum of 300 mm centres.

8.23 The drying period of any render will depend on weather conditions; however, each coat must be left to harden for as long as possible in good drying conditions before application of the subsequent coat. The scrim adhesive must be allowed to harden and dry for a least one day.

Figure 6 Render thickness gauge



8.24 Prior to the render coat, a bead of silicone rubber mastic is gun-applied at window and door frames, overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

Rendering and finishing

8.25 Expansion beads are fitted at agreed positions. Angle beads are fixed to all building corners and to door and window heads and jambs using MR fir-tree fixings at a maximum of 300 mm centres.

8.26 The drying period of any render will depend on weather conditions; however, each coat must be left to harden for as long as possible in good drying conditions before application of the subsequent coat. The scrim adhesive must be allowed to harden and dry for a least one day.

8.27 To prevent the render from drying too rapidly it should not be applied in direct sunlight. Continuous surfaces must be completed without a break.

8.28 After application care must be taken to protect the render from direct sunlight, drying winds, rain, mist and cold (less than 5°C on a falling thermometer) to prevent the drying time from being too rapid or excessively prolonged.

8.29 For all rendering and application of finishing coats continuous surfaces should be completed without a break.

Spar-dash finish

8.30 The MRS7 dashing render is prepared using the same procedures as for the bedding adhesive

(see section 8.8) by mixing the contents of each 40 kg bag with approximately 8 to 9 litres of water. Care must be taken to ensure an even dispersion of the resin and fibre reinforcement.

8.31 One coat of MRS7 is applied to a minimum thickness of 8 mm. A minimum of three bags of suitable spar-aggregate should be emptied into a clean wheelbarrow or tub and any excess water allowed to drain away before being mixed thoroughly. While the render is still soft, the aggregate is thrown or sprayed onto the surface. On completion, the surface must be checked to ensure an even coverage of spar-dash has been achieved. Where necessary, the aggregate should be lightly tamped to ensure that a good bond is achieved.

MRS4 Plain, MRS Scratch, MRS Tyrolean and MRS Alpine finish renders

8.32 The render is prepared using the same procedures as for the bedding adhesive (see section 8.8) by mixing the contents of each 40 kg bag with approximately 6 to 7 litres of water. Care must be taken to ensure an even dispersion of the resin and fibre reinforcement. In hot or windy conditions it may be necessary to include an additional quantity of water during the second mixing to allow for loss during application.

8.33 One coat is trowel-applied to a minimum thickness of 5 mm to receive MRS4 Plain finish or a minimum thickness of 8 mm to receive MRS Scratch, MRS Tyrolean or MRS Alpine finish. The undercoat is lightly scratched and must be left to harden for at least 48 hours before applying one of the following:

(1) MRS4 Plain finish render top coat is applied to a minimum thickness of 8 mm using a wood or fibre float. The top coat should be thinner than the first coat.

(2) MRS Scratch finish render top coat is applied to a thickness of 8 mm. When the render is sufficiently hard, even pressure is applied to remove a 2 mm to 3 mm thick surface layer using a scratch float to create the desired surface texture.

(3) MRS Tyrolean finish render top coat is applied using traditional means or machine spray in successive passes to a thickness of approximately 5 mm to create the desired surface texture.

(4) MRS Alpine finish render top coat is applied to a thickness of approximately 2 mm using a plastic float dragged over the surface vertically and horizontally to create the desired surface texture.

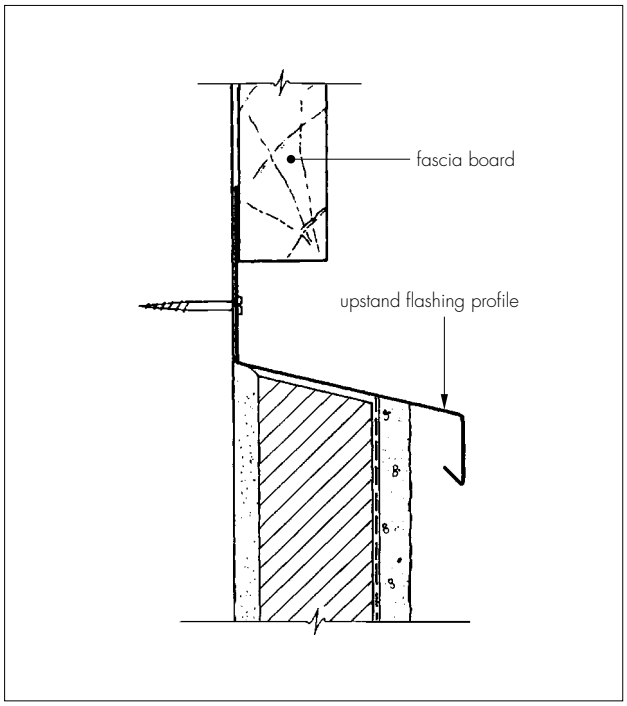
8.34 The top coat is allowed to dry and any dirt, grease, chalking, etc removed before application of the decorative coat.

8.35 MRS6 smooth finish masonry paint is applied in two coats by brush or roller, allowing sufficient drying time between each coat. Drying times depend on weather conditions.

8.36 The decorative finish should not be applied in wet weather, at temperatures below 5°C, or when frost is expected. Freshly coated work should be protected from rain.

8.37 At the tops of walls the system must be protected by an adequate overhang or by an adequately sealed purpose-made flashing (see Figure 7).

Figure 7 Typical eaves detail



8.38 Care must be taken in the detailing of the system around openings and projections (see Figures 8, 9 and 10).

8.39 On completion of the installation, external fittings, eg rainwater goods, are re-fixed through the system into the substrate.

Figure 8 External corner detail

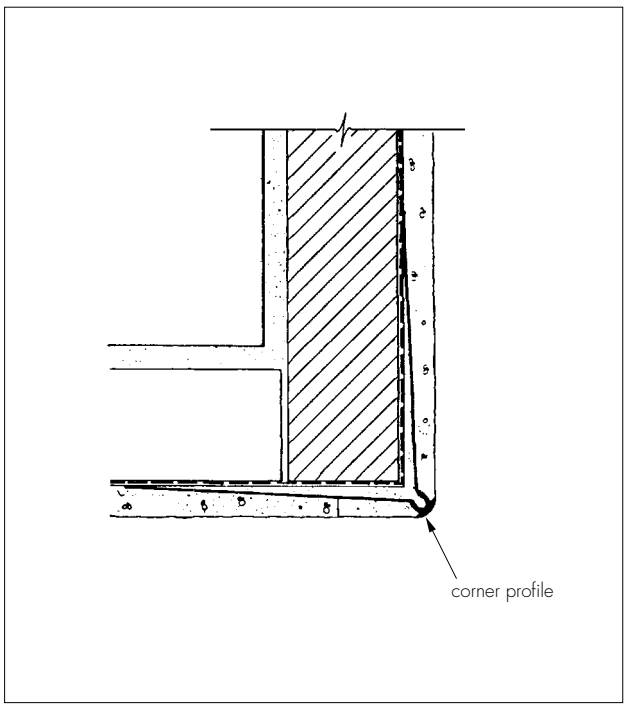


Figure 9 Uninsulated window or door reveal

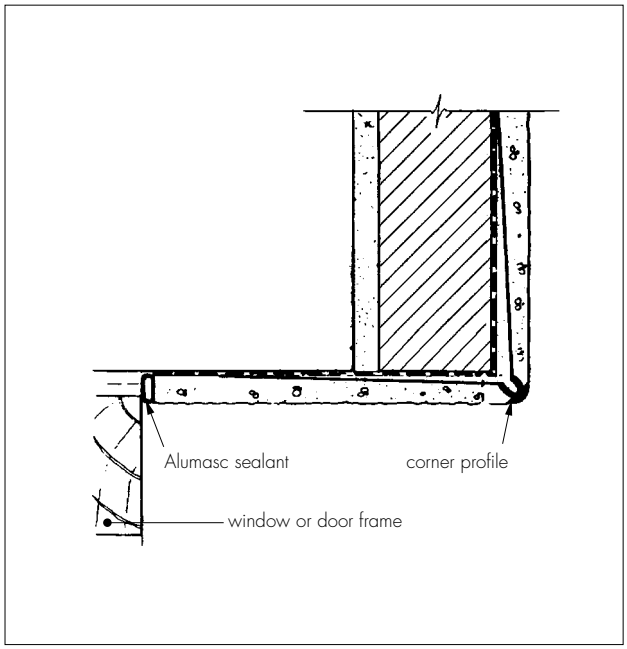
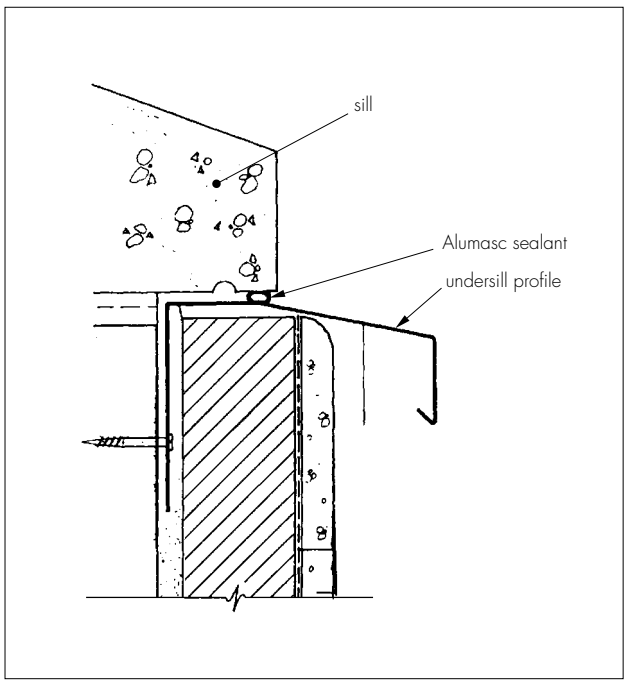


Figure 10 Typical sill detail



Technical Investigations

The following is a summary of the technical investigations carried out on Swisslab PIR-Modified Urethane (CFC- and HCFC-Free) and MRS Finishes, External Wall Insulation Systems.

9 Tests

9.1 Tests were carried out in accordance with MOAT No 22 : 1988 to determine:

component characterisation
heat/spray cycling
resistance to freeze/thaw
impact resistance
water absorption of render
water vapour permeability.

9.2 An examination was made of data relating to:

resistance to dynamic wind uplift[1]
flexural and compressive strength of renders
multi-storey fire tests conducted in accordance with BRE Fire Note 9
fire propagation tests to BS 476-6 : 1989
surface spread of flame tests to BS 476-7 : 1987
pull-out strength of fixings
durability of finishes
thermal conductivity to BS 874-2.1 : 1986
bond strength of MRS3, MRS5F and MRS7.

(1) Tests were conducted by the BBA generally in accordance with European Organisation for Technical Approvals draft ETAG *Guidelines for External Thermal Insulation Composite Systems with rendering*.

10 Other investigations

10.1 The manufacturing process, the methods adopted for quality control of manufacture and bought-in components and details of the quality and composition of the materials used, were examined.

10.2 A computer simulation of the risk of interstitial condensation was undertaken.

10.3 The practicability of installation and the effectiveness of detailing techniques were examined.

Bibliography

BS 476 *Fire tests on building materials and structures*
BS 476-4 : 1970(1984) *Non-combustibility test for materials*
BS 476-6 : 1989 *Method of test for fire propagation for products*
BS 476-7 : 1987 *Method for classification of the surface spread of flame of products*

BS 874 *Methods for determining thermal insulation properties*
BS 874-2 *Tests for thermal conductivity and related properties*
BS 874-2.1 : 1986 *Guarded hot-plate method*

BS 5262 : 1991 *Code of practice for external renderings*

BS 6399 *Loading for buildings*
BS 6399-2 : 1995 *Code of practice for wind loads*

BS 8000 *Workmanship on building sites*
BS 8000-10 : 1995 *Code of practice for plastering and rendering*

CP 3 *Code of basic data for the design of buildings*
CP 3 : Chapter V *Loadings*
CP 3 : Chapter V-2 : 1972 *Wind loads*

MOAT No 22 : 1988 *Directives for the Assessment of External Insulation Systems for Walls (Expanded Polystyrene Insulation Faced with a Thin Rendering)*

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

Date of Third issue: 15th February 2001

Chief Executive

**Original Detail Sheet issued 29th June 1993. This amended version includes a change to the Certificate holder's name, additional assessments of data in relation to dynamic wind uplift (suction) and multi-storey fire tests, covers PIR-modified urethane (CFC- and HCFC-free), includes MRS4 Plain finish, MRS Scratch, MRS Tyrolean and MRS Alpine finish renders and incorporates the spar-dash finish, previously covered by Detail Sheet 10 which is now withdrawn.*

Appendix — System summary — Swisslab PIR-Modified Urethane (CFC- and HCFC-Free) and MRS Finishes, External Wall Insulation Systems

1 System

Insulation	PIR-modified urethane insulation boards, dimensions 1200 mm × 600 mm in a range of thicknesses between 20 mm and 150 mm. Nominal density 32 kgm^{-3} and minimum compressive strength of 150 kNm^{-2}.
Fixings	Mechanical fixings approved by Alumasc Exterior Building Products Limited and the BBA.
MR bedding and scrim adhesives	Polymer-modified cement-based adhesives, supplied as powders to which water is added.
Reinforcing mesh	One metre wide mesh of multi-stranded alkali-resistant glass fibres, having a polymer coating and nominal weights of 150 gm^{-2} or 200 gm^{-2}.
MRS7 dashing render	A polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added and available in a range of colours as listed in section 1.1(5) of this Detail Sheet.
MR spar-dash aggregate	A spar-dash aggregate available in a range of colours to suit MRS7 render.
MRS4 Plain, MRS Scratch MRS Tyrolean and MRS Alpine finish render	A polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added and available in a range of colours.
MRS6 smooth finish masonry paint	A polymer-based masonry paint, applied by roller or brush and available in a range of colours.

2 Thermal properties

Thermal conductivity of Swisslab urethane insulation boards	0.025 $Wm^{-1}K^{-1}$
U values	Using the values given in Table A15 of Approved Document L1 (1995 edition) to the Building Regulations 2000 (England and Wales), the thermal insulation values for a typical 225 mm brick external wall (density 1700 kgm^{-3}) with 10 mm plasterboard:

Insulation thickness (mm)	U value ($Wm^{-2}K^{-1}$)
25	0.61
30	0.55
35	0.49
40	0.45
45	0.41
50	0.38
55	0.35
60	0.33
65	0.31
70	0.29
75	0.28

3 Impact resistance

The Swisslab system is suitable for use where walls are exposed but have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the system may be exposed to severe impact, eg mechanical or malicious damage, precautions may be required to reduce the risk of damage.

4 Properties in relation to fire

The Swisslab system is not non-combustible to BS 476-4 : 1970(1984).

The system is classified Class 0 as defined in the appropriate Building Regulations.

Full scale multi-storey fire tests were conducted in accordance with BRE Fire Note 9.

Fire barriers are not required for this system.

5 Design wind loading and resistance to wind suction*

Assuming a sound substrate which will prohibit pull-out of the fixings below the maximum load achieved through dynamic wind load testing for pattern A (2.5 kPa and 3.5 kPa). An example of loads applied to the dry-fix system at 10 metres and 50 metres can be calculated as explained below:

Previously, wind loading on a particular wall could be calculated in accordance with CP 3 : Chapter V-2 : 1972 *Wind loads*. This code of practice has been replaced by BS 6399-2 : 1995 *Code of practice for wind loads*. The new procedures involve specific site information and do not facilitate generalisations, or 'worst case' calculations. For this reason, this example is based on CP 3 : Chapter V-2. The pressure created by the action of the wind can be calculated from the following formulae:

$P = (C_{pe} - C_{pi})q$ . . . . . (i)

$q = K(V_s)^2$ . . . . . (ii)

$V_s = VS_1 S_2 S_3$ . . . . . (iii)

Where:

P = pressure

C_{pe} = external pressure coefficient . . . . .(–1.0 at 10 m height
. . . . . –1.1 at 50 m height)

C_{pi} = internal pressure coefficient . . . . .(0.2 for both 10 m and
. . . . . 50 m heights)

K = a constant

V_s = design wind speed

V = basic wind speed

S_1 = topography value . . . . . .(from CP 3 = 1.0)

S_2 = ground roughness . . . . . .(from CP 3 = 1.0 for 10 m height
. . . . . .and 1.4 m for 50 m height)

S_3 = statistical factor . . . . . .(from CP 3 = 1.0)

q = the dynamic pressure

Using the above values and equation (i), (ii) and (iii) maximum wind suctions of 1.474 kPa at 10 m and 2.005 kPa at 50 m were calculated using a basic wind speed of 44 Ms^{-1}. The value obtained from dynamic wind load testing on the Swisslab dry-fix system was 2.5 kPa and 3.5 kPa which would indicate a minimum safety factor of 1.7 and 1.3 using 50 mm diameter fixing heads and 2.4 and 1.8 using 90 mm diameter fixing heads respectively.

*Inclusion of MR bedding adhesive (wet-fix) between the insulation and the background will considerably increase the resistance to wind suction.

6 Durability

Age of oldest installation — 7 years.

Assessed life — At least 30 years (with normal maintenance).

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CI/SfB (21.9) Rn7 (M2)

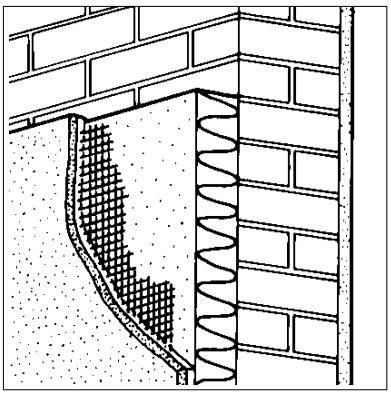
Certificate No 93/2914

SWISSLAB PHENOLIC (CFC-FREE) AND MRS FINISHES, EXTERNAL WALL INSULATION SYSTEMS

DETAIL SHEET 7

*Third issue**

Product



- *THIS DETAIL SHEET RELATES TO SWISSLAB PHENOLIC (CFC-FREE) AND MRS FINISHES, EXTERNAL WALL INSULATION SYSTEMS, SYSTEMS WHICH EMPLOY PHENOLIC INSULATION BOARDS, AND GLASS-FIBRE REINFORCING MESH WITH RENDER FINISHES.*
- *The systems are applied to the outside of external walls of masonry, dense or no-fines concrete construction and are suitable for new or existing buildings.*
- *It is essential that the Swisslab systems are installed and maintained in accordance with the conditions set out in the* Design Data *and* Installation *parts of this Detail Sheet.*
- *See the Appendix for system summary.*

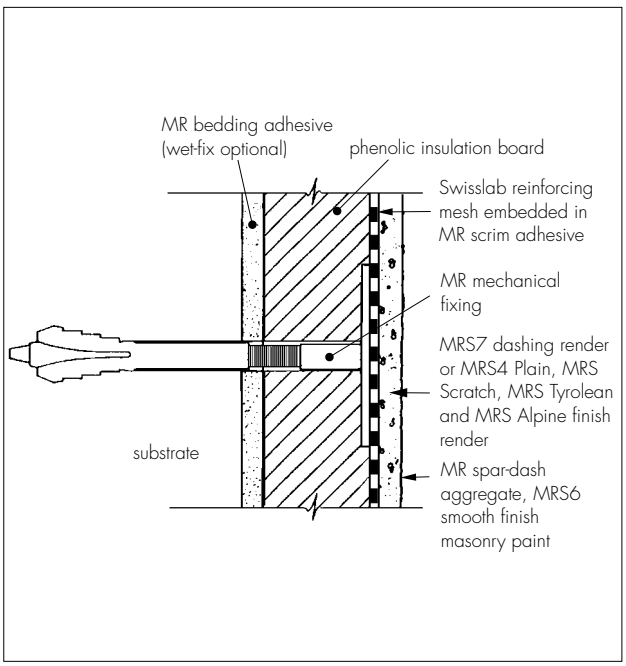
This Detail Sheet must be read in conjunction with the Front Sheets, which give the system's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification.

Technical Specification

1 Description

1.1 The Swisslab Phenolic (CFC-Free) and MRS Finishes, External Wall Insulation Systems (see Figure 1) comprise:

Figure 1 Components of the system



(1) Swisslab phenolic insulation boards — 1200 mm by 600 mm in a range of thicknesses between 20 mm and 150 mm, with a nominal density of 40 kgm^{-3} and a minimum compressive strength of 150 kNm^{-2}. Boards of 15 mm thickness are also available for use in window reveals.

(2) MR mechanical fixings — mechanical fixings approved by the BBA and Alumasc Exterior Building Products Limited. Details of approved fixings may be obtained from the BBA.

(3) MR bedding and scrim adhesives — polymer-modified cement-based adhesives, supplied as powders to which water is added.

(4) Swisslab reinforcing mesh — a one metre wide mesh of multi-stranded alkali-resistant glass fibres, having a polymer coating and a nominal weight of 150 gm^{-2} or 200 gm^{-2}.

(5) MRS7 dashing render — a polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available coloured white, extra white, salmon, terracotta red, red, burgundy, gold, yellow, peach, Scotland brown, light cream, cream, extra pink or pink. Other colours are available to order.

(6) MR spar-dash aggregate — available in a range of colours to suit the MRS7 render.

(7) MRS4 Plain, MRS Scratch, MRS Tyrolean and MRS Alpine finish render — a polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available in the colours listed in section 1.1(5).

(8) MRS6 smooth finish masonry paint — a polymer-based smooth finish decorative coating applied by brush or roller and available in a range of colours to suit MRS4 Plain, MRS Scratch, MRS Tyrolean and MRS Alpine renders.

(9) Ancillary materials:

Alumasc profiles — a range of standard profiles for wall base, end stop, corner mesh, expansion joint, etc. Profiles are available in organic polyester-coated galvanized steel or stainless steel and are provided to the specifier's requirements and approved by the BBA and Alumasc Exterior Building Products Limited

MR fir-tree fixings

MR profile fixings — driven pins with plastic expansion sleeves as approved by the BBA and Alumasc Exterior Building Products Limited

Alumasc sealant — silicone mastic as approved by the BBA and Alumasc Exterior Building Products Limited

MR fungicidal wash

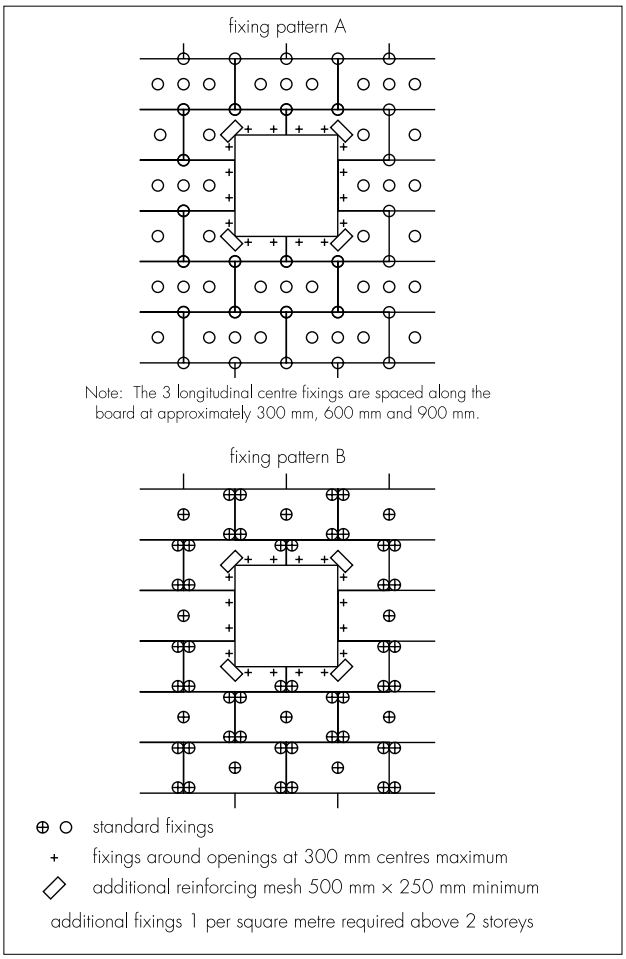
MR stabilising solution/bonding agent

MR plastic thickness gauge.

1.2 Swisslab phenolic insulation boards may be mechanically fastened to the external surfaces of walls (dry-fix system). Alternatively, where it is necessary to provide a levelling coat (see section 8.8), insulation boards may be bonded to the external surfaces of walls using MR bedding adhesive and secured with mechanical fixings (wet-fix system). For both wet- and dry-fix systems there are two choices of fixing pattern (see Figure 2). When all the boards have been secured to the wall the MR scrim adhesive is applied by trowel or a machine spray to the insulation in a minimum thickness of 3 mm, and the reinforcing mesh is embedded in the adhesive. For installations above two storeys additional stainless steel fixings are applied through the reinforcing mesh and insulation boards and into the background at approximately one metre centres. The additional fixings are covered with square pieces of mesh embedded in more adhesive. The adhesive coat is allowed to dry prior to application of the render coats and selected finishes.

1.3 All components are subject to routine in-factory quality control.

Figure 2 Insulation boards fixing patterns



2 Delivery and site storage

2.1 The insulation boards are delivered to site wrapped in polythene. Each pack carries the product identification and batch numbers.

2.2 Components are delivered to site in the packages and quantities as listed in Table 1. Each package carries the product identification, manufacturer's batch number and the BBA identification mark incorporating the number of this Certificate.

Table 1 Component supply details

Component	Quantity and package
MRS3 and MRS5F dubbing renders	25 kg or 40 kg bags
MR bedding and scrim adhesives	25 kg or 40 kg bags
MRS renders	25 kg or 40 kg bags
MRS6 smooth finish masonry paint	10 litre drum
MR spar-dash aggregate	25 kg or 40 kg bags
MR mechanical fixings	boxed by manufacturer
MR plastic thickness gauge	boxed by manufacturer
MR fir-tree fixings	boxed by manufacturer
MR stabilising solution/bonding agent	5 litre drum
MR fungicidal wash	5 litre drum

2.3 The Swisslab reinforcing mesh, one metre wide, is supplied in rolls of 50 metres.

2.4 The phenolic insulation boards should be stored on a firm, clean, level base, off the ground and must be protected from prolonged exposure to

sunlight or rain either by storing in a safe area under cover or re-covering with opaque polythene sheeting. Open packs must be protected from the weather.

2.5 Care must be taken when handling the insulation boards to avoid damage. The boards must not be exposed to open flame or other ignition sources.

2.6 The MR adhesives and renders are cementitious materials and must be stored in dry conditions, off the ground, and be protected from frost at all times.

2.7 The decorative MR spar-dash aggregate should be stored off the ground and protected with opaque polythene sheeting.

2.8 The MRS6 smooth finish masonry paint should be stored under cover away from damage and protected from excessive heat and frost at all times.

Design Data

3 Strength and stability

3.1 The Swisslab Phenolic (CFC-Free) and MRS Finishes, External Wall Insulation Systems have adequate resistance to impact and abrasion where walls are exposed and have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the systems may be exposed to severe impact, eg mechanical or malicious, precautions may be required to reduce the risk of damage. Further guidance may be obtained from the Certificate holder and Building Research Establishment (BRE) Current Paper CP 6 : 81 *Assessment of external walls — Hard body impact resistance.* Heavyweight alkali-resistant glass-fibre mesh can be used in high risk areas.

3.2 Dynamic wind suction tests conducted by the BBA confirm that the dry-fix system (pattern A) using MR standard fixings with 50 mm diameter heads can withstand wind loads up to 2.5 kPa when installed in accordance with the manufacturer's instruction and the installation sections of this Certificate. The same dry-fix system using 90 mm diameter fixing heads can withstand wind loads up to 3.5 kPa. Fixing pattern B (see Figure 2) using MR standard 50 mm diameter fixing heads can withstand wind loads up to 2.0 kPa. Application of MR bedding adhesive to bond the insulation boards to the substrate (wet-fix system) will considerably increase the resistance of the system to dynamic wind suction loads.

3.3 For the dry-fix system (pattern A), with 50 mm and 90 mm diameter fixing heads the wind suction forces to be resisted on any particular site calculated in accordance with BS 6399-2 : 1995 or CP 3 : Chapter V-2 : 1972, including any required safety factor, would be less than 2.5 kPa and 3.5 kPa respectively. See section 5 of the Appendix to this Certificate, which includes example calculations based on general site assumptions.

4 Properties in relation to fire

4.1 In the opinion of the BBA, use of the systems will not introduce any additional hazard in respect of behaviour in fire when compared with a system using traditional sand/cement render finishes.

4.2 The systems are classified Class 0 as described in the national Building Regulations:

England and Wales

Approved Document B, Appendix A, paragraph 12

Scotland

Technical Standards, *deemed to satisfy provisions,* Part E, Table 2 to (E6.1)a

Northern Ireland

Technical Booklet E, paragraph 2.4.

4.3 Full scale multi-storey fire tests have been conducted in accordance with BRE Fire Note 9 *Assessing the fire performance of external cladding systems: a test method.*

4.4 The behaviour in fire of external wall insulation systems is the subject of recommendations by BRE. For this system, there are no recommendations for fire barriers or a height restriction of the building to be treated provided that:

(a) there are no cavities between the rear of the face of the insulation and the background, and

(b) Additional stainless steel fixings, one per square metre, are inserted through the reinforcing mesh and insulation and driven firmly into the background (see section 8.18).

5 Proximity of flues

When systems are installed in close proximity to certain flue pipes the relevant provisions of the national Building Regulations, should be met:

England and Wales

Approved Document J

Scotland

Technical Standards, Part F

Northern Ireland

Technical Booklet L.

6 Thermal insulation

6.1 For the purpose of U value calculations to determine if the requirements of the Building, or other statutory, Regulations are met, the thermal conductivity (λ value) of the insulation may be taken as 0.018 $Wm^{-1}K^{-1}$.

6.2 The requirement for limiting the heat loss through the building fabric will be satisfied if the U values of

the building elements do not exceed the maximum values in the relevant Elemental Approach given in the national Building Regulations:

England and Wales

Approved Document L. The effect of thermal bridges should be taken into account

Scotland

Technical Standards, Part J

Northern Ireland

Technical Booklet F.

6.3 Guidance is also given in these documents on selecting the thickness of insulation required to enable a wall to achieve the desired U value. Alternative approaches are also described which allow for some flexibility in design of U values for individual constructional elements.

6.4 Where insulation boards have not been continued into window or door reveals due to a lack of clearance there will be a risk of cold bridging at these points. Where door and window frames are to be replaced it is recommended that their size be adjusted to permit the reveals to be insulated.

6.5 Depending on constructional details, cold bridging can also occur at the eaves and at ground-floor level, and care should be taken to minimise this, eg roof or loft insulation should continue over the wall head, ensuring that ventilation openings are not obstructed.

7 Durability

7.1 The results of accelerated ageing tests in accordance with MOAT No 22 : 1988 indicate that the systems are durable. The systems should remain effective for at least 30 years, provided any damage to the surface finish is repaired immediately, and regular maintenance is undertaken including checks on joints in the system and on external plumbing figments to identify leakage of rainwater into the system, enabling steps to be taken to correct the defects.

7.2 MRS7 dashing render has been certified for use over masonry substrates (since 26th August 1988) and as part of the Swisslab External Wall Insulation Systems (since 1st September 1988).

7.3 MRS4 render with MRS6 smooth finish masonry paint has been certificated for use as part of the Swisslab External Wall Insulation Systems (since 1st September 1988). MRS6 has been certificated as a smooth finish masonry paint for use over specified masonry or render substrates (since 23rd September 1988).

7.4 Reference should be made to the BBA's website for the validity status of the relevant Certificates.

7.5 The spar-dash finish will break up the flow of water on the surface and reduce the risk of discolouration by water runs.

7.6 The decorative finishes may become discoloured with time, the rate depending on the initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discolouration by algae and lichens may occur in particularly wet areas. The appearance of MRS7 can be restored using traditional cleaning methods (such as brushing or washing) suitable for sand/cement renders. The appearance of MRS6 can be restored by a further application of finish. The advice of the Certificate holder should be sought.

7.7 Render containing Portland cement may be subject to lime bloom. The occurrence of this may be reduced by avoiding application in adverse weather conditions. The effect is transient and less noticeable on lighter colours.

Installation

8 Procedure

General

8.1 Application is carried out in accordance with Alumasc Exterior Building Products Limited's current installation instructions.

8.2 The MR bedding adhesive, scrim adhesive and render coats must not be applied in rain or mist, at temperatures below 5°C or above 30°C, if exposure to frost is likely to occur during drying, or if the background or the boards are already wet or frostbound.

8.3 All rendering should be in accordance with the relevant recommendations of BS 5262 : 1991 and BS 8000-10 : 1995.

8.4 MR adhesives and renders are mixed using a paddle mixer. Conventional concrete mixers are unsuitable. The products may be applied by trowel or a machine spray.

Positioning and securing insulation boards

8.5 One coat of MR fungicidal wash followed by, if required, one coat of MR stabilising solution/bonding agent is applied by brush, roller or knapsack spray to the entire wall surface.

8.6 The Alumasc wall base profile is secured to the external wall above the damp-proof course using the approved profile fixings at approximately 300 mm centres (see Figure 3).

8.7 Stop beads are positioned vertically, eg at party wall positions where the adjoining house does not require treatment (see Figure 4).

Figure 3 Typical section at base level

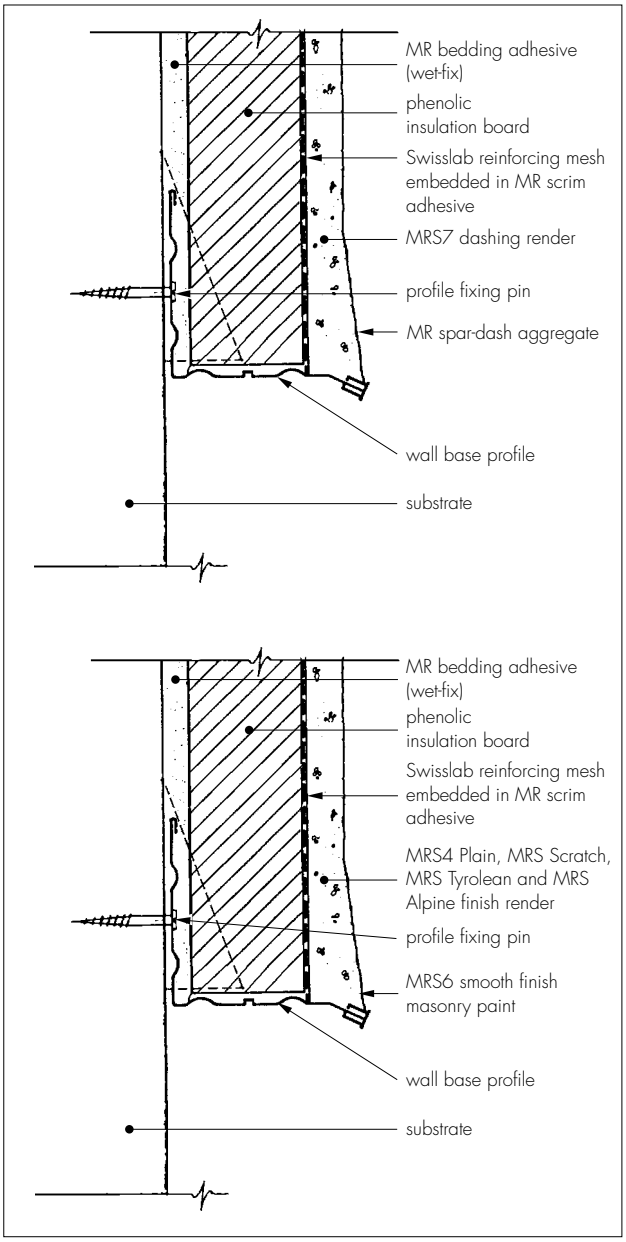
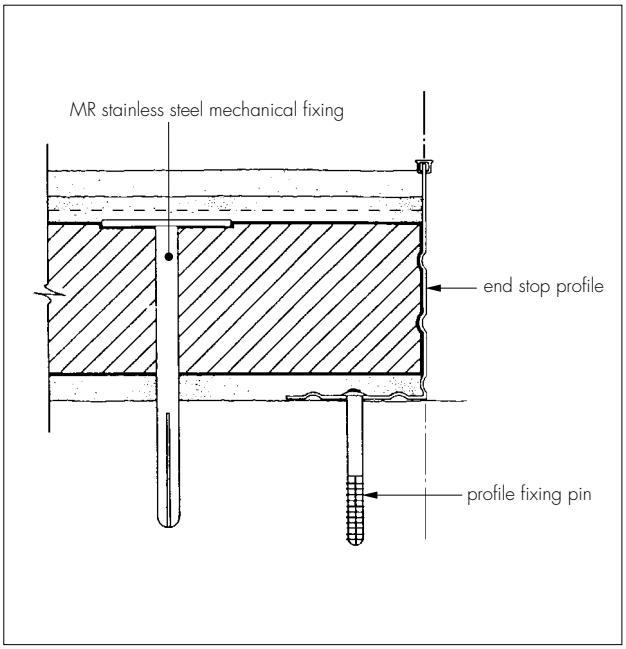


Figure 4 Typical end stop detail



8.8 To compensate for minor variations in the backing wall flatness, if required, MR bedding adhesive (wet-fix system only) is prepared for use by mixing the contents of each 40 kg bag with 7 to 8 litres of cold, clean water. An electrically driven paddle mixer is used for a minimum of five minutes until a smooth, workable consistency is achieved. The material is left to stand for at least five minutes and again mixed for a further two minutes. A bed coat of MR bedding adhesive is applied to the entire surface to a minimum thickness of 6 mm and finished with a serrated trowel or comb.

8.9 The first run of insulation boards is positioned on the base profile. When using the wet-fix system boards are pressed firmly into the adhesive. Subsequent rows of boards are positioned so that the board joints are staggered and overlapped at the building corners and in such a manner that board joints do not occur within 200 mm of the corner of openings (see Figure 2). If required, the boards may be arranged with the longer edge positioned vertically.

8.10 For both dry- and wet-fix systems, the insulation boards are mechanically fastened to the wall using either fixing pattern A or B (see Figure 2). Holes are drilled into the substrate to a minimum depth of 50 mm and the mechanical fixings are inserted and tapped firmly into place, securing the insulation board to the substrate. Insulation boards may also be installed using the Swisslab Universal Fixing Pattern (see Detail Sheet 15).

8.11 Care must be taken to ensure that all board edges are butted tightly together, and alignment should be checked as work proceeds. Any high spots or irregularities should be removed by lightly planing with a rasp.

8.12 To fit around details such as doors and windows, insulation boards may be cut with a sharp knife or a fine-tooth saw. If required, purpose-made window sills are fitted. They are designed to prevent water ingress and incorporate drips to shed water clear of the system.

8.13 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits.

8.14 Mechanical fixings are positioned 300 mm apart around door and window details and 300 mm vertical centres at building corners. At corners, fixings should be positioned inwards by 75 mm plus the thickness of the insulation.

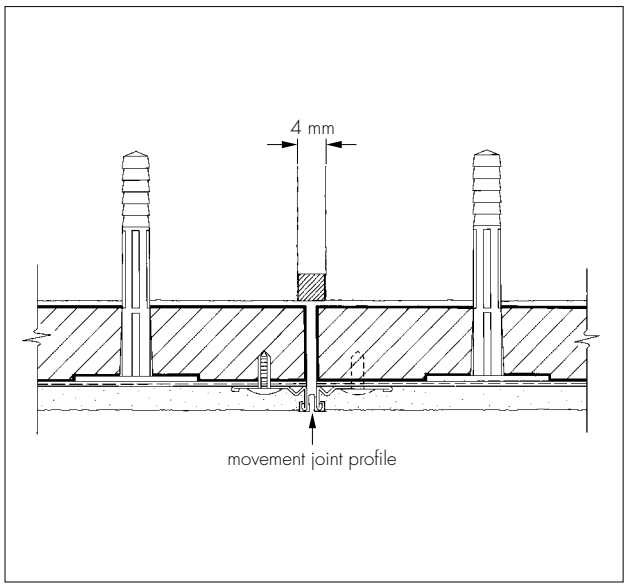
Movement joints and profiles

8.15 Movement joints in the substrate must be continued through the system. The joint detail using purpose-made metal trims is illustrated in Figure 5.

8.16 Expansion bead locations are marked vertically at agreed positions. These beads are positioned at approximately 7 m centres along a

building, the centres depending on the individual requirements of each job.

Figure 5 Vertical movement joint detail



Reinforcing

8.17 The MR scrim adhesive is prepared as described in section 8.8 and a bed coat is trowel-applied to the surface of dry insulation boards to a minimum thickness of 3 mm.

8.18 An alkali-resisting glass-fibre mesh is bedded into the adhesive with 75 mm laps at joints. Extra mesh is used around openings (see Figure 2).

8.19 For installations above two storeys additional holes are drilled at one metre centres before the scrim adhesive hardens and stainless steel fixings are inserted through the mesh and tapped firmly home. The fixings are then covered with MR scrim adhesive and square pieces of mesh measuring no less than 150 mm by 150 mm.

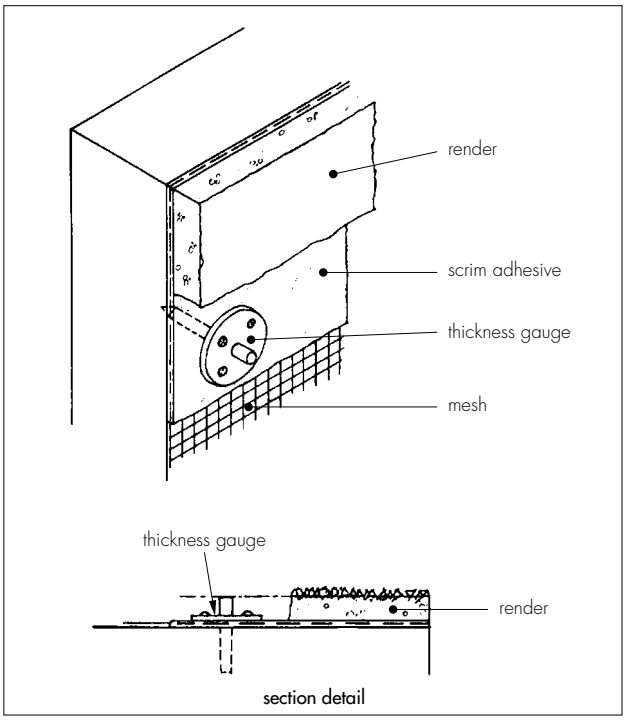
8.20 If a spar-dash finish is required, a thickness gauge is pressed into the mesh and scrim adhesive while the adhesive is still wet. The gauge is used to determine the thickness of the following render coat. It is designed so that the disc sits on the surface with a small amount of adhesive compressed into the holes (see Figure 6).

8.21 Prior to the render coat, a bead of silicone rubber mastic is gun-applied at window and door frames, overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

Rendering and finishing

8.22 Expansion beads are fixed vertically in agreed positions. Angle beads are fixed to all building corners and to door and window heads and jambs. The beads are fixed using the MR fir-tree fixings at maximum 300 mm centres.

Figure 6 Render thickness gauge



8.23 The drying period of any render will depend on weather conditions; however, each coat must be left to harden for as long as possible in good drying conditions before application the subsequent coat. The scrim coat must be allowed to harden and dry for at lest one day.

8.24 To prevent the render from drying too rapidly it should not be applied in direct sunlight. Continuous surfaces must be completed without a break.

8.25 After application care must be taken to protect the finish from direct sunlight, drying winds, rain, mist and (less than 5°C on a falling thermometer) to prevent the drying time from being too rapid or excessively prolonged.

8.26 For all rendering and application of finishing coats continuous surfaces should be completed without a break.

Spar-dash finish

8.27 The MRS7 dashing render is prepared using the same procedures as for the bedding adhesive (see section 8.8) by mixing the contents of each 40 kg bag with approximately 8 to 9 litres of water. Care must be taken to ensure an even dispersion of the resin and fibre reinforcement.

8.28 One coat of MRS7 is applied to a minimum thickness of 8 mm. A minimum of three bags of suitable spar-aggregate should be emptied into a clean wheelbarrow or tub and any excess water allowed to drain away before being mixed thoroughly. While the render is still soft, the aggregate is thrown or sprayed onto the surface. On completion, the surface must be checked to ensure an even coverage of spar dash has been

achieved. Where necessary, the aggregate should be lightly tamped to ensure that a good bond is achieved.

MRS4 Plain, MRS Scratch, MRS Tyrolean and MRS Alpine finish render

8.29 The render is prepared using the same procedures as for the scrim adhesive (see section 8.9) by mixing the contents of each 40 kg bag with approximately 6 to 7 litres of water. Care must be taken to ensure an even dispersion of the resin and fibre reinforcement. In hot or windy conditions it may be necessary to include a small additional quantity of water during the second mixing to allow for loss of water during application.

8.30 One coat is trowel-applied to a minimum thickness of 5 mm to receive MRS4 Plain finish or a minimum thickness of 8 mm to receive MRS Scratch, MRS Tyrolean or MRS Alpine finish. The undercoat is lightly scratched and must be left to harden for at least 48 hours before applying one of the following:

(1) MRS4 Plain finish render top coat is applied to a minimum thickness of 8 mm using a wood or fibre float. The top coat should be thinner than the first coat.

(2) MRS Scratch finish render top coat is applied to a thickness of 8 mm. When the render is sufficiently hard, even pressure is applied to remove a 2 mm to 3 mm thick surface layer using a scratch float to create the desired surface texture.

(3) MRS Tyrolean finish render top coat is applied using traditional means or machine spray in successive passes to a thickness of approximately 5 mm to create the desired surface texture.

(4) MRS Alpine finish render top coat is applied to a thickness of approximately 2 mm using a plastic float dragged over the surface vertically and horizontally to create the desired surface texture.

8.31 The top coat is allowed to dry and any dirt, grease, chalking, etc removed before application of the decorative coat.

8.32 MRS6 smooth finish masonry paint is applied in two coats by brush or roller. The drying times will be dependent upon weather conditions.

8.33 The decorative finish should not be applied in wet weather, at temperatures below 5°C, or when frost is expected. Freshly coated work should be protected from rain, mist and cold conditions.

8.34 At the tops of walls the system must be protected by an adequate overhang or by an adequately sealed purpose-made flashing (see Figure 7).

8.35 Care must be taken in the detailing of the system around openings and projections (see Figures 8, 9 and 10).

Figure 7 Typical eaves detail

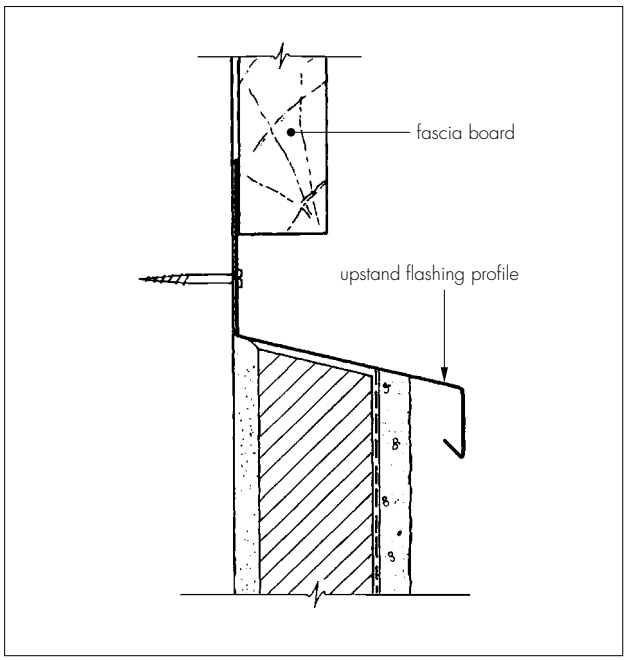


Figure 8 External corner detail

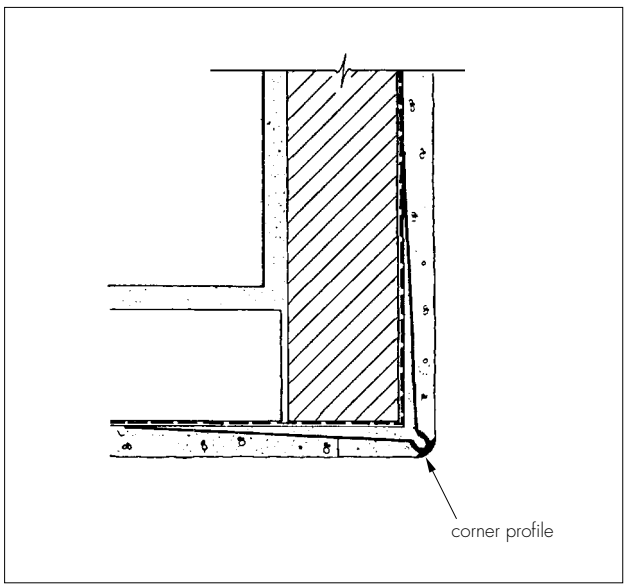


Figure 9 Uninsulated window or door reveal

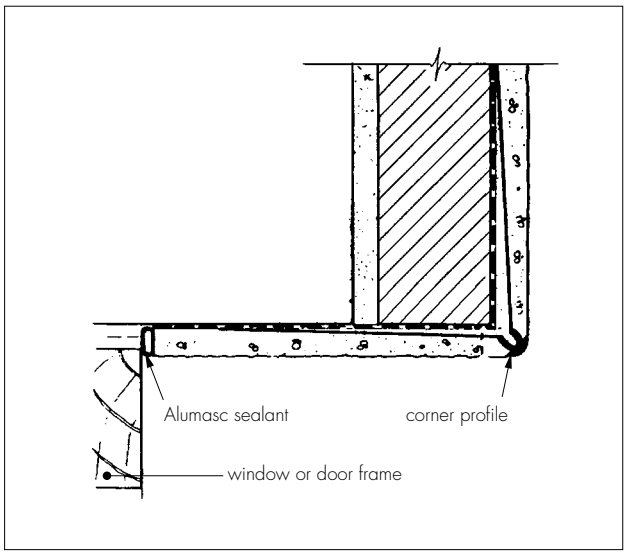
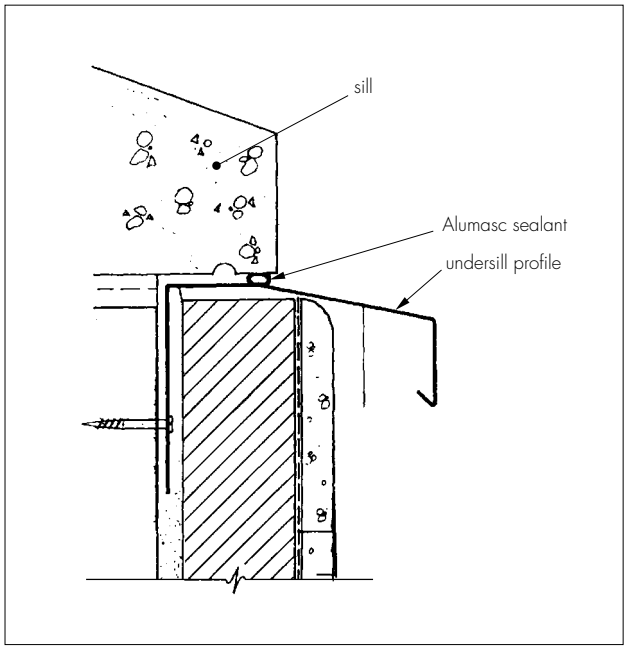


Figure 10 Typical sill detail



8.36 On completion of the installation, external fittings, eg rainwater goods, are re-fixed through the system into the substrate.

Technical Investigations

The following is a summary of the technical investigations carried out on the Swisslab Phenolic (CFC-Free) and MRS Finishes, External Wall Insulation Systems.

9 Tests

9.1 Tests were carried out in accordance with MOAT No 22 : 1988 to determine:

component characterisation
heat/spray cycling
resistance to freeze/thaw
impact resistance
water absorption of render
water vapour permeability.

9.2 An examination was made of data relating to:

resistance to dynamic wind uplift[1]
flexural and compressive strength of renders
multi-storey fire tests in accordance with BRE Fire Note 9
fire propagation tests to BS 476-6 : 1989
surface spread of flame tests to BS 476-7 : 1987
pull-out strength of fixings
durability of finish
bond strength of MRS3, MRS5F and MRS7
thermal conductivity to BS 874-2.1 : 1986.

(1) Tests were conducted by the BBA generally in accordance with European Organisation for Technical Approvals draft ETAG *Guidelines for External Thermal Insulation Composite Systems with rendering*.

10 Other investigations

10.1 The manufacturing process, the methods adopted for quality control of manufacture and bought-in components and details of the quality and composition of the materials used, were examined.

10.2 A computer simulation of the risk of interstitial condensation was undertaken.

10.3 The practicability of installation and the effectiveness of detailing techniques were examined.

Bibliography

BS 476 *Fire tests on building materials and structures*
BS 476-4 : 1970(1984) *Non-combustibility test for materials*
BS 476-6 : 1989 *Method of test for fire propagation for products*
BS 476-7 : 1987 *Method for classification of the surface spread of flame of products*

BS 874 *Methods for determining thermal insulating properties*
BS 874-2 *Tests for thermal conductivity and related properties*
BS 874-2.1 : 1986 *Guarded hot-plate method*

BS 5262 : 1991 *Code of practice for external renderings*

BS 6399 *Loading for buildings*
BS 6399-2 : 1995 *Code of practice for wind loads*

BS 8000 *Workmanship on building sites*
BS 8000-10 : 1995 *Code of practice for plastering and rendering*

CP 3 *Code of basic data for the design of buildings*
CP 3 : Chapter V *Loadings*
CP 3 : Chapter V-2 : 1972 *Wind loads*

MOAT No 22 : 1988 *Directives for the Assessment of External Insulation Systems for Walls (Expanded Polystyrene Insulation Faced with a Thin Rendering)*

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

Date of Third issue: 15th February 2001

Chief Executive

**Original Detail Sheet issued 29th June 1993. This revised version includes change of Certificate holder's name, addition of spar-dash (previously covered by Detail Sheet 8 which is now withdrawn) MRS4 Plain, MRS Scratch, MRS Tyrolean and MRS Alpine finish, and additional assessments of data in relation to dynamic wind uplift (suction) and multi-storey fire tests.*

Appendix — System summary — Swisslab Phenolic (CFC-Free) and MRS Finishes, External Wall Insulation Systems

1 System

Insulation	Phenolic insulation boards, dimensions 1200 mm × 600 mm in a range of thicknesses between 20 mm and 150 mm. Nominal density 40 kgm^{-3} and minimum compressive strength of 150 kNm^{-2}. Boards of 15 mm thickness are also available for use in window reveals.
Fixings	Mechanical fixings approved by Alumasc Exterior Building Products Limited and the BBA.
MR bedding and scrim adhesives	Polymer-modified cement-based adhesives, supplied as powders to which water is added.
Reinforcing mesh	One metre wide mesh of multi-stranded alkali-resistant glass fibres, having a polymer coating and nominal weights of 150 gm^{-2} or 200 gm^{-2}.
MRS4 Plain, MRS Scratch, MRS Tyrolean and Mrs Alpine finish render	A polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added and available in a range of colours.
MRS6 smooth finish masonry paint	A polymer-based masonry paint, applied by roller or brush available in a range of colours.
MRS7 dashing render	A polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available in a range of colours as listed in section 1.1(5) of this Detail Sheet.
MR spar-dash aggregate	A spar-dash aggregate available in a range of colours to suit MRS7 render.

2 Thermal properties

Thermal conductivity of Swisslab phenolic insulation boards	0.018 $Wm^{-1}K^{-1}$
U values	Using the values given in Table A15 of Approved Document L1 (1995 edition) to the Building Regulations 2000 (England and Wales), the thermal insulation values for a typical 225 mm brick external wall (density 1700 kgm^{-3}) with 10 mm plasterboard:

Insulation thickness (mm)	U value ($Wm^{-2}K^{-1}$)
20	0.58
25	0.50
30	0.44
35	0.39
40	0.35
45	0.32
50	0.29
55	0.27
60	0.25
65	0.24
70	0.22

3 Impact resistance

The Swisslab system is suitable for use where walls are exposed but have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the system may be exposed to severe impact, eg mechanical or malicious damage, precautions may be required to reduce the risk of damage.

4 Properties in relation to fire

The Swisslab system is not non-combustible to BS 476-4 : 1970(1984).

The system is classified Class 0 as defined in the appropriate Building Regulations.

Full scale multi-storey fire tests were conducted in accordance with BRE Fire Note 9.

Fire barriers are not required for this system.

5 Design wind loading and resistance to wind suction*

Assuming a sound substrate which will prohibit pull-out of the fixings below the maximum load achieved through dynamic wind load testing for pattern A (2.5 kPa and 3.5 kPa). An example of loads applied to the dry-fix system at 10 metres and 50 metres can be calculated as explained below:

Previously, wind loading on a particular wall could be calculated in accordance with CP 3 : Chapter V-2 : 1972 *Wind loads*. This code of practice has been replaced by BS 6399-2 : 1995 *Code of practice for wind loads*. The new procedures involve specific site information and do not facilitate generalisations, or 'worst case' calculations. For this reason, this example is based on CP 3 : Chapter V-2. The pressure created by the action of the wind can be calculated from the following formulae:

$P = (C_{pe} - C_{pi})q$ . . . . . (i)

$q = K(V_s)^2$ . . . . . (ii)

$V_s = VS_1 S_2 S_3$ . . . . . (iii)

Where:

P = pressure

C_{pe} = external pressure coefficient . . . (–1.0 at 10 m height . . . . . –1.1 at 50 m height)

C_{pi} = internal pressure coefficient . . . (0.2 for both 10 m and . . . . . 50 m heights)

K = a constant

V_s = design wind speed

V = basic wind speed

S_1 = topography value . . . . . .(from CP 3 = 1.0)

S_2 = ground roughness . . . . . (from CP 3 = 1.0 for 10 m height . . . . . and 1.4 m for 50 m height)

S_3 = statistical factor . . . . . (from CP 3 = 1.0)

q = the dynamic pressure

Using the above values and equation (i), (ii) and (iii) maximum wind suctions of 1.474 kPa at 10 m and 2.005 kPa at 50 m were calculated using a basic wind speed of 44 Ms^{-1}. The value obtained from dynamic wind load testing on the Swisslab dry-fix system was 2.5 kPa and 3.5 kPa which would indicate a minimum safety factor of 1.7 and 1.3 using 50 mm diameter fixing heads and 2.4 and 1.8 using 90 mm diameter fixing heads respectively.

*Inclusion of MR bedding adhesive between the insulation and the substrate which will considerably increase the resistance to wind suction.

6 Durability

Age of oldest installation — 7 years.

Assessed life — At least 30 years (with normal maintenance).

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CI/SfB
(21.9) Rn7 (M2)

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

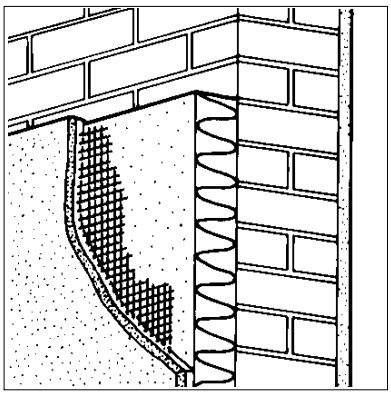
SWISSLAB MINERAL WOOL, SPAR-DASH RENDER FINISH, EXTERNAL WALL INSULATION SYSTEM

Certificate No 93/2914

DETAIL SHEET 9

*Third issue**

Product



- *THIS DETAIL SHEET RELATES TO SWISSLAB MINERAL WOOL, SPAR-DASH RENDER FINISH, EXTERNAL WALL INSULATION SYSTEM, A SYSTEM EMPLOYING MINERAL WOOL INSULATION BOARDS, AND GLASS-FIBRE REINFORCING MESH WITH RENDER FINISHES.*
- *The system is applied to the outside of external walls of masonry, dense or no-fines concrete construction and is suitable for new or existing buildings.*
- *It is essential that the Swisslab system is installed and maintained in accordance with the conditions set out in the* Design Data *and* Installation *parts of this Detail Sheet.*
- *See the Appendix for system summary.*

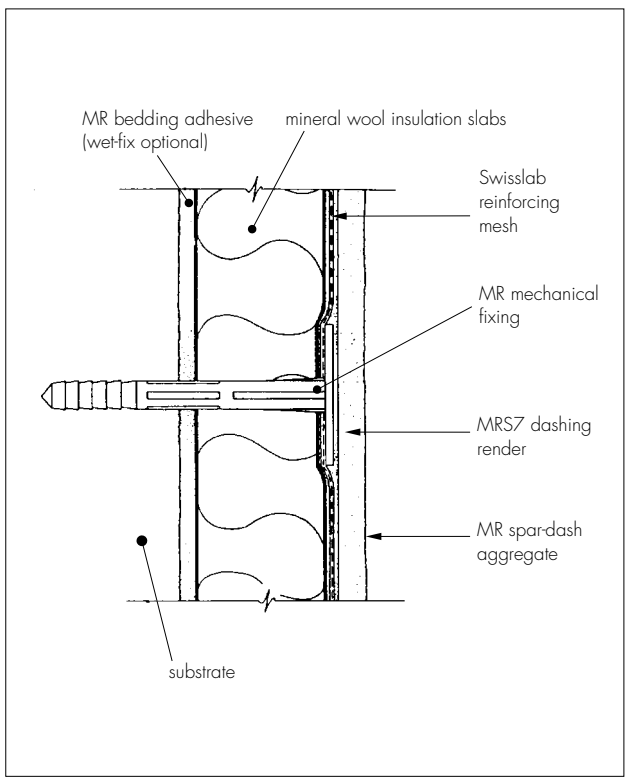
This Detail Sheet must be read in conjunction with the Front Sheets, which give the system's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification.

Technical Specification

1 Description

1.1 The Swisslab Mineral Wool, Spar-Dash Render Finish, External Wall Insulation System (see Figure 1) comprises:

Figure 1 Components of the system



(1) Swisslab crimped or standard mineral wool insulation slabs — 1200 mm by 600 mm in a range of thicknesses between 30 mm and 200 mm, with characteristics respectively of:

density (kgm^{-3})	100 (crimped only), 128, 140 and 160
typical compression resistance (at 20% compression) (kPa)	35, 50, 65 and 75

(2) MR mechanical fixings — mechanical fixings approved by the BBA and Alumasc Exterior Building Products Limited. Details of approved fixings may be obtained from the BBA.

(3) MR bedding and scrim adhesives — polymer-modified cement-based adhesives, supplied as powders to which water is added.

(4) Swisslab reinforcing mesh — a one metre wide mesh of multi-stranded, alkali-resistant glass fibres, having a polymer coating and a nominal weight of 150 gm^{-2} or 200 gm^{-2}.

(5) MRS7 dashing render — a polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available coloured white, extra white, salmon, terracotta red, red, burgundy, gold, yellow, peach, grey, Scotland brown, light cream, cream, extra pink or pink. Other colours are available to order.

(6) The decorative MR spar-dash aggregate — available in a range of colours to suit the MRS7 render.

(7) Ancillary materials:

Alumasc profiles — a range of standard profiles for wall base, end stop, corner mesh, expansion joint, etc. Profiles are available in organic polyester powder coated galvanized steel or stainless steel and are provided to the specifier's requirements and approved by the BBA and Alumasc Exterior Building Products Limited

MR fir-tree fixings

MR profile fixings — driven pins with plastic expansion sleeves as approved by the BBA and Alumasc Exterior Building Products Limited

Alumasc sealant — silicone mastic as approved by the BBA and Alumasc Exterior Building Products Limited

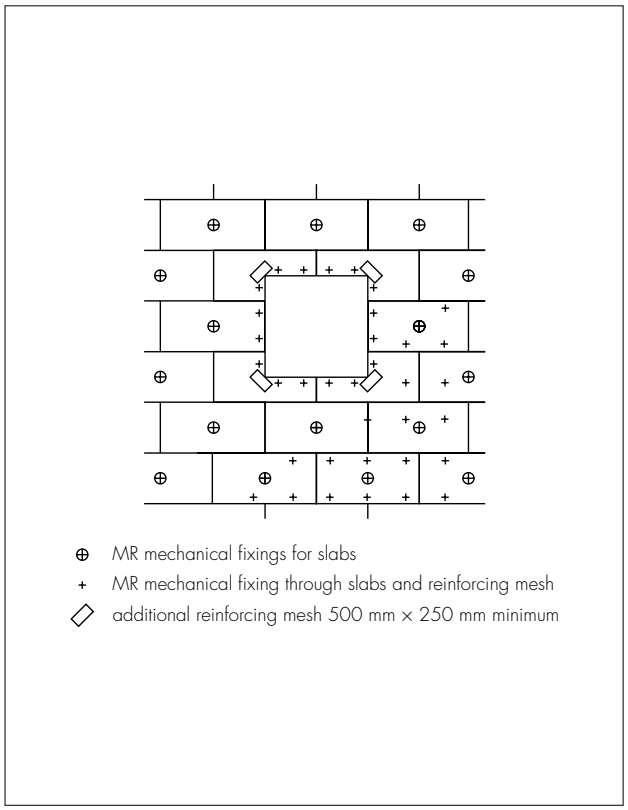
MR fungicidal wash

MR stabilising solution/bonding agent; and

MR plastic thickness gauge.

1.2 Swisslab mineral wool insulation slabs may be mechanically fastened to the external surfaces of walls (dry-fix system). Alternatively, where it is necessary to provide a levelling coat (see section 8.8), insulation slabs may be bonded to the external surfaces of walls using MR bedding adhesive and secured with mechanical fixings (wet-fix system). For both wet- and dry-fix systems the slabs are mechanically fastened to the external surface of walls initially with one fixing at the centre of each slab (see Figure 2).

Figure 2 Insulation slab fixing patterns



1.3 The MR scrim adhesive is trowel-applied, in a minimum thickness of 3 mm, to the slabs and the reinforcing mesh is then embedded in the adhesive. Before the adhesive has set, holes are drilled through the system and mechanical fixings are inserted, in accordance with the procedures detailed in section 8 of this Detail Sheet. For installations above two storeys, when using polypropylene fixings, additional stainless steel fixings are applied at approximately one metre centres and covered with square pieces of mesh embedded in more adhesive. MR plastic thickness gauges are pressed into the wet adhesive to ensure a correct coverage of MRS7 dashing render. When dry an 8 mm to 10 mm layer of the MRS7 dashing render is applied and dry-dashed with MR spar-dash aggregate.

1.4 All components are subject to routine in-factory quality control.

2 Delivery and site storage

2.1 The insulation slabs are delivered to site wrapped in polythene. Each pack carries the product identification and batch numbers.

2.2 Components are delivered to site in the packages and quantities as listed in Table 1. Each package carries the product identification, manufacturer's batch number and the BBA identification mark incorporating the number of this Certificate.

Table 1 Component supply details

Component	Quantity and package
MRS3 and MRS5F dubbing render	25 kg or 40 kg bags
MR bedding and scrim adhesives	25 kg or 40 kg bags
MRS renders	25 kg or 40 kg bags
MR spar-dash aggregate	25 kg or 40 kg bags
MR mechanical fixings	boxed by manufacturer
MR fir-tree fixings	boxed by manufacturer
MR stabilising solution/bonding agent	5 litre drum
MR fungicidal wash	5 litre drum
MR plastic thickness gauge	boxed by manufacturer

2.3 The Swisslab reinforcing mesh, one metre wide, is supplied in rolls of 50 metres.

2.4 The mineral wool insulation slabs should be stored on a firm, clean, level base, off the ground and must be protected from prolonged exposure to rain by storing in a safe area under cover until required for use. Care must be taken when handling the slabs to avoid damage. Opened packs must be protected from the weather.

2.5 The MR adhesives and renders are cementitious materials and must be stored in dry conditions, off the ground, and be protected from frost at all times.

2.6 The decorative MR spar-dash aggregate should be stored off the ground and protected with polythene sheeting.

Design Data

3 Strength and stability

3.1 The Swisslab Mineral Wool, Spar-Dash Render Finish, External Wall Insulation System has adequate resistance to impact and abrasion where walls are exposed and have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the system may be exposed to severe impact, eg mechanical or malicious, precautions may be required to reduce the risk of damage. Heavyweight alkali-resistant glass-fibre mesh can be used in high risk areas. Further guidance may be obtained from the Certificate holder and Building Research Establishment (BRE) Current Paper CP 6 : 81 *Assessment of external walls — Hard body impact resistance.*

3.2 Dynamic wind suction tests conducted by the BBA confirm that the dry-fix system (pattern A) using MR standard fixings with 50 mm diameter heads can withstand wind loads up to 2.5 kPa when installed in accordance with the manufacturer's instruction and the installation sections of this Certificate. The same dry-fix system using fixings with 90 mm diameter heads can withstand wind loads up to 3.5 kPa. Application of MR bedding adhesive to bond the insulation boards to the substrate (wet-fix system) will considerably increase the resistance of the system to dynamic wind suction loads.

3.3 For the dry-fix system (pattern A) with fixings of 50 mm or 90 mm diameter heads the wind suction forces to be resisted on any particular site calculated in accordance with BS 6399-2 : 1995 or CP 3 : Chapter V-2 : 1972, including any required safety factor, would be less than 2.5 kPa and 3.5 kPa respectively. See section 5 of the Appendix to this Certificate, which includes example calculations based on general site assumptions.

4 Properties in relation to fire

4.1 In the opinion of the BBA the use of the system will not introduce any additional hazard in respect of behaviour in fire when compared with a system using traditional sand/cement render finishes.

4.2 The system is classified Class 0 as described in the national Building Regulations:

England and Wales

Approved Document B, Appendix A, paragraph 12

Scotland

Technical Standards, *deemed to satisfy provisions*, Part E, Table 2 to (E6.1)a

Northern Ireland

Technical Booklet E, paragraph 2.4.

4.3 The behaviour in fire of external wall insulation systems is the subject of recommendations by BRE which, for this system, makes no restriction on the height of building to be treated.

5 Proximity of flues

For this system there are no provisions to be met.

6 Thermal insulation

6.1 For the purpose of U value calculations to determine if the requirements of the Building, or other statutory, Regulations are met, the thermal conductivity (λ value) of the insulation may be taken as 0.034 $Wm^{-1}K^{-1}$, 0.035 $Wm^{-1}K^{-1}$, 0.035 $Wm^{-1}K^{-1}$, and 0.036 $Wm^{-1}K^{-1}$, for densities of 100 kgm^{-3}, 128 kgm^{-3}, 140 kgm^{-3}, and 160 kgm^{-3}, respectively.

6.2 The requirement for limiting the heat loss through the building fabric will be satisfied if the U values of the building elements do not exceed the maximum values in the relevant Elemental Approach given in the national Building Regulations:

England and Wales

Approved Document L. The effect of the thermal bridges should be taken into account

Scotland

Technical Standards, Part J

Northern Ireland

Technical Booklet F.

6.3 Guidance is also given in these documents on selecting the thickness of insulation required to enable a wall to achieve the desired U value. Alternative approaches are also described which allow for some flexibility in design of U values for individual constructional elements.

6.4 Where insulation slabs have not been continued into window or door reveals due to a lack of clearance there will be a risk of cold bridging at these points. Where door and window frames are to be replaced it is recommended that their size be adjusted to permit the reveals to be insulated.

6.5 Depending on constructional details, cold bridging can also occur at the eaves and at ground-floor level, and care should be taken to minimise this, eg roof or loft insulation should continue over the wall head, ensuring that ventilation openings are not obstructed.

7 Durability

7.1 The results of accelerated ageing tests in accordance with MOAT No 22 : 1988 indicate that the system is durable. The system should remain effective for at least 30 years, provided any damage to the surface finish is repaired immediately, and regular maintenance is undertaken including checks on joints in the system and on external plumbing fitments to identify leakage of rainwater into the

system, enabling steps to be taken to correct the defects.

7.2 MRS7 dashing render has been certificated for use over masonry substrates (since 26th August 1988) and as part of the Swisslab External Wall Insulation Systems (since 1st September 1988). Reference should be made to the BBA's website for the validity status of the relevant Certificates.

7.3 The spar-dash finish will break up the flow of water on the surface and reduce the risk of discolouration by water runs. The finish may become discoloured with time, the rate depending on the initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discolouration by algae and lichens may occur in particularly wet areas. The appearance can be restored using traditional methods (such as brushing and washing) suitable for sand/cement renders.

7.4 Render containing Portland cement may be subject to lime bloom. The occurrence of this may be reduced by avoiding application in adverse weather conditions. The effect is transient and less noticeable on lighter colours.

Installation

8 Procedure

General

8.1 Application is carried out in accordance with Alumasc Exterior Building Products Limited's current installation instructions.

8.2 The MR bedding adhesive, scrim adhesive and render coats must not be applied in rain or mist, at temperatures below 5°C or above 30°C, if exposure to frost is likely to occur during drying, or if the background or the boards are already wet or frostbound.

8.3 All rendering should be in accordance with the relevant recommendations of BS 5262 : 1991 and BS 8000-10 : 1995.

8.4 MR adhesives and renders are mixed using a paddle mixer. Conventional concrete mixers are unsuitable.

Positioning and securing insulation slabs

8.5 One coat of MR fungicidal wash followed by one coat of MR stabilising solution/bonding agent is applied by brush, roller or knapsack spray to the entire wall surface.

8.6 The Alumasc wall base profile is secured to the external wall above the damp-proof course using the approved profile fixings at approximately 300 mm centres (see Figure 3).

8.7 Stop beads are positioned vertically, eg at party wall positions where the adjoining house does not require treatment (see Figure 4).

8.8 To compensate for minor variations in the backing wall flatness, if required, MR bedding adhesive (wet-fix system only) is prepared for use by mixing the contents of each 40 kg bag with 7 to 8 litres of cold, clean water. An electrically driven paddle mixer is used for a minimum of five minutes until a smooth, workable consistency is achieved. The material is left to stand for at least five minutes and again mixed for a further two minutes. A bed coat of MR bedding adhesive is applied to the entire surface to a minimum thickness of 6 mm and finished with a serrated trowel or comb.

Figure 3 Typical section at base

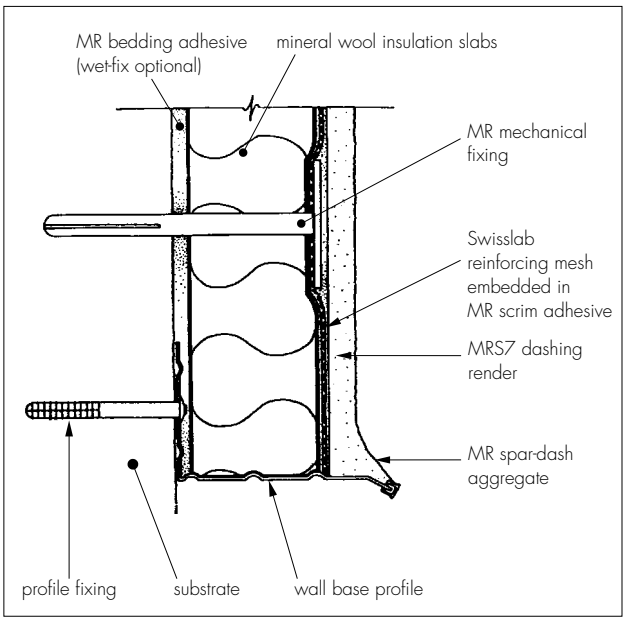
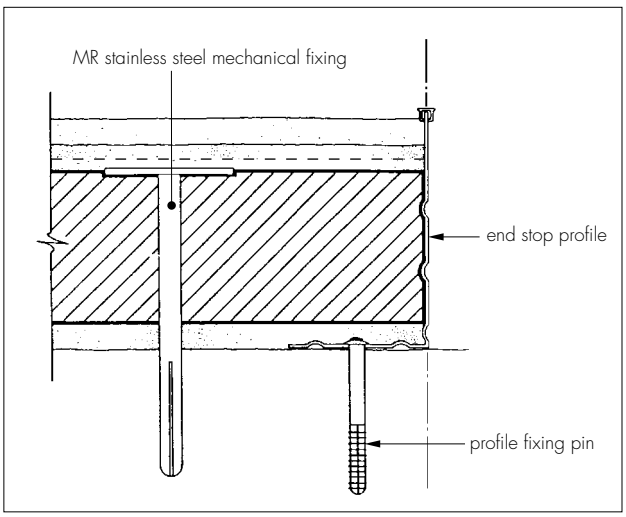


Figure 4 Typical end stop detail



8.9 The first run of insulation slabs is positioned on the base profile. When using the wet-fix system, slabs are pressed firmly into the adhesive. Subsequent rows of slabs are positioned so that the vertical slab joints are staggered and overlapped at the building corners and in such a

manner that board joints do not occur within 200 mm of the corners of openings (see Figure 2). If required, the boards may be arranged with the longer edge positioned vertically.

8.10 For both dry- and wet-fix systems, holes are drilled into the substrate to a minimum depth of 50 mm through the centre of each slab and the mechanical fixings are inserted and tapped firmly into place, securing the insulation slab to the substrate.

8.11 Care must be taken to ensure that all slab edges are butted tightly together, and alignment should be checked as work proceeds.

8.12 To fit around details such as doors and windows, insulation slabs may be cut with a sharp knife or a fine-tooth saw. If required, purpose-made window sills are fitted. They are designed to prevent water ingress and incorporate drips to shed water clear of the system.

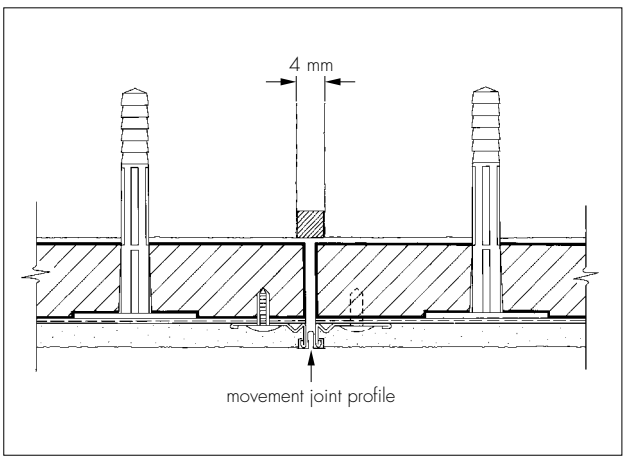
8.13 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits.

Movement joints and profiles

8.14 Movement joints in the substrate must be continued through the system. The joint detail using purpose-made metal trims is illustrated in Figure 5.

8.15 Expansion bead locations are marked vertically at agreed positions. These beads are positioned at approximately 7 m centres along a building, the centres depending on the individual requirements of each job.

Figure 5 Vertical movement joint detail



Reinforcing

8.16 The MR scrim adhesive is prepared as described in section 8.8. A bed coat is trowel-applied to the surface of dry insulation slabs to a minimum thickness of 3 mm.

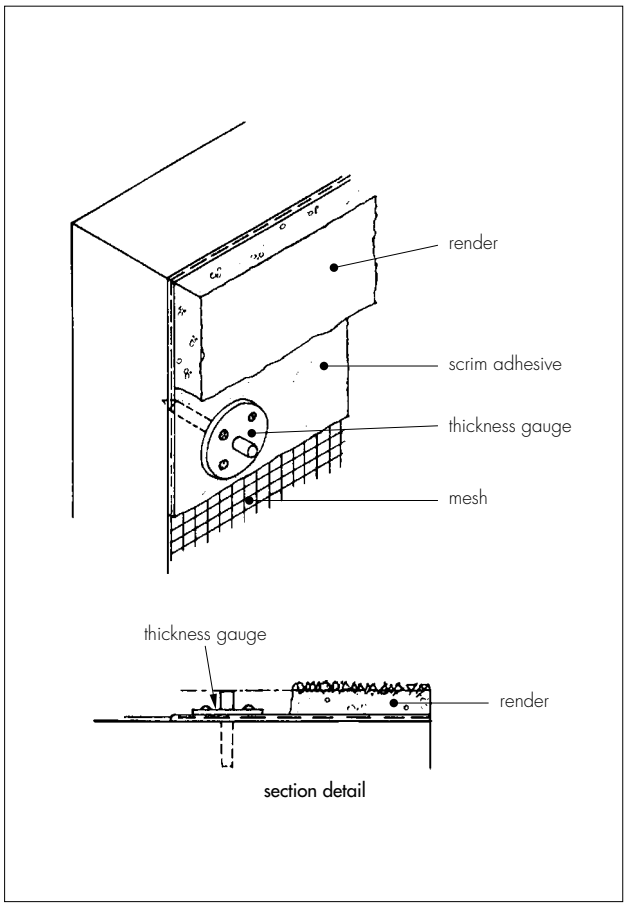
8.17 An alkali-resisting glass-fibre mesh is bedded into the adhesive with 75 mm laps at joints. Extra mesh is used around openings (see Figure 2).

8.18 Before the adhesive has set, holes are drilled through the system into the substrate to a minimum depth of 50 mm and mechanical fixings are inserted and tapped firmly into place. The fixing pattern should begin 100 mm above the base profile (bellcast), from movement and expansion beads and door and window openings, and 200 mm from building corners. Mechanical fixings are positioned 300 mm apart around door and window openings and 300 mm vertical centres at building corners. Fixings are positioned, thereafter, at maximum 450 mm vertical and horizontal centres over the entire surface.

8.19 For installations above two storeys, when using polypropylene fixings, additional holes are drilled at one metre centres before the scrim adhesive hardens and stainless steel fixings are inserted through the mesh and tapped firmly home. The fixings are then covered with MR scrim adhesive and square pieces of mesh measuring no less than 150 mm by 150 mm.

8.20 A thickness gauge is pressed into the mesh and scrim adhesive while the adhesive is still wet. The gauge is used to determine the thickness of the following render coat. It is designed so that the disc sits on the surface with a small amount of adhesive compressed into the holes (see Figure 6).

Figure 6 Render thickness gauge



8.21 Prior to the render coat, a bead of silicone rubber mastic is gun-applied at window and door frames, overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

Rendering and finishing

8.22 Expansion beads are fixed vertically at agreed positions. Angle beads are fixed to all building corners and to windows, door heads and jambs. The beads are fixed using MR fir-tree fixings at maximum 300 mm centres.

8.23 The drying period for any render will depend on weather conditions; however, the scrim adhesive must be left to harden and dry out for at least one day before application of any render coat.

8.24 To prevent the renders from drying too rapidly they should not be applied in direct sunlight. Continuous surfaces must be completed without a break.

8.25 For all rendering and application of finishing coats continuous surfaces should be completed without a break.

8.26 The MRS7 dashing render is prepared using the same procedures as for the bedding adhesive (see section 8.9) by mixing the contents of each 40 kg bag with approximately 8 to 9 litres of water. Care must be taken to ensure an even dispersion of the resin and fibre reinforcement.

8.27 One coat of MRS7 is applied to a minimum thickness of 8 mm. A minimum of three bags of suitable spar-dash aggregate should be emptied into a clean wheelbarrow or tub and any excess water allowed to drain away before being mixed thoroughly. While the render is still soft, the aggregate is thrown or sprayed onto the surface. On completion, the surface must be checked to ensure an even coverage of spar-dash has been achieved. Where necessary the aggregate should be lightly tamped to ensure that a good bond is achieved.

8.28 After application care must be taken to protect the finish from direct sunlight, drying winds, rain, mist and cold (less than 5°C on a falling thermometer) to prevent the drying time from being too rapid or excessively prolonged.

8.29 At the tops of walls the system must be protected by an adequate overhang or by an adequately sealed purpose-made flashing (see Figure 7).

8.30 Care must be taken in the detailing of the system around openings and projections (see Figures 8, 9 and 10).

8.31 On completion of the installation, external fittings, eg rainwater goods, are re-fixed through the system into the substrate.

Figure 7 Typical eaves detail

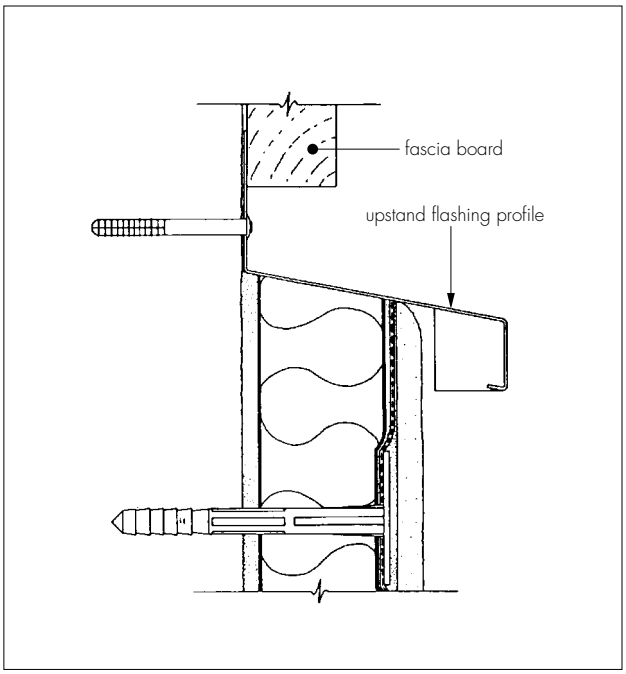


Figure 8 Uninsulated window or door reveal

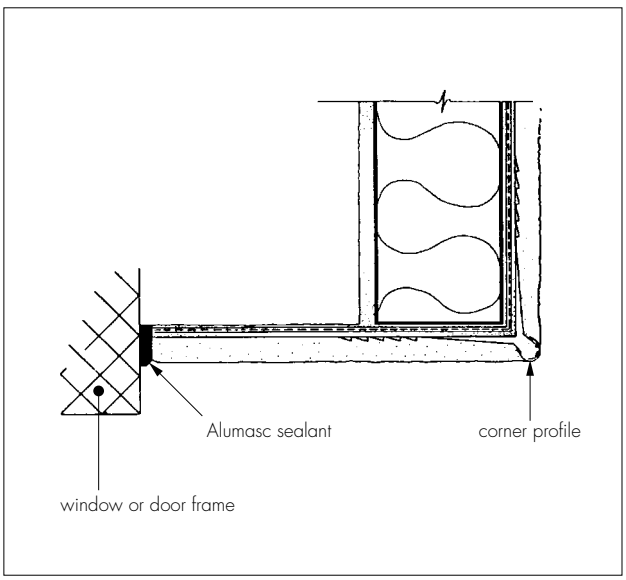


Figure 9 Insulated window or door reveal

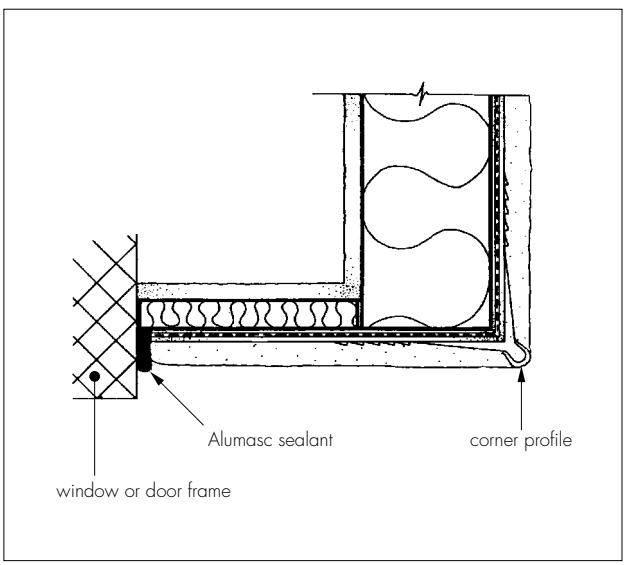
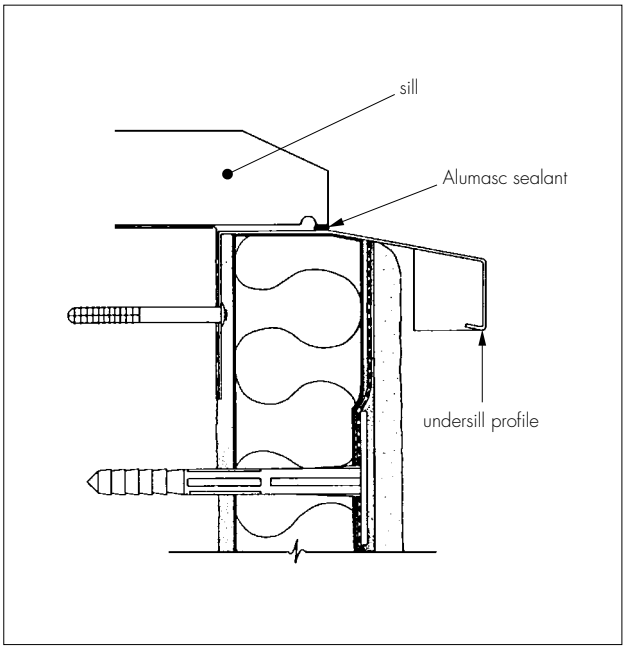


Figure 10 Typical sill detail



Technical Investigations

The following is a summary of the technical investigations carried out on the Swisslab Mineral Wool, Spar-Dash Render Finish, External Wall Insulation System.

9 Tests

9.1 Tests were carried out in accordance with MOAT No 22 : 1988 to determine:

component characterisation
heat/spray cycling
resistance to freeze/thaw
impact resistance
water absorption of render
water vapour permeability.

9.2 An examination was made of data relating to:

resistance to dynamic wind uplift[1]
flexural and compressive strength of MRS renders
fire propagation tests to BS 476-6 : 1989
surface spread of flame tests to BS 476-7 : 1987
pull-out strength of fixings
durability of finish
bond strength of MRS3, MRS5F and MRS7
thermal conductivity to BS 874-2.1 : 1986.

(1) Tests were conducted by the BBA generally in accordance with European Organisation for Technical Approvals draft ETAG *Guidelines for External Thermal Insulation Composite Systems with rendering*.

10 Other investigations

10.1 The manufacturing process, the methods adopted for quality control of manufacture and bought-in components and details of the quality and composition of the materials used, were examined.

10.2 A computer simulation of the risk of interstitial condensation was undertaken.

10.3 The practicability of installation and the effectiveness of detailing techniques were examined.

Health and safety

It is recommended that where mineral wool is being handled, appropriate protective clothing such as gloves and face masks should be worn at all times. Consideration should be given to the need to wear eye protection when manipulating slabs at or above bead height.

Bibliography

BS 476 *Fire tests on building materials and structures*
BS 476-4 : 1970(1984) *Non-combustibility test for materials*
BS 476-6 : 1989 *Method of test for fire propagation for products*
BS 476-7 : 1987 *Method for classification of the surface spread of flame of products*

BS 874 *Methods for determining thermal insulating properties*
BS 874-2 *Tests for thermal conductivity and related properties*
BS 874-2.1 : 1986 *Guarded hot-plate method*

BS 5262 : 1991 *Code of practice for external renderings*

BS 6399 *Loading for buildings*
BS 6399-2 : 1995 *Code of practice for wind loads*

BS 8000 *Workmanship on building sites*
BS 8000-10 : 1995 *Code of practice for plastering and rendering*

CP 3 *Code of basic data for the design of buildings*
CP 3 : Chapter V *Loadings*
CP 3 : Chapter V-2 : 1972 *Wind loads*

MOAT No 22 : 1988 *Directives for the Assessment of External Insulation Systems for Walls (Expanded Polystyrene Insulation Faced with a Thin Rendering)*

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

Date of Third issue: 15th February 2001

Chief Executive

**Original Detail Sheet issued 29th June 1993. This revised version includes change of Certificate holder's name and additional assessments of data in relation to dynamic wind upfift (suction).*

Appendix — System summary — Swisslab Mineral Wool, Spar-Dash Render Finish, External Wall Insulation System

1 System

Insulation

Mineral wool insulation slabs, dimensions 1200 mm × 600 mm in a range of thicknesses between 30 mm and 200 mm. Nominal densities 100 kgm^{-3} (crimped), 128 kgm^{-3}, 140 kgm^{-3} and 160 kgm^{-3} and typical compression resistance of 35 kPa, 50 kPa, 65 kPa and 75 kPa, respectively.

Fixings

Mechanical fixings approved by Alumasc Exterior Building Products Limited and the BBA.

MR bedding and scrim adhesives

Polymer-modified cement-based adhesives, supplied as powders to which water is added.

Reinforcing mesh

One metre wide mesh of multi-stranded alkali-resistant glass fibres, having a polymer coating and nominal weights of 150 gm^{-2} or 200 gm^{-2}.

MRS7 dashing render

A polymer-modified and fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available in a variety of colours as listed in section 1.1(5) of this Detail Sheet.

MR spar-dash aggregate

A spar-dash aggregate available in a range of colours to suit MRS7 render.

2 Thermal properties

Thermal conductivity of Swisslab mineral wool insulation slabs

0.034 $Wm^{-1}K^{-1}$ (for 100 kgm^{-3} density slabs)
0.035 $Wm^{-1}K^{-1}$ (for 128 kgm^{-3} density slabs)
0.035 $Wm^{-1}K^{-1}$ (for 140 kgm^{-3} density slabs)
0.036 $Wm^{-1}K^{-1}$ (for 160 kgm^{-3} density slabs)

U values

Using the values given in Table A15 of Approved Document L1 (1995 edition) to the Building Regulations 2000 (England and Wales), the thermal insulation values for a typical 225 mm brick external wall (density 1700 kgm^{-3}) with 10 mm plasterboard:

Insulation thickness (mm)	U value at insulation density 100 kgm^{-3} ($Wm^{-2}K^{-1}$)
30	0.66
40	0.55
50	0.48
60	0.42
75	0.35
100	0.28

3 Impact resistance

The Swisslab system is suitable for use where walls are exposed but have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the system may be exposed to severe impact, eg mechanical or malicious damage, precautions may be required to reduce the risk of damage.

4 Properties in relation to fire

The Swisslab system is not non-combustible to BS 476-4 : 1970(1984).

The system is classified Class 0 as defined in the appropriate Building Regulations.

5 Design wind loading and resistance to wind suction*

Assuming a sound substrate which will prohibit pull-out of the fixings below the maximum load, achieved through dynamic wind load testing for pattern A (2.5 kPa and 3.5 kPa). An example of loads applied to the dry-fix system at 10 metres and 50 metres can be calculated as explained below:

Previously, wind loading on a particular wall could be calculated in accordance with CP 3 : Chapter V-2 : 1972 *Wind loads*. This code of practice has been replaced by BS 6399-2 : 1995 *Code of practice for wind loads*. The new procedures involve specific site information and do not facilitate generalisations, or 'worst case' calculations. For this reason, this example is based on CP 3 : Chapter V-2. The pressure created by the action of the wind can be calculated from the following formulae:

$P = (C_{pe} - C_{pi})q$ . . . . . (i)

$q = K(V_s)^2$ . . . . . (ii)

$V_s = VS_1 S_2 S_3$ . . . . . (iii)

Where:

P = pressure

C_{pe} = external pressure coefficient . . . . (–1.0 at 10 m height . . . . . –1.1 at 50 m height)

C_{pi} = internal pressure coefficient . . . . (0.2 for both 10 m and . . . . . 50 m heights)

K = a constant

V_s = design wind speed

V = basic wind speed

S_1 = topography value . . . . . (from CP 3 = 1.0)

S_2 = ground roughness . . . . . (from CP 3 = 1.0 for 10 m height . . . . . and 1.4 m for 50 m height)

S_3 = statistical factor . . . . . (from CP 3 = 1.0)

q = the dynamic pressure

Using the above values and equation (i), (ii) and (iii) maximum wind suctions of 1.474 kPa at 10 m and 2.005 kPa at 50 m were calculated using a basic wind speed of 44 Ms^{-1}. The value obtained from dynamic wind load testing on the Swisslab dry-fix system was (2.5 kPa and 3.5 kPa) which would indicate a minimum safety factor of 1.7 and 1.3 using 50 mm diameter fixing heads, and 2.4 and 1.8 using 90 mm diameter fixing heads respectively.

*Inclusion of MR bedding adhesive between the insulation and the substrate which will considerably increase the resistance to wind suction.

6 Durability

Age of oldest installation — 7 years.

Assessed life — At least 30 years (with normal maintenance).

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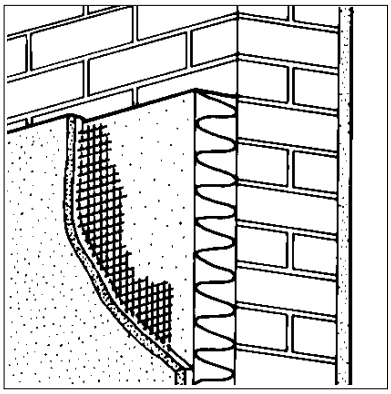
CI/SfB (21.9) Rn7 (M2)

Certificate No 93/2914

SWISSLAB PIR-MODIFIED URETHANE (CFC-FREE), SPAR-DASH RENDER FINISH, EXTERNAL WALL INSULATION SYSTEM

DETAIL SHEET 11
*Second issue**

Product



- *THIS DETAIL SHEET RELATES TO SWISSLAB PIR-MODIFIED URETHANE (CFC-FREE), SPAR-DASH RENDER FINISH, EXTERNAL WALL INSULATION SYSTEM, A SYSTEM EMPLOYING PIR-MODIFIED URETHANE INSULATION BOARDS, AND GLASS-FIBRE REINFORCING MESH WITH RENDER FINISHES.*
- *The system is applied to the outside of external walls of masonry, dense or no-fines concrete construction and is suitable for new or existing buildings.*
- *It is essential that the Swisslab system is installed and maintained in accordance with the conditions set out in the* Design Data *and* Installation *parts of this Detail Sheet.*
- *See the Appendix for system summary.*

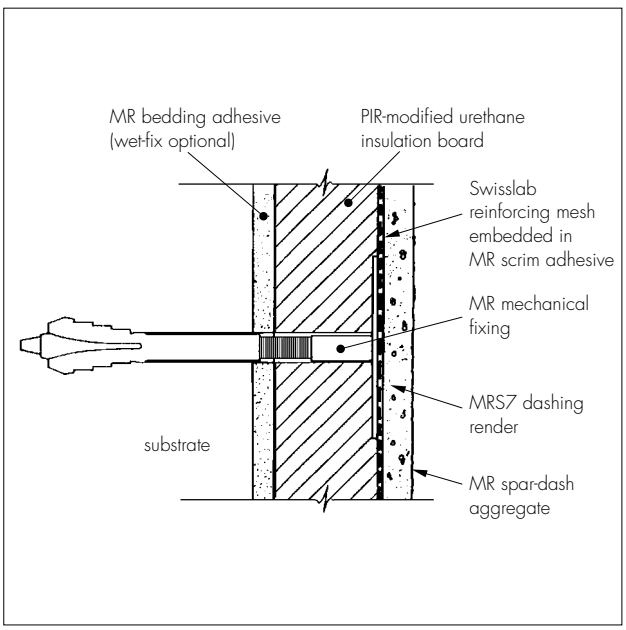
This Detail Sheet must be read in conjunction with the Front Sheets, which give the system's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification.

Technical Specification

1 Description

1.1 The Swisslab PIR-Modified Urethane (CFC-Free), Spar-Dash Render Finish, External Wall Insulation System (see Figure 1) comprises:

Figure 1 Components of the system



(1) Swisslab PIR-modified urethane insulation boards — 1200 mm by 600 mm in a range of thicknesses between 20 mm and 150 mm and with a minimum compressive strength of 175 kNm^{-2}. Boards of 15 mm thickness are also available for use in window reveals.

(2) MR mechanical fixings — mechanical fixings approved by the BBA and Alumasc Exterior Building Products Limited. Details of approved fixings may be obtained from the BBA.

(3) MR bedding and scrim adhesives — polymer-modified cement-based adhesives, supplied as powder to which water is added.

(4) Swisslab reinforcing mesh — a one metre wide mesh of multi-stranded alkali-resistant glass fibres, having a polymer coating and a nominal weight of 150 gm^{-2} or 200 gm^{-2}.

(5) MRS7 dashing render — a polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available coloured white, extra white, salmon, terracotta red, red, burgundy, gold, yellow, peach, grey, Scotland brown, light cream, cream, pink or extra pink. Other colours are available to order.

(6) MR spar-dash aggregate, available in a range of colours to suit the MRS7 render.

(7) Ancillary materials:

Alumasc profiles — a range of standard profiles for wall base, end stop, corner mesh, expansion joint, etc. Profiles are available in organic polyester-coated galvanized steel or stainless steel and are provided to the specifier's requirements and approved by the BBA and Alumasc Exterior Building Products Limited

MR profile fixings — driven pins with plastic expansion sleeves as approved by the BBA and Alumasc Exterior Building Products Limited

MR fir-tree fixings

Alumasc sealant — silicone mastic as approved by the BBA and Alumasc Exterior Building Products Limited

MR fungicidal wash

MR stabilising solution/bonding agent, and

MR plastic thickness gauge.

1.2 Swisslab PIR-modified urethane insulation boards may be mechanically fastened to the external surfaces of walls (dry-fix system). Alternatively, where it is necessary to provide a levelling coat (see section 8.7), insulation boards may be bonded to the external surfaces of walls using MR bedding adhesive and secured with mechanical fixings (wet-fix system). For both wet- and dry-fix systems there are two choices of fixing pattern (see Figure 2). When all the boards have been secured to the wall, MR scrim adhesive is trowel-applied to the insulation in a minimum thickness of 3 mm, and the reinforcing mesh is embedded in the adhesive. For installations above two storeys additional stainless steel fixings are applied through the reinforcing mesh and insulation boards and into the background at approximately one metre centres. The additional fixings are covered with square pieces of mesh embedded in more adhesive. MR plastic thickness gauges are pressed into the wet adhesive to ensure a correct coverage of MRS7 dashing render. When dry an 8 mm to 10 mm layer of the MRS7 dashing render is then applied and dry-dashed with MR spar-dash aggregate.

1.3 All components are subject to routine in-factory quality control.

2 Delivery and site storage

2.1 The insulation boards are delivered to site wrapped in polythene. Each pack carries the product identification and batch numbers.

2.2 Components are delivered to site in the packages and quantities as listed in Table 1. Each package carries the product identification, manufacturer's batch number and the BBA identification mark incorporating the number of this Certificate.

Table 1 Component supply details

Component	Quantity and package
MRS3 and MRS5F dubbing render	25 kg or 40 kg bags
MR fir-tree fixings	boxed by manufacturer
MR bedding and scrim adhesives	25 kg or 40 kg bags
MRS renders	25 kg or 40 kg bags
MR spar-dash aggregate	25 kg or 40 kg bags
MR mechanical fixings	boxed by manufacturer
MR stabilising solution/bonding agent	5 litre drum
MR fungicidal wash solution	5 litre drum
MR plastic thickness gauge	boxed by manufacturer

2.3 The Swisslab reinforcing mesh, one metre wide, is supplied in rolls of 50 metres.

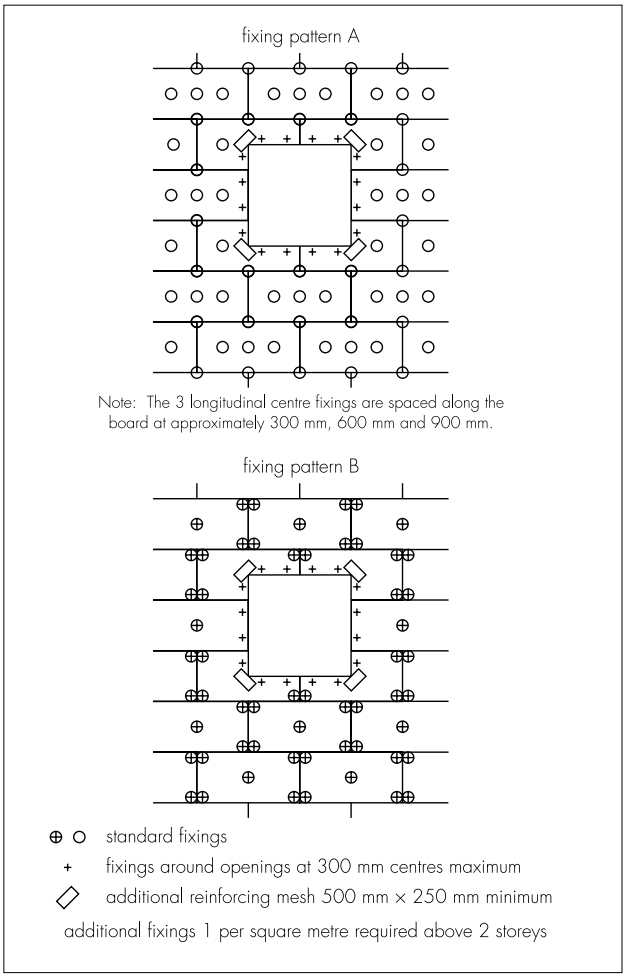
2.4 The PIR-modified urethane insulation boards should be stored on a firm, clean, level base, off the ground and must be protected from prolonged exposure to sunlight and rain either by storing in a safe area under cover or re-covering with opaque polythene sheeting. Opened packs must be protected from the weather.

2.5 Care must be taken when handling the insulation boards to avoid damage. The boards must not be exposed to open flame or other ignition sources.

2.6 The MR adhesives and renders are cementitious materials and must be stored in dry conditions, off the ground, and be protected from frost at all times.

2.7 The decorative MR spar-dash aggregate should be stored off the ground and protected with opaque polythene sheeting.

Figure 2 Insulation boards fixing pattern



Design Data

3 Strength and stability

3.1 The Swisslab PIR-Modified Urethane (CFC-Free), Spar-Dash Render Finish, External Wall Insulation System has adequate resistance to impact and abrasion where walls are exposed and have

some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the system may be exposed to severe impact, eg mechanical or malicious, precautions may be required to reduce the risk of damage. Heavyweight alkali resistant glass-fibre mesh can be used in high risk areas. Further guidance may be obtained from the Certificate holder and Building Research Establishment (BRE) Current Paper CP 6 : 81 *Assessment of external walls — Hard body impact resistance*.

3.2 Dynamic wind suction tests conducted by the BBA confirm that the dry-fix system (pattern A) using MR standard fixings with 50 mm diameter heads can withstand wind loads up to 2.5 kPa when installed in accordance with the manufacturer's instruction and the installation sections of this Certificate. The same dry-fix system using MR fixings with 90 mm diameter heads can withstand wind loads up to 3.5 kPa; with MR standard fixings with 50 mm diameter heads arranged in fixing pattern B (see Figure 2), it can withstand wind loads up to 2.0 kPa. Application of MR bedding adhesive to bond the insulation boards to the substrate (wet-fix system) will considerably increase the resistance of the system to dynamic wind suction loads.

3.3 For dry-fix system (pattern A) with fixings of 50 mm or 90 mm diameter heads the wind suction forces to be resisted on any particular site calculated in accordance with BS 6399-2 : 1995 or CP 3 : Chapter V-2 : 1972, including any required safety factor, would be less than 2.5 kPa and 3.5 kPa respectively. See section 5 of the Appendix to this Certificate, which includes example calculations based on general site assumptions.

4 Properties in relation to fire

4.1 In the opinion of the BBA the use of the system will not introduce any additional hazard in respect of behaviour in fire when compared with a system using traditional sand/cement render finishes.

4.2 The system is classified Class 0 as described in the national Building Regulations:

England and Wales

Approved Document B, Appendix A, paragraph 12

Scotland

Technical Standards, *deemed to satisfy provisions*, Part E, Table 2 to (E6.1)a

Northern Ireland

Technical Booklet E, paragraph 2.4.

4.3 Full scale multi-storey fire tests have been conducted in accordance with BRE Fire Note 9 *Assessing the fire performance of external cladding systems: a test method*.

4.4 The behaviour in fire of external wall insulation systems is the subject of recommendations by BRE. For this system, there are no recommendations for fire barriers or a height restriction of the building to be treated provided that:

(a) there are no cavities between the rear of the face of the insulation and the background, and

(b) Additional stainless fixings, one per square metre, are inserted through the reinforcing mesh and insulation and driven firmly into the background (see section 8.19).

5 Proximity of flues

When the system is installed in close proximity to certain flue pipes the relevant provisions of the national Building Regulations should be met:

England and Wales

Approved Document J

Scotland

Technical Standards, Part F

Northern Ireland

Technical Booklet L.

6 Thermal insulation

6.1 For the purpose of U value calculations to determine whether the requirements of the Building, or other statutory, Regulations are met, the thermal conductivity (λ value) of the insulation may be taken as 0.028 $Wm^{-1}K^{-1}$.

6.2 The requirement for limiting the heat loss through the building fabric will be satisfied if the U values of the building elements do not exceed the maximum values in the relevant Elemental Approach given in the national Building Regulations:

England and Wales

Approved Document L. The effect of thermal bridges should be taken into account.

Scotland

Technical Standards, Part J

Northern Ireland

Technical Booklet F.

6.3 Guidance is also given in these documents on selecting the thickness of insulation required to enable a wall to achieve the desired U value. Alternative approaches are also described which allow for some flexibility in design of U values for individual constructional elements.

6.4 Where insulation boards have not been continued into window or door reveals due to a lack of clearance there will be a risk of cold bridging at these points. Where door and window frames are to be replaced it is recommended that their size be adjusted to permit the reveals to be insulated.

6.5 Depending on constructional details, cold bridging can also occur at the eaves and at

ground-floor level, and care should be taken to minimise this, eg roof or loft insulation should continue over the wall head, ensuring that ventilation openings are not obstructed.

7 Durability

7.1 The results of accelerated ageing tests in accordance with MOAT No 22 : 1988 indicate that the system is durable. The system should remain effective for at least 30 years, provided any damage to the surface finish is repaired immediately, and regular maintenance is undertaken including checks on joints in the system and on external plumbing fitments to identify leakage of rainwater into the system, enabling steps to be taken to correct the defects.

7.2 MRS7 dashing render has been certificated for use over masonry substrates (since 26th August 1988) and as part of the Swisslab External Wall Insulation Systems (since 1st September 1988). Reference should be made to the BBA's website for the validity status of the relevant Certificates.

7.3 The spar-dash finish will break up the flow of water on the surface and reduce the risk of discolouration by water runs. The finish may become discoloured with time, the rate depending on the initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discolouration by algae and lichens may occur in particularly wet areas. The appearance can be restored using traditional methods (such as brushing and washing) suitable for sand/cement renders.

7.4 Render containing Portland cement may be subject to lime bloom. The occurrence of this may be reduced by avoiding application in adverse weather conditions. The effect is transient and less noticeable on lighter colours.

Installation

8 Procedure

General

8.1 Application is carried out in accordance with Alumasc Exterior Building Products Limited's current installation instructions.

8.2 The MR bedding adhesive, scrim adhesive and render coats must not be applied in rain or mist, at temperatures below 5°C or above 30°C, if exposure to frost is likely to occur during drying, or if the background or boards are already wet or frostbound.

8.3 All rendering should be in accordance with the relevant recommendations of BS 5262 : 1991.

8.4 MR adhesives and renders are mixed using a paddle mixer. Conventional concrete mixers are unsuitable. The products may be applied by trowel or machine spray.

Positioning and securing insulation boards

8.5 One coat of MR fungicidal wash followed by, if required, one coat of MR stabilising solution/bonding agent is applied by brush, roller or knapsack spray to the entire wall surface.

8.6 The Alumasc wall base profile is secured to the external wall above the damp-proof course using the approved profile fixings at approximately 300 mm centres (see Figure 3).

8.7 Stop beads are positioned vertically, eg at party wall positions where the adjoining house does not require treatment (see Figure 4).

Figure 3 Typical section at base level

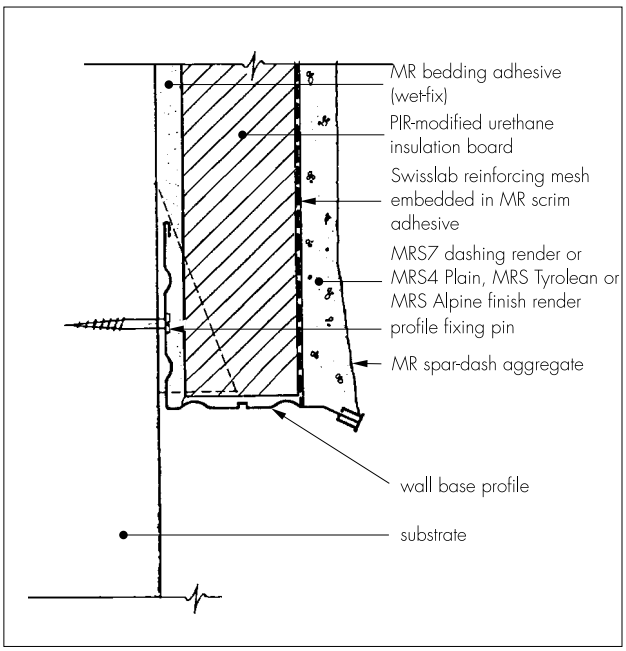
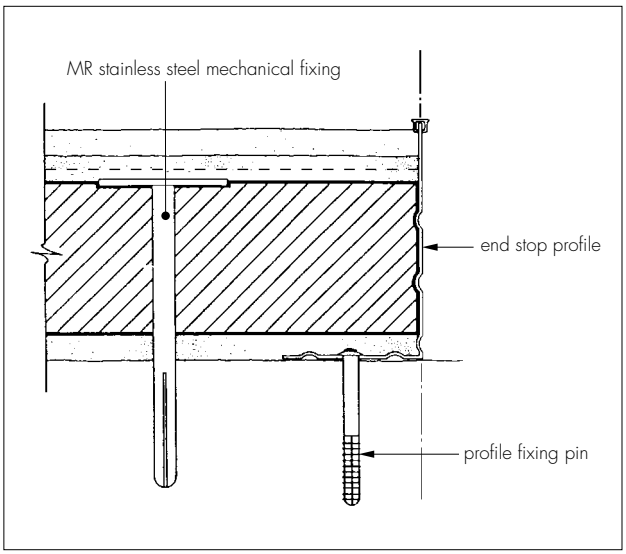


Figure 4 Typical end stop detail



8.8 To compensate for minor variations in the backing wall flatness, if required, MR bedding

adhesive (wet-fix system only) is prepared for use by mixing the contents of each 40 kg bag with 7 to 8 litres of cold, clean water. An electrically driven paddle mixer is used for a minimum of five minutes until a smooth, workable consistency is achieved. The material is left to stand for at least five minutes and again mixed for a further two minutes. A bed coat of MR bedding adhesive is applied to the entire surface to a minimum thickness of 6 mm and finished with a serrated trowel or comb.

8.9 The first run of insulation boards is positioned on the base profile. When using the wet-fix system boards are pressed firmly into the adhesive. Subsequent rows of boards are positioned so that the board joints are staggered and overlapped at the building corners and in such a manner that board joints do not occur within 200 mm from the corners of openings (see Figure 2). If required, the boards may be arranged with the longer edge positioned vertically.

8.10 For both dry- and wet-fix systems, the insulation boards are mechanically fastened to the wall using either fixing pattern A or B (see Figure 2). Holes are drilled into the substrate to a minimum depth of 50 mm and the mechanical fixings are inserted and tapped firmly into place, securing the insulation board to the substrate. Insulation boards may also be installed using the Swisslab Universal Fixing Pattern (see Detail Sheet 15).

8.11 Care must be taken to ensure that all board edges are butted tightly together, and alignment should be checked as work proceeds. Any high spots or irregularities should be removed by lightly planing with a rasp.

8.12 To fit around details such as doors and windows, insulation boards may be cut with a sharp knife or a fine-tooth saw. If required, purpose-made window sills are fitted. They are designed to prevent water ingress and incorporate drips to shed water clear of the system.

8.13 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits.

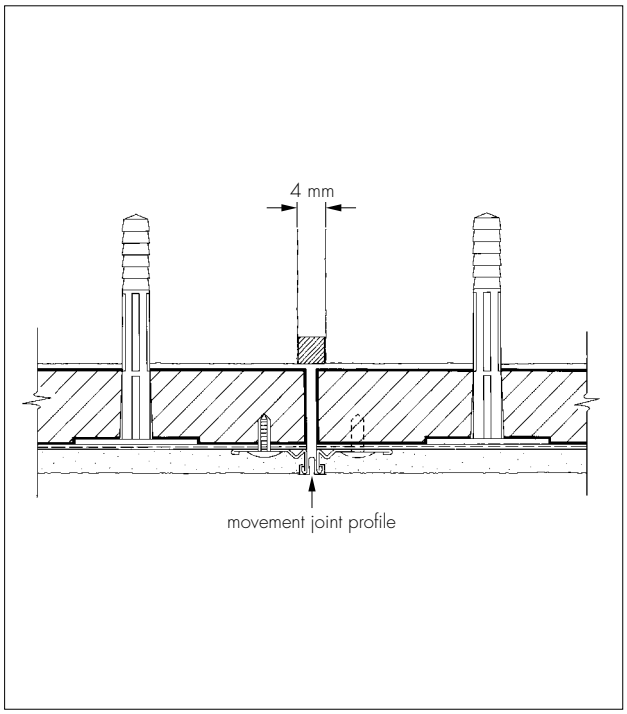
8.14 Mechanical fixings are positioned 300 mm apart around door and window details and 300 mm vertical centres at building corners. At corners, fixings should be positioned inwards by 75 mm plus the thickness of the insulation.

Movement joints and profiles

8.15 Movement joints in the substrate must be continued through the system. The joint detail using purpose-made metal trims is illustrated in Figure 5.

8.16 Expansion bead locations are marked vertically at agreed positions. The beads are positioned at approximately 7 m centres along a building, the centres depending on the individual requirements of each job.

Figure 5 Vertical movement joint detail



Reinforcing

8.17 The MR scrim adhesive is prepared as described in section 8.8 and a bed coat is trowel-applied to the surface of dry insulation boards to a minimum thickness of 3 mm.

8.18 An alkali-resisting glass-fibre mesh is bedded into the adhesive with 75 mm laps at joints. Extra mesh is used around openings (see Figure 2).

8.19 For installations above two storeys additional holes are drilled at one metre centres before the scrim adhesive hardens and stainless steel fixings are inserted through the mesh and tapped firmly home. The fixings are then covered with MR scrim adhesive and square pieces of mesh measuring no less than 150 mm by 150 mm.

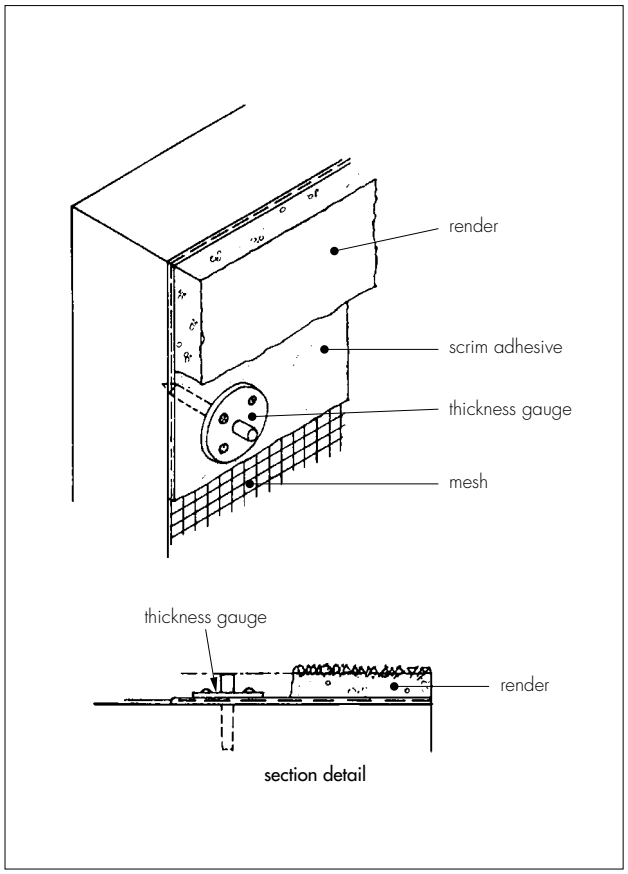
8.20 A thickness gauge is pressed into the mesh and scrim adhesive while the adhesive is still wet. The gauge is used to determine the thickness of the following render coat. It is designed so that the disc sits on the surface with a small amount of adhesive compressed into the holes (see Figure 6).

8.21 Prior to the render coat, a bead of silicone rubber mastic is gun-applied at window and door frames, overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

Rendering and finishing

8.22 Expansion beads are fixed vertically at the agreed positions. Angle beads are fixed to all building corners and to windows, door heads and jambs. The profiles are fixed using MR fir-tree fixings at maximum 300 mm centres.

Figure 6 Render thickness gauge



8.23 The drying period of any render will depend on weather conditions; however, the scrim adhesive must be left to harden and dry for at least one day before application of any render coat.

8.24 The MRS7 dashing render is prepared using the same procedures as for the bedding adhesive (see section 8.9) by mixing the contents of each 40 kg bag with approximately 8 to 9 litres of water. Care must be taken to ensure an even dispersion of the resin and fibre reinforcement.

8.25 One coat of MRS7 is applied to a minimum thickness of 8 mm. A minimum of three bags of suitable spar-dash aggregate should be emptied into a clean wheelbarrow or tub and any excess water allowed to drain away before being mixed thoroughly. While the render is still soft, selected clean spar aggregate is thrown or sprayed onto the surface. On completion, the surface must be checked to ensure an even coverage of spar-dash has been achieved. Where necessary the aggregate should be lightly tamped to ensure that a good bond is achieved.

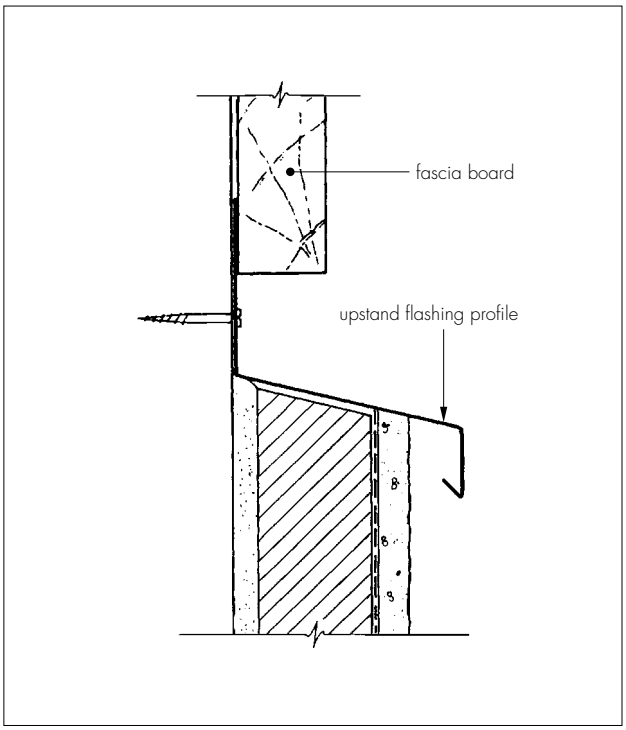
8.26 To prevent the renders from drying too rapidly they should not be applied in direct sunlight. Continuous surfaces must be completed without a break.

8.27 After application care must be taken to protect the finish from direct sunlight, drying winds, rain, mist and cold (less than 5°C on a falling thermometer) to prevent the drying time from being too rapid or excessively prolonged.

8.28 For all rendering and application of finishing coats continuous surfaces should be completed without a break.

8.29 At the tops of walls the system must be protected by an adequate overhang or by an adequately sealed purpose-made flashing (see Figure 7).

Figure 7 Typical eaves detail



8.30 Care must be taken in the detailing of the system around openings and projections (see Figures 8, 9 and 10).

8.31 On completion of the installation, external fittings, eg rainwater goods, are re-fixed through the system into the substrate.

Figure 8 External corner detail

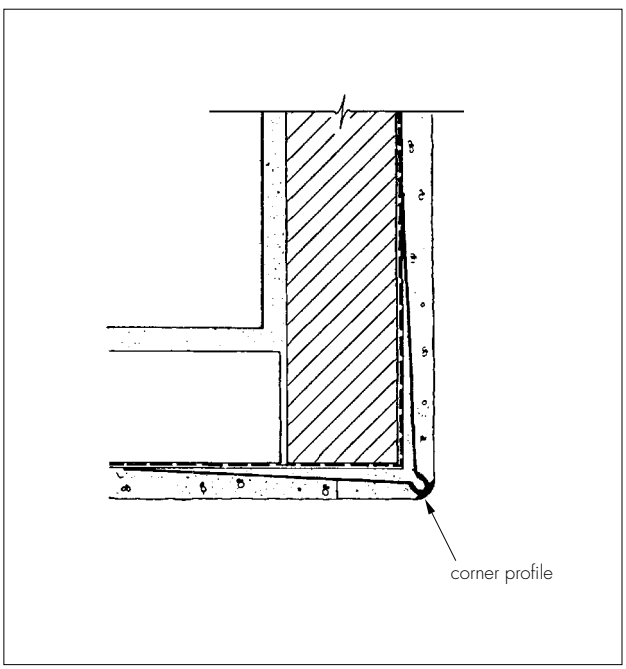


Figure 9 Uninsulated window or door reveal

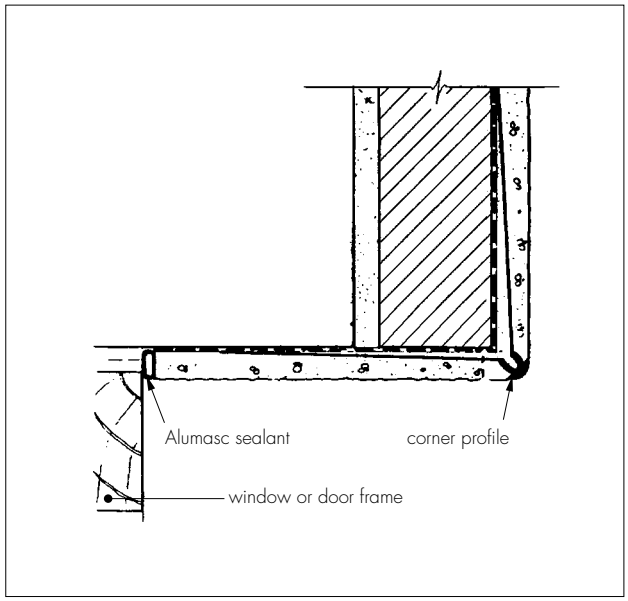
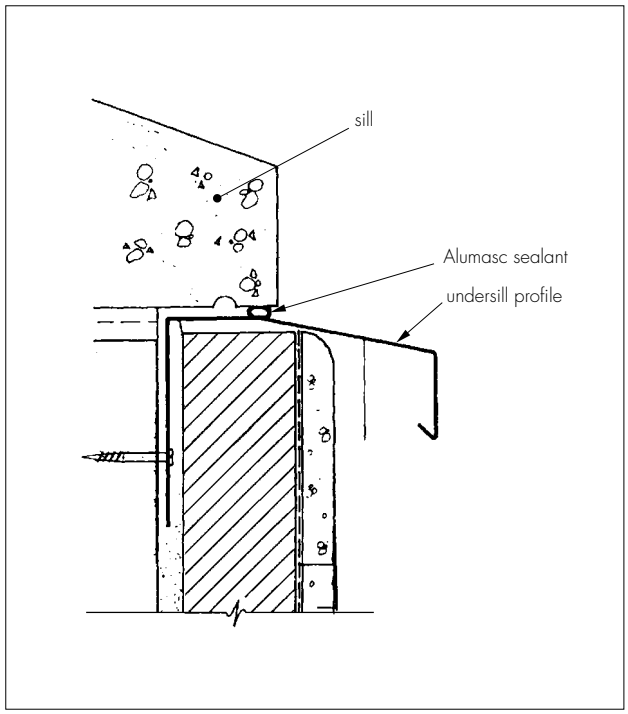


Figure 10 Typical sill detail



Technical Investigations

The following is a summary of the technical investigations carried out on the Swisslab PIR-Modified Urethane (CFC-free), Spar-Dash Render Finish, External Wall Insulation System.

9 Tests

9.1 Tests were carried out in accordance with MOAT No 22 : 1988 to determine:

component characterisation
heat/spray cycling
resistance to freeze/thaw
impact resistance
water absorption of render
water vapour permeability.

9.2 An examination was made of data relating to:

resistance to dynamic wind uplift(1)
flexural and compressive strength of renders
multi-storey tests conducted in accordance with BRE Fire Note 9
fire propagation tests to BS 476-6 : 1989
surface spread of flame tests to BS 476-7 : 1987
pull-out strength of fixings
durability of finish
bond strength of MRS3, MRS5F and MRS7
thermal conductivity to BS 874-2.1 : 1986.

(1) Tests were conducted by the BBA generally in accordance with European Organisation for Technical Approvals draft ETAG *Guidelines for External Thermal Insulation Composite Systems with rendering.*

10 Other investigations

10.1 The manufacturing process, the methods adopted for quality control of manufacture and bought-in components and details of the quality and composition of the materials used, were examined.

10.2 A computer simulation of the risk of interstitial condensation was undertaken.

10.3 The practicability of installation and the effectiveness of detailing techniques were examined.

Bibliography

BS 476 *Fire tests on building materials and structures*
BS 476-4 : 1970(1984) *Non-combustibility test for materials*
BS 476-6 : 1989 *Method of test for fire propagation for products*
BS 476-7 : 1987 *Method for classification of the surface spread of flame of products*

BS 874 *Methods for determining thermal insulation properties*
BS 874-2 *Tests for thermal conductivity and related properties*
BS 874-2.1 : 1986 *Guarded hot-plate method*

BS 5262 : 1991 *Code of practice for external renderings*

BS 6399 *Loading for buildings*
BS 6399-2 : 1995 *Code of practice for wind loads*

BS 8000 *Workmanship on building sites*
BS 8000-10 : 1995 *Code of practice for plastering and rendering*

CP 3 *Code of basic data for the design of buildings*
CP 3 : Chapter V *Loadings*
CP 3 : Chapter V-2 : 1972 *Wind loads*

MOAT No 22 : 1988 *Directives for the Assessment of External Insulation Systems for Walls (Expanded Polystyrene Insulation Faced with a Thin Rendering)*

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

Date of Second issue: 15th February 2001

Chief Executive

**Original Detail Sheet issued 23rd December 1994. This revised version includes change of Certificate holder's name, and additional assessments of data in relation to dynamic wind uplift (suction) and multi-storey fire tests.*

Appendix — System summary — Swisslab PIR-Modified Urethane (CFC-Free), Spar-Dash Render Finish, External Wall Insulation System

1 System

Insulation

PIR-modified urethane insulation boards, dimensions 1200 mm × 600 mm in a range of thicknesses between 20 mm and 150 mm. Minimum compressive strength of 172 kNm^{-2}. Boards of 15 mm thickness are also available for use in window reveals.

Fixings

Mechanical fixings approved by Alumasc Exterior Building Products Limited and the BBA.

MR bedding and scrim adhesives

Polymer-modified cement-based adhesives, supplied as powders to which water is added.

Reinforcing mesh

One metre wide mesh of multi-stranded alkali-resistant glass fibres, having a polymer coating and nominal weights of 150 gm^{-2} or 200 gm^{-2}.

MRS7 dashing render

A polymer-modified and fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available in a variety of colours as listed in section 1.1(5) of this Detail Sheet.

MR spar-dash aggregate

A spar-dash aggregate available in a range of colours to suit MRS7 render.

2 Thermal properties

Thermal conductivity of Swisslab PIR-modified urethane insulation boards

0.028 $Wm^{-1}K^{-1}$

U values

Using the values given in Table A15 of Approved Document L1 (1995 edition) to the Building Regulations 2000 (England and Wales), the thermal insulation values for a typical 225 mm brick external wall (density 1700 kgm^{-3}) with 10 mm plasterboard:

Insulation thickness (mm)	U value ($Wm^{-2}K^{-1}$)
25	0.66
30	0.59
35	0.53
40	0.49
45	0.45
50	0.41
55	0.39
60	0.36
65	0.34
70	0.32
75	0.30
80	0.29

3 Impact resistance

The Swisslab system is suitable for use where walls are exposed but have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the system may be exposed to severe impact, eg mechanical or malicious damage, precautions may be required to reduce the risk of damage.

4 Properties in relation to fire

The Swisslab system is not non-combustible to BS 476-4 : 1970(1984).

The system is classified Class 0 as defined in the appropriate Building Regulations.

Full scale multi-storey fire tests have been conducted in accordance with BRE Fire Note 9.

Fire barriers are not required for this system.

5 Design wind loading and resistance to wind suction*

Assuming a sound substrate which will prohibit pull-out of the fixings below the maximum load achieved through dynamic wind load testing for pattern A (2.5 kPa and 3.5 kPa). An example of loads applied to the dry-fix system at 10 metres and 50 metres can be calculated as explained below:

Previously, wind loading on a particular wall could be calculated in accordance with CP 3 : Chapter V-2 : 1972 *Wind loads*. This code of practice has been replaced by BS 6399-2 : 1995 *Code of practice for wind loads*. The new procedures involve specific site information and do not facilitate generalisations, or 'worst case' calculations. For this reason, this example is based on CP 3 : Chapter V-2. The pressure created by the action of the wind can be calculated from the following formulae:

$P = (C_{pe} - C_{pi})q$ . . . . . (i)

$q = K(V_s)^2$ . . . . . (ii)

$V_s = VS_1 S_2 S_3$ . . . . . (iii)

Where:

P = pressure

C_{pe} = external pressure coefficient . . . . (–1.0 at 10 m height . . . . . –1.1 at 50 m height)

C_{pi} = internal pressure coefficient . . . . (0.2 for both 10 m and . . . . . 50 m heights)

K = a constant

V_s = design wind speed

V = basic wind speed

S_1 = topography value . . . . . (from CP 3 = 1.0)

S_2 = ground roughness . . . . . (from CP 3 = 1.0 for 10 m height . . . . . and 1.4 m for 50 m height)

S_3 = statistical factor . . . . . (from CP 3 = 1.0)

q = the dynamic pressure

Using the above values and equation (i), (ii) and (iii) maximum wind suctions of 1.474 kPa at 10 m and 2.005 kPa at 50 m were calculated using a basic wind speed of 44 Ms^{-1}. The value obtained from dynamic wind load testing on the Swisslab dry-fix system was 2.5 kPa and 3.5 kPa which would indicate a minimum safety factor of 1.7 and 1.3 using 50 mm diameter fixing heads and 2.4 and 1.8 using 90 mm diameter fixing heads respectively.

*Inclusion of MR bedding adhesive between the insulation and the substrate which will considerably increase the resistance to wind suction.

6 Durability

Age of oldest insulation — 7 years.

Assessed life — At least 30 years (with normal maintenance).

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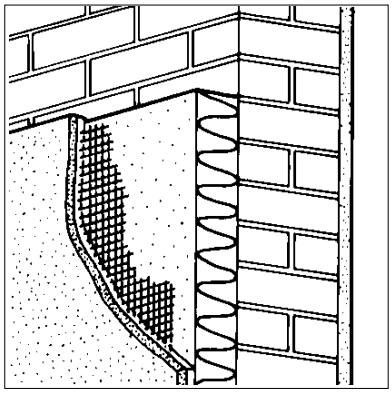
Certificate No 93/2914

SWISSLAB PHENOLIC (CFC- AND HCFC-FREE) AND MRS RENDER FINISHES, EXTERNAL WALL INSULATION SYSTEMS

DETAIL SHEET 12
*Second issue**

Product



- *THIS DETAIL SHEET RELATES TO SWISSLAB PHENOLIC (CFC- AND HCFC-FREE) AND MRS RENDER FINISHES, EXTERNAL WALL INSULATION SYSTEMS, SYSTEMS WHICH EMPLOY PHENOLIC INSULATION BOARDS, AND GLASS-FIBRE REINFORCING MESH WITH RENDER FINISHES.*
- *The systems are applied to the outside of external walls of masonry, dense or no-fines concrete construction and are suitable for new or existing buildings.*
- *It is essential that the Swisslab systems are installed and maintained in accordance with the conditions set out in the* Design Data *and* Installation *parts of this Detail Sheet.*
- *See the Appendix for system summary.*

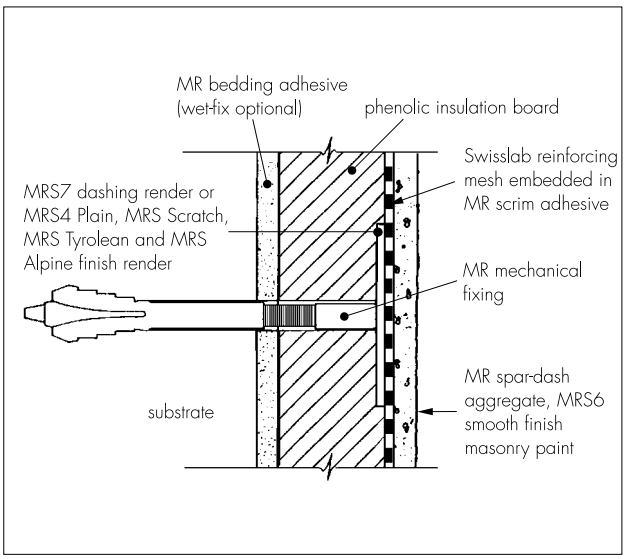
This Detail Sheet must be read in conjunction with the Front Sheets, which give the system's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification.

Technical Specification

1 Description

1.1 The Swisslab Phenolic (CFC- and HCFC-Free) and MRS Render Finishes, External Wall Insulation Systems (see Figure 1) comprise:

Figure 1 Components of the system



(1) Swisslab phenolic insulation boards — 1200 mm by 600 mm in a range of thicknesses between 25 mm and 150 mm, with a nominal density of 40 kgm^{-3} and a minimum compressive strength of 120 kNm^{-2}. Boards of 15 mm thickness are also available for use in window reveals.

(2) MR mechanical fixings — mechanical fixings approved by the BBA and Alumasc Exterior Building Products Limited. Details of approved fixings may be obtained from the BBA.

(3) MR bedding and scrim adhesives — polymer-modified cement-based adhesive, supplied as powders to which water is added.

(4) Swisslab reinforcing mesh — a one metre wide mesh of multi-stranded alkali-resistant glass fibres, having a polymer coating and a nominal weight of 150 gm^{-2} or 200 gm^{-2}.

(5) MRS7 dashing render — a polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available coloured white, extra white, salmon, terracotta red, red, burgundy, gold, yellow, peach, grey, Scotland brown, light cream, cream, extra pink or pink. Other colours are available to order.

(6) The decorative MR spar-dash aggregate is available in a range of colours to suit the MRS7 render.

(7) MRS4 Plain, MRS Scratch, MRS Tyrolean, and MRS Alpine finish render — a polymer-modified fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available in the colours listed in section 1.1(5).

(8) MRS6 smooth finish masonry paint — a polymer-based smooth-finish decorative coating applied by brush or roller and available in a range of colours to suit MRS4 render.

(9) Ancillary materials:

Alumasc profiles — a range of standard profiles for wall base, end stop, corner mesh, expansion joint, etc. Profiles are available in organic polyester-coated galvanized steel or stainless steel and are provided to the specifier's requirements and approved by the BBA and Alumasc Exterior Building Products Limited

MR profile fixings — driven pins with plastic expansion sleeves as approved by the BBA and Alumasc Exterior Building Products Limited

MR fir-tree fixings

Alumasc sealant — silicone mastic as approved by the BBA and Alumasc Exterior Building Products Limited

MR fungicidal wash

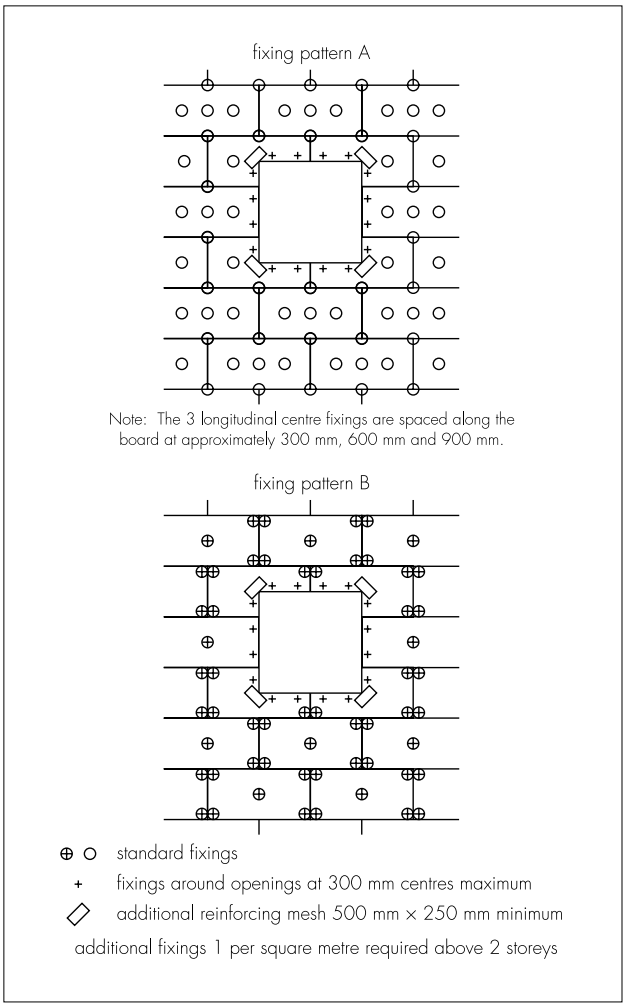
MR stabilising solution/bonding agent, and

MR plastic thickness gauge.

1.2 Swisslab phenolic insulation boards may be mechanically fastened to the external surfaces of walls (dry-fix system). Alternatively, where it is necessary to provide a levelling coat (see section 8.9), insulation boards may be bonded to the external surfaces of walls using MR bedding adhesive and secured with mechanical fixings (wet-fix system). For both wet- and dry-fix systems there are two choices of fixing pattern (see Figure 2). When all the boards have been secured to the wall, MR scrim adhesive is trowel-applied to the insulation in a minimum thickness of 3 mm, and the reinforcing mesh is embedded in the adhesive. For installations above two storeys additional stainless steel fixings are applied through the reinforcing mesh and insulation boards and into the background at approximately one metre centres. The additional fixings are covered with square pieces of mesh embedded in more adhesive. The adhesive coat is allowed to dry prior to application of the render coats and selected finishes.

1.3 All components are subject to routine in-factory quality control.

Figure 2 Insulation boards fixing pattern



2 Delivery and site storage

2.1 The insulation boards are delivered to site wrapped in polythene. Each pack carries the product identification and batch numbers.

2.2 Components are delivered to site in the packages and quantities as listed in Table 1. Each package carries the product identification, manufacturer's batch number and the BBA identification mark incorporating the number of this Certificate.

Table 1 Component supply details

Component	Quantity and package
MR bedding and scrim adhesives	25 kg or 40 kg bag
MRS renders	25 kg or 40 kg bag
MRS6 smooth finish masonry paint	10 litre drum
MR spar-dash aggregate	25 kg or 40 kg bag
MR mechanical fixings	boxed by manufacturer
MR plastic thickness gauge	boxed by manufacturer
MR fir-tree fixings	boxed by manufacturer
MR stabilising solution/bonding agent	5 litre drum
MR fungicidal wash	5 litre drum

2.3 The Swisslab reinforcing mesh, one metre wide, is supplied in rolls of 50 metres.

2.4 The phenolic insulation boards should be stored on a firm, clean, level base, off the ground

and must be protected from prolonged exposure to sunlight or rain either by storing in a safe area under cover or re-covering with opaque polythene sheeting. Open packs must be protected from the weather.

2.5 Care must be taken when handling the insulation boards to avoid damage. The boards must not be exposed to open flame or other ignition sources.

2.6 The MR adhesives and renders are cementitious materials and must be stored in dry conditions, off the ground, and be protected from frost at all times.

2.7 The decorative MR spar-dash aggregate should be stored off the ground and protected with opaque polythene sheeting.

2.8 MRS6 smooth finish masonry paint should be stored in a safe area under cover and protected from excessive heat and frost at all times.

Design Data

3 Strength and stability

3.1 The Swisslab Phenolic (CFC- and HCFC-Free) and MRS Finishes, External Wall Insulation Systems have adequate resistance to impact and abrasion where walls are exposed and have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the systems may be exposed to severe impact, eg mechanical or malicious, precautions may be required to reduce the risk of damage. Heavyweight alkali-resistant glass-fibre mesh can be used in high risk areas. Further guidance may be obtained from the Certificate holder and Building Research Establishment (BRE) Current Paper CP 6 : 81 *Assessment of external walls — Hard body impact resistance*.

3.2 Dynamic wind suction tests conducted by the BBA confirm that the dry-fix system (pattern A) using MR standard fixings with 50 mm diameter heads can withstand wind loads up to 2.5 kPa when installed in accordance with the manufacturer's instruction and the installation sections of this Certificate. The same dry-fix system using 90 mm diameter fixing heads can withstand wind loads up to 3.5 kPa. Fixing pattern B using MR standard 50 mm diameter fixing heads can withstand wind loads up to 2.0 kPa. Application of MR bedding adhesive to bond the insulation boards to the substrate (wet-fix system) will considerably increase the resistance of the system to dynamic wind suction loads.

3.3 For the dry-fix system (pattern A), with fixings of 50 mm or 90 mm diameter heads the wind suction forces to be resisted on any particular site calculated in accordance with BS 6399-2 : 1995 or CP 3 : Chapter V-2 : 1972, including any required safety factor, would be less than 2.5 kPa and 3.5 kPa respectively (see section 5 of the Appendix to this Certificate, which includes example calculations based on general site assumptions).

4 Properties in relation to fire

4.1 In the opinion of the BBA the use of the system will not introduce any additional hazard in respect of behaviour in fire when compared with a system using traditional sand/cement render finishes.

4.2 The system is classified Class 0 as described in the national Building Regulations:

England and Wales

Approved Document B, Appendix A, paragraph 12

Scotland

Technical Standards, *deemed to satisfy provisions*, Part E, Table 2 to (E6.1)a

Northern Ireland

Technical Booklet E, paragraph 2.4.

4.3 Full scale multi-storey fire tests have been conducted in accordance with BRE Fire Note 9 *Assessing the fire performance of external cladding systems: a test method.*

4.4 The behaviour in fire of external wall insulation systems is the subject of recommendations by BRE. For this system, there are no recommendations for fire barriers or a height restriction of the building to be treated provided that:

(a) there are no cavities between the rear of the face of the insulation and the background, and

(b) Additional stainless steel fixings, one per square metre, must be inserted through the reinforcing mesh and insulation and driven firmly into the background (see section 8.19).

5 Proximity of flues

When a system is installed in close proximity to certain flue pipes the relevant provisions of the national Building Regulation should be met:

England and Wales

Approved Document J

Scotland

Technical Standards, Part F

Northern Ireland

Technical Booklet L.

6 Thermal insulation

6.1 For the purpose of U value calculations to determine if the requirements of the Building, or other statutory, Regulations are met, the thermal conductivity (λ value) of the insulation may be taken as 0.019 $Wm^{-1}K^{-1}$.

6.2 The requirement for limiting the heat loss through the building fabric will be satisfied if the U values of the building elements do not exceed the maximum values in the relevant Elemental

Approach given in the national Building Regulations:

England and Wales

Approved Document L. The effect of thermal bridges should be taken into account

Scotland

Technical Standards, Part J

Northern Ireland

Technical Booklet F.

6.3 Guidance is also given in these documents on selecting the thickness of insulation required to enable a wall to achieve the desired U value. Alternative approaches are also described which allow for some flexibility in design of U values for individual constructional elements.

6.4 Where insulation boards have not been continued into window or door reveals due to a lack of clearance there will be a risk of cold bridging at these points. Where door and window frames are to be replaced it is recommended that their size be adjusted to permit the reveals to be insulated.

6.5 Depending on constructional details, cold bridging can also occur at the eaves and at ground-floor level, and care should be taken to minimise this, eg roof or loft insulation should continue over the wall head, ensuring that ventilation openings are not obstructed.

7 Durability

7.1 The results of accelerated ageing tests in accordance with MOAT No 22 : 1988 indicate that the system is durable. The system should remain effective for at least 30 years, provided any damage to the surface finish is repaired immediately, and regular maintenance is undertaken including checks on joints in the system and on external plumbing fitments to identify leakage of rainwater into the system, enabling steps to be taken to correct the defects.

7.2 MRS7 dashing render finish has been certified for use over masonry substrates (since 26th August 1988) and as part of the Swisslab External Wall Insulation Systems (since 1st September 1988).

7.3 MRS4 render with MRS6 smooth finish masonry paint has been certificated for use as part of the Swisslab External Wall Insulation Systems (since 1st September 1988). MRS6 has been certificated as a smooth finish masonry paint for use over specified masonry or render substrates (since 23rd September 1988).

7.4 Reference should be made to the BBA's website for the validity status of the relevant Certificates.

7.5 The spar-dash finish will break up the flow of water on the surface and reduce the risk of discolouration by water runs.

7.6 The decorative finishes may become discoloured with time, the rate depending on the initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discolouration by algae and lichens may occur in particularly wet areas. The appearance of MRS7 can be restored using traditional cleaning methods (such as brushing or washing) suitable for sand/cement renders. The appearance of MRS6 can be restored by a further application of finish. The advice of the Certificate holder should be sought.

7.7 Render containing Portland cement may be subject to lime bloom. The occurrence of this may be reduced by avoiding application in adverse weather conditions. The effect is transient and less noticeable on lighter colours.

Installation

8 Procedure

General

8.1 Application is carried out in accordance with Alumasc Exterior Building Products Limited's current installation instructions.

8.2 The MR bedding adhesive, scrim adhesive and render coats must not be applied in rain or mist, at temperatures below 5°C or above 30°C, if exposure to frost is likely to occur during drying, or if the background or boards are already wet or frostbound.

8.3 All rendering should be in accordance with the relevant recommendations of BS 5262 : 1991.

8.4 MR adhesives and renders are mixed using a paddle mixer. Conventional concrete mixers are unsuitable. The products may be applied by trowel or a machine spray.

Positioning and securing insulation boards

8.5 One coat of MR fungicidal wash followed by, if required, one coat of MR stabilising solution/ bonding agent is applied by brush, roller or knapsack spray to the entire wall surface.

8.6 The Alumasc wall base profile is secured to the external wall above the damp-proof course using the approved profile fixings at approximately 300 mm centres (see Figure 3).

8.7 Stop beads are positioned vertically, such as at party wall positions where the adjoining house does not require treatment (see Figure 4).

Figure 3 Typical section at base level

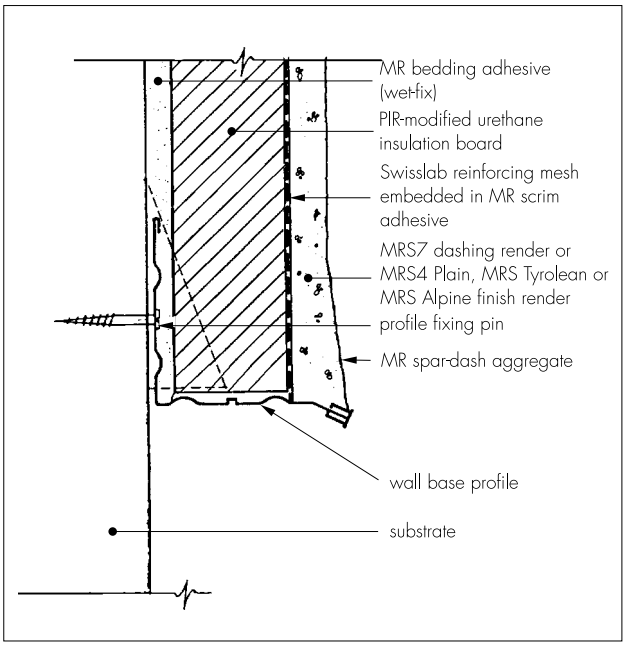
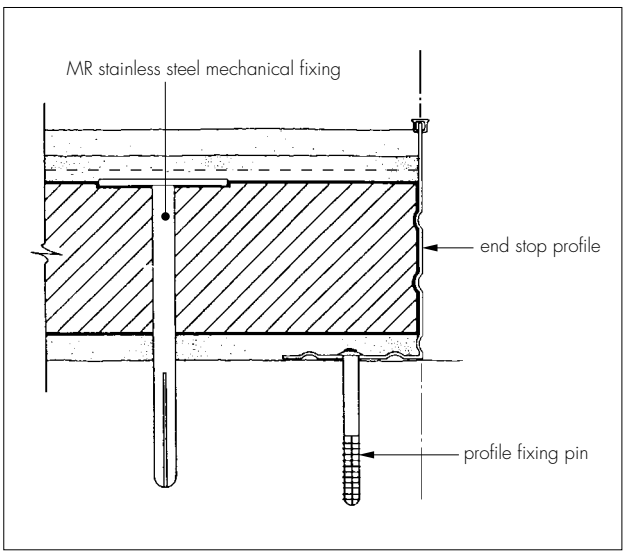


Figure 4 Typical end stop detail



8.8 To compensate for minor variations in the backing wall flatness, if required, MR bedding adhesive (wet-fix system only) is prepared for use by mixing the contents of each 40 kg bag with 7 to 8 litres of cold, clean water. An electrically driven paddle mixer is used for a minimum of five minutes until a smooth, workable consistency is achieved. The material is left to stand for at least five minutes and again mixed for a further two minutes. A bed coat of MR bedding adhesive is applied to the entire surface to a minimum thickness of 6 mm and finished with a serrated trowel or comb.

8.9 The first run of insulation boards is positioned on the base profile. When using the wet-fix system boards are pressed firmly into the adhesive. Subsequent rows of boards are positioned so that the board joints are staggered and overlapped at the building corners and in such a manner that board joints do not occur within 200 mm of the corners of openings (see Figure 2). If required, the boards may be arranged with the longer edge positioned vertically.

8.10 For both dry- and wet-fix systems, the insulation boards are mechanically fastened to the wall using either fixing pattern A or B (see Figure 2). Holes are drilled into the substrate to a minimum depth of 50 mm and the mechanical fixings are inserted and tapped firmly into place, securing the insulation board to the substrate. Insulation boards may also be installed using the Swisslab Universal Fixing Pattern (see Detail Sheet 15).

8.11 Care must be taken to ensure that all board edges are butted tightly together, and alignment should be checked as work proceeds. Any high spots or irregularities should be removed by lightly planing with a rasp.

8.12 To fit around details such as doors and windows, insulation boards may be cut with a sharp knife or a fine-tooth saw. If required, purpose-made window sills are fitted. They are designed to prevent water ingress and incorporate drips to shed water clear of the system.

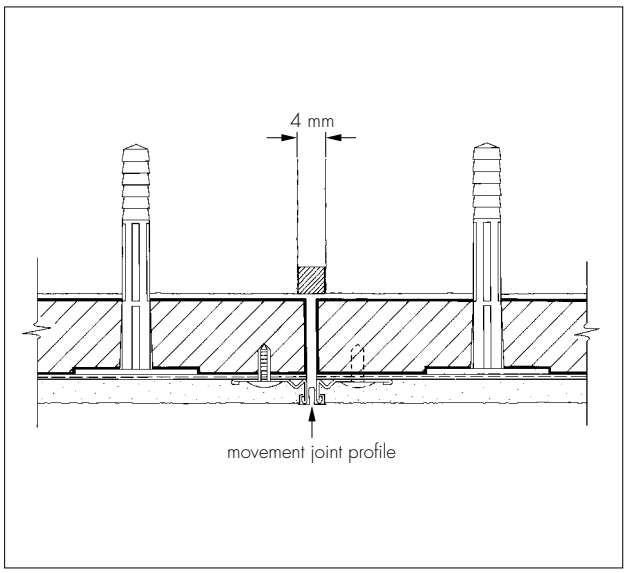
8.13 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits.

8.14 Mechanical fixings are positioned 300 mm apart around door and window details and 300 mm vertical centres at building corners. At corners, fixings should be positioned inwards by 75 mm plus the thickness of the insulation.

Movement joints and profiles

8.15 Movement joints in the substrate must be continued through the system. The joint detail using purpose-made metal trims is illustrated in Figure 5.

Figure 5 Vertical movement joint detail



8.16 Expansion bead locations are marked vertically in agreed positions. These beads are positioned at approximately 7 m centres along a

building, the centres depending on the individual requirements of each job.

Reinforcing

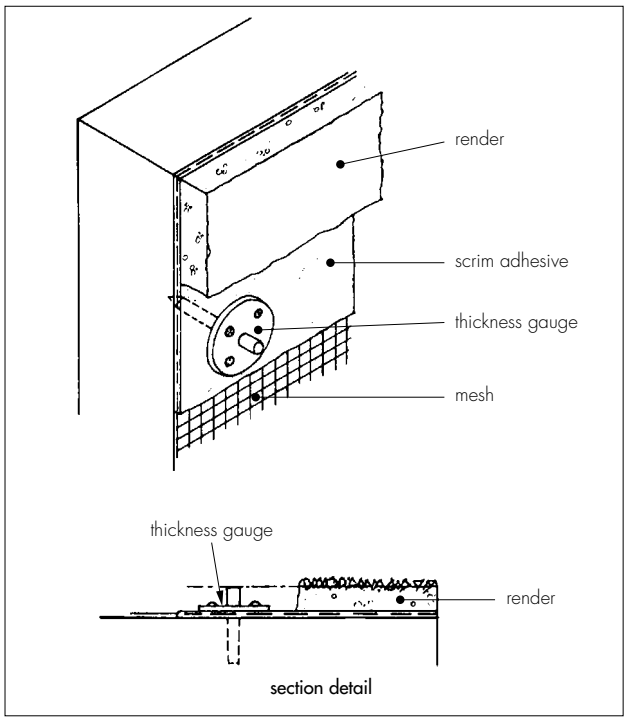
8.17 The MR scrim adhesive is prepared as described in section 8.8 and a bed coat is trowel-applied to the surface of dry insulation boards to a minimum thickness of 3 mm.

8.18 An alkali-resisting glass-fibre mesh is bedded into the adhesive with 75 mm laps at joints. Extra mesh is used around openings (see Figure 2).

8.19 For installations above two storeys additional holes are drilled at one metre centres before the scrim adhesive hardens and stainless steel fixings are inserted through the mesh and tapped firmly home. The fixings are then covered with MR scrim adhesive and square pieces of mesh measuring no less than 150 mm by 150 mm.

8.20 If a spar-dash finish is required, a thickness gauge is pressed into the mesh and scrim adhesive while the adhesive is still wet. The gauge is used to determine the thickness of the following render coat. It is designed so that the disc sits on the surface with a small amount of adhesive compressed into the holes (see Figure 6).

Figure 6 Render thickness gauge



8.21 Prior to the render coat, a bead of silicone rubber mastic is gun-applied at window and door frames, overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

Rendering and finishing

8.22 Expansion beads are fitted at agreed positions. Angle beads are fixed to all building corners and to door and window heads and jambs. The profiles are fixed using MR fir-tree fixings at maximum 300 mm centres.

8.23 Angle beads are fixed to all building corners and to door and window heads and jambs.

8.24 Expansion beads are fixed vertically in agreed positions. These beads are positioned at approximately seven metre centres along a building, the centres depending on the individual requirements of each job.

8.25 The drying period of any render will depend on weather conditions; however, each coat must be left to harden for as long as possible in good drying conditions before application of the subsequent coat. The scrim adhesive must be allowed to harden and dry for at least one day.

8.26 To prevent the renders from drying too rapidly they should not be applied in direct sunlight. Continuous surfaces must be completed without a break.

8.27 After application care must be taken to protect the renders from direct sunlight, drying winds, rain, mist and cold (less than 5°C on a falling thermometer) to prevent the drying time from being too rapid or excessively prolonged.

8.28 For all rendering and application of finishing coats continuous surfaces should be completed without a break.

Spar-dash finish

8.29 The MRS7 dashing render is prepared using the same procedures as for the bedding adhesive (see section 8.8) by mixing the contents of each 40 kg bag with approximately 8 to 9 litres of water. Care must be taken to ensure an even dispersion of the resin and fibre reinforcement.

8.30 One coat of MRS7 is trowel-applied to a minimum thickness of 8 mm. A minimum of three bags of suitable spar-aggregate should be emptied into a clean wheelbarrow or tub and any excess water allowed to drain before being mixed thoroughly. While the render is still soft, aggregate is thrown or sprayed onto the surface. On completion, the surface must be checked to ensure an even coverage of spar dash has been achieved. Where necessary, the aggregate should be lightly tamped to ensure that a good bond is achieved.

MRS Plain, MRS Scratch, MRS Tyrolean and MRS Alpine render finish

8.31 The render is prepared using the same procedures as for the bedding adhesive (see section 8.9) by mixing the contents of each 40 kg bag with approximately 6 to 7 litres of water. Care must be taken to ensure an even dispersion of the resin and fibre reinforcement. In hot or windy conditions it may be necessary to include a small additional quantity of water during the second mixing to allow for loss of water during application.

8.32 One coat of MRS4 is trowel-applied to a minimum thickness of 5 mm to receive MRS4 Plain finish or a minimum thickness of 8 mm to receive

MRS Scratch, MRS Tyrolean or MRS Alpine finish. the undercoat is lightly scratched and must be left to harden for at least 48 hours before applying one of the following:

(1) MRS4 Plain finish render top coat is applied to a minimum thickness of 8 mm using a wood or fibre float. The top coat should be thinner than the first coat.

(2) MRS Scratch finish render top coat is applied to a thickness of 8 mm. When the render is sufficiently hard, even pressure is applied to remove a 2 mm to 3 mm thick surface layer using a scratch float to create the desired surface texture.

(3) MRS Tyrolean finish render top coat is applied using traditional means or machine spray in successive passes to a thickness of approximately 5 mm to create the desired surface texture.

(4) MRS Alpine finish render top coat is applied to a thickness of approximately 2 mm using a plastic float dragged over the surface vertically and horizontally to create the desired surface texture.

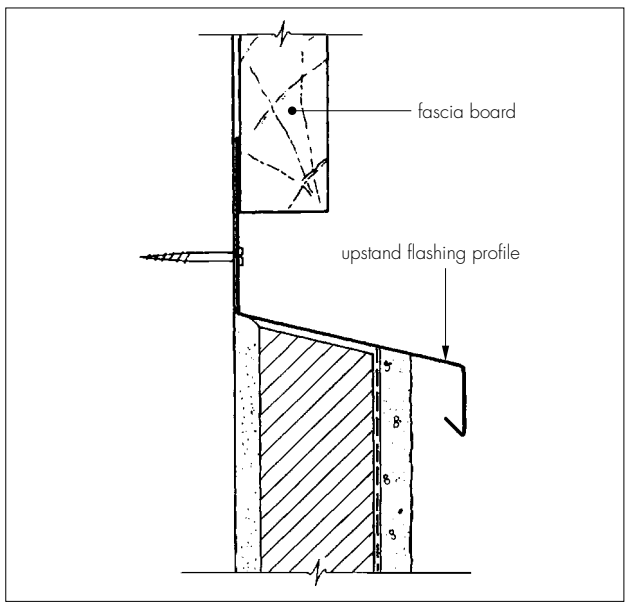
8.33 The top coat is allowed to dry and any dirt, grease, chalking, etc removed before application of the decorative coat.

8.34 MRS6 smooth finish masonry paint is applied in two coats by brush or roller. The drying times will be dependent upon weather conditions.

8.35 The decorative finish should not be applied in wet weather, at temperatures below 5°C, or when frost is expected. Freshly coated work should be protected from rain, mist and cold conditions.

8.36 At the tops of walls the system must be protected by an adequate overhang or by an adequately sealed purpose-made flashing (see Figure 7).

Figure 7 Typical eaves detail



8.37 Care must be taken in the detailing of the system around openings and projections (see Figures 8, 9 and 10).

8.38 On completion of the installation, external fittings, eg rainwater goods, are re-fixed through the system into the substrate.

Figure 8 External corner detail

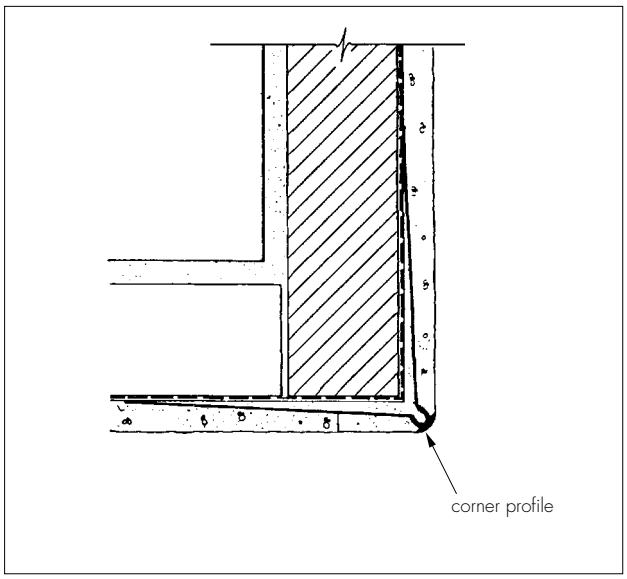


Figure 9 Uninsulated window or door reveal

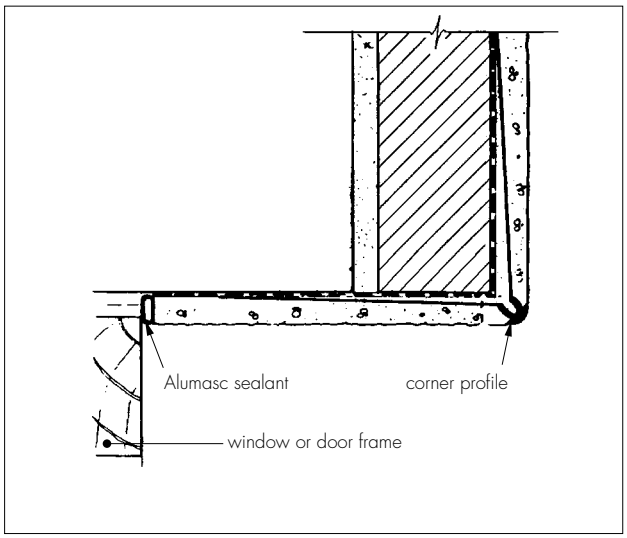
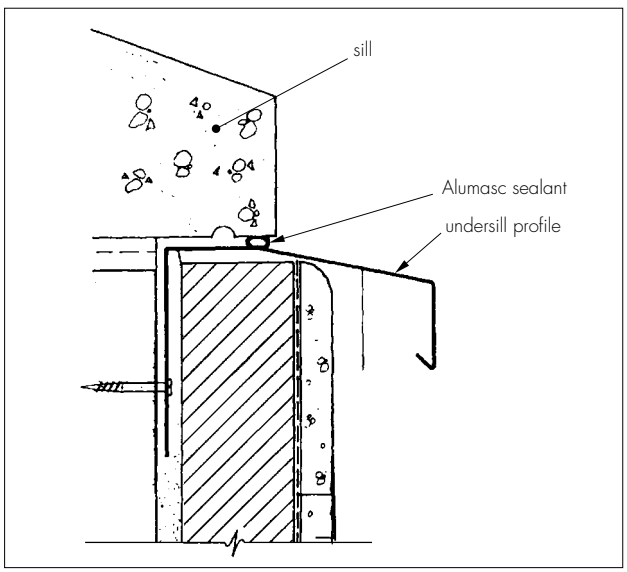


Figure 10 Typical sill detail



Technical Investigations

The following is a summary of the technical investigations carried out on the Swisslab Phenolic (CFC- and HCFC-Free) and MRS Finishes, External Wall Insulation Systems.

9 Tests

9.1 Tests were carried out in accordance with MOAT No 22 : 1988 to determine:

component characterisation
heat/spray cycling
resistance to freeze/thaw
impact resistance
water absorption of render
water vapour permeability.

9.2 An examination was made of data relating to:

resistance to dynamic wind uplift[1]
flexural and compressive strength of renders
multi-storey fire tests conducted in accordance with BRE fire Note 9
fire propagation tests to BS 476-6 : 1989
surface spread of flame tests to BS 476-7 : 1987
pull-out strength of fixings
durability of finish
bond strength of MRS3, MRS5F and MRS7
thermal conductivity to BS 874-2.1 : 1986.

(1) Tests were conducted by the BBA generally in accordance with European Organisation for Technical Approvals draft ETAG *Guidelines for External Thermal Insulation Composite Systems with rendering.*

10 Other investigations

10.1 The manufacturing process, the methods adopted for quality control of manufacture and bought-in components and details of the quality and composition of the materials used, were examined.

10.2 A computer simulation of the risk of interstitial condensation was undertaken.

10.3 The practicability of installation and the effectiveness of detailing techniques were examined.

Bibliography

BS 476 *Fire tests on building materials and structures*
BS 476-4 : 1970(1984) *Non-combustibility test for materials*
BS 476-6 : 1989 *Method of test for fire propagation for products*
BS 476-7 : 1987 *Method for classification of the surface spread of flame of products*

BS 874 *Methods for determining thermal insulation properties*
BS 874-2 *Tests for thermal conductivity and related properties*
BS 874-2.1 : 1986 *Guarded hot-plate method*

BS 5262 : 1991 *Code of practice for external renderings*

BS 6399 *Loading for buildings*
BS 6399-2 : 1995 *Code of practice for wind loads*

BS 8000 *Workmanship on building sites*
BS 8000-10 : 1995 *Code of practice for plastering and rendering*

CP 3 *Code of basic data for the design of buildings*
CP 3 : Chapter V *Loadings*
CP 3 : Chapter V-2 : 1972 *Wind loads*

MOAT No 22 : 1988 *Directives for the Assessment of External Insulation Systems for Walls (Expanded Polystyrene Insulation Faced with a Thin Rendering)*

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

Date of Second issue: 15th February 2001

Chief Executive

**Original Detail Sheet issued 21st May 1996. This revised version includes change of Certificate holder's name, reduction of compressive strength, addition of spar-dash (previously covered by Detail Sheet 13, which is now withdrawn) MRS4 Plain, MRS Scratch, MRS Tyrolean and MRS Alpine finish and additional assessments of data in relation to dynamic wind uplift (suction) and multi-storey fire tests.*

Appendix — System summary — Swisslab Phenolic (CFC- and HCFC-Free) and MRS Render Finishes, External Wall Insulation Systems

1 System

Insulation	Phenolic insulation boards, dimensions 1200 mm × 600 mm in a range of thicknesses between 20 mm and 150 mm. Nominal density 40 kgm^{-3} and minimum compressive strength of 120 kNm^{-2}. Boards of 15 mm thickness are also available for use in window reveals.
Fixings	Mechanical fixings approved by Alumasc Exterior Building Products Limited and the BBA.
MR bedding and scrim adhesives	Polymer-modified cement-based adhesives, supplied as powders to which water is added.
Reinforcing mesh	One metre wide mesh of multi-stranded alkali-resistant glass fibres, having a polymer coating and nominal weights of 150 gm^{-2} or 200 gm^{-2}.
MRS4 Plain, MRS Scratch, MRS Tyrolean and MRS Alpine finish render	A polymer-modified fibre-reinforced cement-based mortar. Supplied as a powder to which water is added and available in a range of colours.
MRS6 smooth finish masonry paint	A polymer-based masonry paint, applied by roller or brush and available in a range of colours.
MRS7 dashing render	A polymer-modified and fibre-reinforced cement-based mortar supplied as a powder to which water is added, and available in a range of colours as listed in section 1.1(5) of this Detail Sheet.
MR spar-dash aggregate	A spar-dash aggregate available in a range of colours to suit MRS7 render.

2 Thermal properties

Thermal conductivity of Swisslab phenolic insulation boards	0.019 $Wm^{-1}K^{-1}$
U values	Using the values given in Table A15 of Approved Document L1 (1995 edition) to the Building Regulations 2000 (England and Wales), the thermal insulation values for a typical 225 mm brick external wall (density 1700 kgm^{-3}) with 10 mm plasterboard:

Insulation thickness (mm)	U value ($Wm^{-2}K^{-1}$)
25	0.52
30	0.45
35	0.41
40	0.37
45	0.33
50	0.31
55	0.28
60	0.26
65	0.25
70	0.23
75	0.22
80	0.21

3 Impact resistance

The Swisslab system is suitable for use where walls are exposed but have some protection, eg walls of private dwellings and walls of communal dwellings above ground-floor level. Where the system may be exposed to severe impact, eg mechanical or malicious damage, precautions may be required to reduce the risk of damage.

4 Properties in relation to fire

The Swisslab system is not non-combustible to BS 476-4 : 1970(1984).

The system is classified Class 0 as defined in the appropriate Building Regulations.

Full scale multi-storey fire tests were conducted in accordance with BRE Fire Note 9.

Fire barriers are not required for this system.

5 Design wind loading and resistance to wind suction*

Assuming a sound substrate which will prohibit pull-out of the fixings below the maximum load for pattern A achieved through dynamic wind load testing for Pattern A (2.5 kPa and 3.5 kPa). An example of loads applied to the dry-fix system at 10 metres and 50 metres can be calculated as explained below:

Previously, wind loading on a particular wall could be calculated in accordance with CP 3 : Chapter V-2 : 1972 *Wind loads*. This code of practice has been replaced by BS 6399-2 : 1995 *Code of practice for wind loads*. The new procedures involve specific site information and do not facilitate generalisations, or 'worst case' calculations. For this reason, this example is based on CP 3 : Chapter V-2. The pressure created by the action of the wind can be calculated from the following formulae:

$P = (C_{pe} - C_{pi})q$ . . . . . (i)

$q = K(V_s)^2$ . . . . . (ii)

$V_s = VS_1 S_2 S_3$ . . . . . (iii)

Where:

P = pressure

C_{pe} = external pressure coefficient . . . . .(–1.0 at 10 m height . . . . . –1.1 at 50 m height)

C_{pi} = internal pressure coefficient . . . . .(0.2 for both 10 m and . . . . . 50 m heights)

K = a constant

V_s = design wind speed

V = basic wind speed

S_1 = topography value . . . . . .(from CP 3 = 1.0)

S_2 = ground roughness . . . . . .(from CP 3 = 1.0 for 10 m height . . . . . and 1.4 m for 50 m height)

S_3 = statistical factor . . . . . .(from CP 3 = 1.0)

q = the dynamic pressure

Using the above values and equation (i), (ii) and (iii) maximum wind suctions of 1.474 kPa at 10 m and 2.005 kPa at 50 m were calculated using a basic wind speed of 44 Ms^{-1}. The value obtained from dynamic wind load testing on the Swisslab dry-fix system was 2.5 kPa and 3.5 kPa which would indicate a minimum safety factor of 1.7 and 1.3 using 50 mm diameter fixing heads, and 2.4 and 1.8 using 90 mm diameter fixing heads respectively.

*Inclusion of MR bedding adhesive between the insulation and the substrate will considerably increase the resistance to wind suction.

6 Durability

Age of oldest installation — 7 years.

Assessed life — At least 30 years (with normal maintenance).

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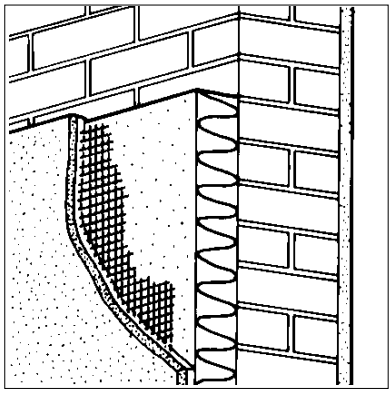
Certificate No 93/2914

DETAIL SHEET 15

SWISSLAB UNIVERSAL FIXING PATTERN FOR MULTI-STOREY BUILDING APPLICATION

Product



- *THIS DETAIL SHEET RELATES TO THE SWISSLAB UNIVERSAL FIXING PATTERN FOR MULTI-STOREY BUILDING APPLICATION.*
- *It is an additional fixing method for use with external wall insulation systems covered by Detail Sheets 2, 6, 7, 9, 11 and 12 of this Certificate.*
- *It is essential that the Swisslab system is installed and maintained in accordance with the conditions set out in the* Design Data *and* Installation *parts of this and the relevant Detail Sheets.*

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

Technical Specification

1 Description

1.1 The Swisslab Universal Fixing Pattern relates to an arrangement of mechanical fixings which can be used to secure Swisslab systems in multi-storey applications. The fixing arrangement is described in section 4 of this Detail Sheet.

1.2 The system incorporates a Swisslab insulant, a glass-fibre mesh, MR polymer-modified fibre-reinforced cement render finishes and components as described in the relevant accompanying Detail Sheets. Swisslab MR mechanical fixings are approved by the BBA and Alumasc Exterior Building Products Limited. Details of approved fixings may be obtained from the BBA.

1.3 MR Bedding Adhesive is applied to the surface of the wall, and the insulation is pressed firmly into position. The insulation may, if required, be mechanically fastened to the external surface of walls initially with one fixing at the centre of each slab or board. The MR Scrim adhesive is trowel-applied to the insulation and the reinforcing mesh is then embedded in the adhesive. Before the adhesive has set, holes are drilled through the system and mechanical fixings are inserted, in accordance with the procedures detailed in section 7 of this Detail Sheet. Above two storeys, additional stainless steel fixings are applied at approximately one metre centres and covered with square pieces of mesh embedded in more adhesive. Finishes are applied in accordance with the relevant accompanying Detail Sheets.

Design Data

2 Strength and stability

Dynamic wind suction tests conducted by the BBA generally in accordance with the Guideline for European Technical Approvals (ETAG) for External Thermal Insulation Composite Systems with Rendering, have shown that normal Swisslab (dry-fix) systems can withstand loads up to 3.5 kpa depending on the specified fixing system, type of fixing and diameter of fixing head. For multi-storey buildings, the Swisslab Universal Fixing Pattern is always used in conjunction with MR Bedding Adhesive (wet-fix) which will considerably increase the resistance to dynamic wind suction. BBA tests indicate that the Universal Fixing Pattern (wet-fix) can resist wind loads in excess of 7.5 kpa and, therefore, is capable of withstanding the anticipated wind loads likely in the United Kingdom.

3 Properties in relation to fire

3.1 The Building Research Establishment (BRE) conducted fire tests in accordance with BRE Fire Note 9 *Assessing the fire performance of external cladding systems : a test method*, using a four storey test facility, and have concluded that for the Swisslab Phenolic and Swisslab Urethane with MR Reinforcing Scrim and MR Spar-Dash Finish and Plain Render Finishes, fire barriers are not required and make no restriction on the height of the building to be treated, provided there are no cavities between the rear of the face of the insulation and the background. See Detail Sheets 6, 7, 11 and 12 of this Certificate.

3.2 The behaviour in fire of external wall insulation systems is the subject of recommendations by BRE, which, for the Swisslab system incorporating mineral wool insulation, makes no restriction on the height of the building to be treated (see Detail Sheet 9 of this Certificate). This also applies to the Swisslab system incorporating expanded polystyrene insulation provided that the system incorporates fire barriers of mineral wool 150 mm high and of the same thickness as the EPS, bonded to the background with MR Bedding Adhesive and mechanically fixed using stainless steel fixings at every floor level from the third storey. See Detail Sheet 2 of this Certificate for full details.

Installation

4 Procedure

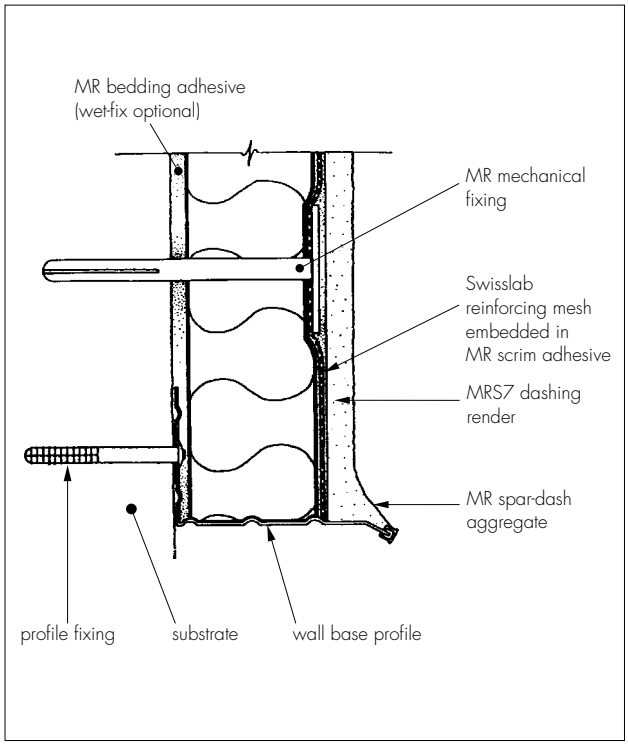
General

4.1 Except for any variations detailed below, installation of the Swisslab system should be in accordance with the relevant accompanying Detail Sheets.

4.2 One coat of MR fungicidal wash followed by one coat of stabilising solution bonding agent is applied where required by brush, roller or knapsack spray to the entire wall surface.

4.3 The Alumasc base profile is secured to the external wall above the damp-proof course using the approved profile fixings at approximately 300 mm centres (see Figure 1).

Figure 1 Typical section at base level



4.4 The MR Bedding adhesive is prepared for use by mixing the contents of each 40 kg bag with 7 to 8 litres of cold, clean water. An electrically driven paddle mixer is used for a minimum of five minutes until a smooth, workable consistency is achieved. The material is left to stand for at least five minutes and again mixed for a further two minutes. A bed coat of the adhesive is trowel-applied to the entire surface to a minimum thickness of 6 mm and finished with a serrated trowel or comb.

4.5 The first run of insulation slabs or boards is positioned on the base profile. The insulation is pressed firmly into the adhesive with a wooden board to ensure maximum contact between the soft adhesive and the insulation. Subsequent rows are positioned so that the vertical joints are staggered and overlapped at the building corners and in such a manner that joints do not occur within 200 mm of the corners of openings.

4.6 Where there is a risk that insulation boards may become detached (eg unprotected scaffold, high wind suction) and for Swisslab mineral wool, holes are drilled into the substrate to a minimum depth of 50 mm through the centre of each slab and initial mechanical fixings are inserted and tapped firmly into place, securing the insulation slab to the substrate.

4.7 Care must be taken to ensure that all slab edges are butted tightly together, and alignment should be checked as work proceeds.

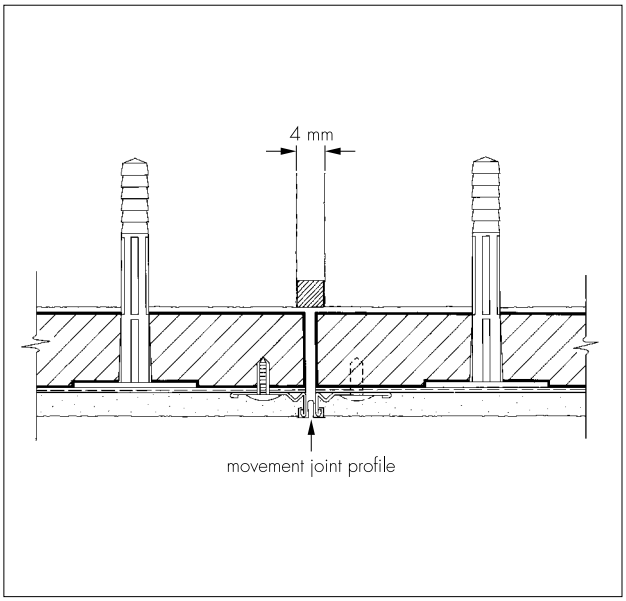
4.8 To fit around details such as doors and windows, insulation slabs may be cut with a sharp knife or a fine-tooth saw. If required, purpose-made window sills are fitted. They are designed to prevent water ingress and incorporate drips to shed water clear of the system.

4.9 Installation continues until the whole wall is completely covered including, where appropriate, the building soffits.

Movement joints

4.10 Movement joints in the substrate must be continued through the system. The joint detail using purpose-made metal trims is illustrated in Figure 2.

Figure 2 Vertical movement joint detail

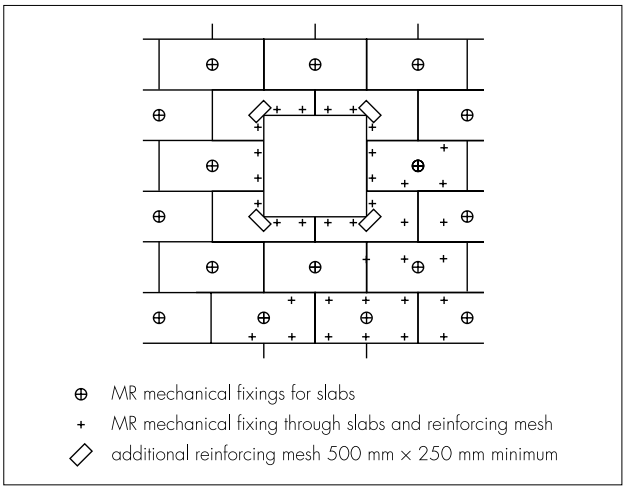


Reinforcing

4.11 The MR Scrim adhesive is trowel-applied to the surface of dry insulation slabs to a minimum thickness of 3 mm.

4.12 An alkali-resistant glass-fibre mesh is bedded into the adhesive with 75 mm laps at joints. Extra mesh is used around openings (see Figure 3).

Figure 3 Insulation slab fixing patterns



4.13 Before the adhesive has set, holes are drilled through the system into the substrate to a minimum depth of 50 mm and main system mechanical fixings are inserted and tapped firmly into place. The fixing pattern should begin 100 mm above the base profile (bellcast), from expansion beads and door and window openings, and 200 mm from building corners. Mechanical fixings are positioned 300 mm apart around door and window openings and 300 mm vertical centres at building corners. Fixings are positioned, thereafter, at maximum 450 mm vertical and horizontal centres over the entire surface.

4.14 Above two storeys, additional holes are drilled at one metre centres before MR Scrim adhesive hardens and stainless steel fixings are inserted through the mesh and tapped firmly home. The fixings are then covered with further adhesive and square pieces of mesh measuring no less than 150 mm by 150 mm.

4.15 When MR Spar-Dash is required, a thickness gauge is pressed into the mesh and MR Scrim adhesive while the adhesive is still wet. The gauge is used to determine the thickness of the following render coat.

4.16 The required finishes are applied in accordance with the relevant accompanying Detail Sheets of this Certificate.

Technical Investigations

An examination was made of data relating to resistance to dynamic wind uplift in the Swisslab Universal Fixing Pattern. The data resulted from tests conducted by the BBA generally in accordance with European Organisation for Technical Approvals draft ETAG *Guideline for External Thermal Insulation Composite Systems with Rendering*.

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

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