CODE OF PRACTICE

FOR THE INSTALLATION OF
CELLULAR PVC-U CLADDING SYSTEMS

(REF: 349/2 JULY 2009)

THE BRITISH PLASTICS FEDERATION

6 BATH PLACE
RIVINGTON STREET
LONDON EC2A 3JE

TEL: 020 7457 5000
FAX: 020 7457 5045
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SECTION ONE - General

1.1 **Scope.** The purpose of this Code is to emphasise the good practice for the successful and safe installation of non-structural cellular PVC-U (PVC-UE) products in cladding.

Design/Application is considered and recommendations given. Repair/Renovation aspects are also addressed, and appropriate methods outlined.

For aspects beyond the scope of this code, advice should be sought from the product supplier.

1.2 **References.** The titles of the standard publications referred to in this code are listed in Appendix A

1.3 **Definitions.** For the purpose of this code the definitions in BS6100:1989 apply. Terms that are particularly relevant are explained below, together with others not in the standard.

1.3.1 Cladding, a board system (often ornamental) used as a covering to a structure as a rain screen or for aesthetic purposes.

1.3.2 Perimeter Trims, A rigid PVC trim designed to act as a start/finishing component to the edges of the clad areas.

1.3.3 Bottom Edge Trims, Commonly a starter trim pre-fixed to the cladding support battens – having a lip to engage the first plank without the need for face fixing.

1.3.4 Top Edge Trims, general “U” channel trims designed to complete the top of clad areas. Available as single part or two part (push fit) versions, the latter improves installation procedure and is suitable for working in restricted areas.

1.3.5 Corner trims, either single or two part for use at intersections where the clad area changes direction.

1.3.6 Side Trims, as the top edge trim, fixed at side abutments/finishes allowing for the provision of thermal expansion gaps at board ends and channelling water to the base of the clad areas.

1.3.7 Joint Trims or Centre Joint Trim, Either single or two part for use at intersections where clad area exceeds the standard length.

SECTION TWO – Materials & Components

2.1 ** Extruded Cellular PVC-U (PVC-UE), Extruded PVC-U & Injection moulded PVC-U**

The materials used for the successful manufacture of cladding products should be as follows:

2.1.1 Extruded Cellular PVC-U (PVC-UE) profiles manufactured in accordance with BS 7619:2009

Interlocking, secret fixed cladding planks

2.1.2 Extruded PVC-U profiles manufactured in accordance with manufacturers agreed specifications.

Perimeter trims available in a standard length, to cater for cladding board joints, corners, abutments and ends.

2.1.3 Injection mouldings manufactured with good manufacturing practice.

Purpose made mouldings to cater for specific joints and corners and end cap details.

2.2 ** Stainless Steel Fixings**

All fixings should be A4 marine grade and comply with BS EN ISO 3506: 1+2: 1998. Note: The composition of Grade A4 corresponds to austenitic steel 316.

2.3 **Timber**

Timber for use as support work or battening should be of sound quality and treated as defined in Section 2.6 of this code.
Where the timber substrate is preservative treated with copper/chrome/arsenic care must be taken to ensure that sufficient time is allowed for complete fixation of the preservative (approximately seven days) to avoid corrosion of fixing nails.

Introduced battens and support timber work should be cut from one of the species listed in appendix B.

Plywood sheathing material should comply with the requirements of BS5268-2: 2002 and exposed edges shall be treated as in Section 2.6 of this Code.

2.4 Sealants

Sealants or adhesives used as sealants shall be of a type recommended by the sealant/adhesive manufacturer as suitable for exterior applications. Typically, Low Modulus Silicone to BS5889 (Type A) or solvent free / moisture cure adhesives.

2.5 Breathable Membranes

All product should comply with and be installed in accordance with BS 4016:1997

2.6 Preservatives/Treatments

Timber should be preserved in accordance with BS 5589:1989

2.7 Supplementary Fittings

Allied products installed to the roofline area to ensure a complete working system.

2.7.1 Flue Vents

A clearance should be allowed between the flue and the cladding products complying with current Building Regulations. Minimum requirement states a 75mm clearance should exist between flue and cladding and where appropriate a non-combustible shield should be fitted to deflect heat away from the cladding surface.

2.7.2 Other Supplementary Fittings

Other fittings which apply loads e.g., telephone lines, TV aerial brackets, should not be fixed directly to Cellular PVC-U (PVC-UE) products.
SECTION THREE - Design

3.1 Weather Resistance

Design in accordance with the minimum requirements of this code will ensure that the cladding area is weather resistant.

Specifiers should satisfy themselves that the cladding they are specifying has been satisfactorily tested up to 2000 Pascals.

3.2 Structural Stability

3.2.1 All fixings must be capable, when used in accordance with manufacturers instructions and other relevant building Codes of Practice, of accepting imparted loads through climatic or other anticipated loadings (refer to BS 6399-2 : 1997).

3.2.2 Battens and Support Timberwork

Battens and support timber work should be constructed in accordance with good working practice. Recommended battens should be 25mm x 38mm or a minimum of 19mm x 38mm. There should be a double batten arrangement where appropriate e.g. when joining together cladding runs and/or at corner intersections.

Support timber work should be rigid and have sufficient width and depth to avoid splitting on penetration of fixings.

3.3 Condensation and Ventilation

Condensation occurs when warm moisture laden air meets a surface the temperature of which is below the dew point of the air.

3.3.1 Ventilation

A 10mm minimum vented airspace should exist behind all cladding installations as defined in NHBC Chapter 6.2:1992 and BS 8200:1985. However, taking into account the batten dimensions it is recommended that where possible 19 – 25mm airspace is maintained.

Sheathing and insulation should be protected by a waterproof breathable membrane and to minimise the risk of condensation the minimum vented airspace should be maintained between the cladding and the substrate.

3.4 Durability

Installations carried out in accordance with the recommendations of this Code can be regarded as having a Reference Service Life of 35 years as specified in the BRE Green Guide 2009. Durability may be influenced by climatic conditions and by atmospheric pollution.

3.4.1 Timber

All new timber must be pre-treated with preservative according to section 2.6 in order for it to have an adequate life.

3.4.2 Fixings

A4 Grade stainless steel is intended to give "high performance" corrosion resistance.

3.5 Fire Resistance

To ensure the correct specification of material is used, taking into account the requirements of the current Building Regulations, the manufacturer should assess fire performance in accordance with BS 476–7:1997, Fire Tests on Building Materials and Structures - Method of test to determine the Surface Spread of Flame of Products. Performance is reported as a classification ranging 1–3, with Class1 being the best achievable.

3.6 Quality

Cellular PVC (PVC-UE) materials must be manufactured in accordance with BS7619: 2009 and manufacturers should have a valid KiteMark® approval to this standard.
Environmental

Cellular PVC roofline and cladding profiles have the potential to last the lifetime of the building without the need for maintenance. Maintenance is costly and can contribute to CO₂ levels. At the end of their lifetime they can easily be removed and fully recycled. Recycling PVC into new products requires significantly less energy than manufacturing from new. In addition PVC can be recycled many times over.

Under the BRE Green Guide (2008 Edition), which underpins the Code for Sustainable Homes, PVC cladding has an A+ environmental rating. In addition, under Responsible Sourcing of Basic Building Elements, PVC Cladding over a framework of certified and legally sourced timber qualifies for 1.5 points as a Tier 3 product.

Note
Tier 3 products are those where both the manufacturer and the major raw materials supplier are ISO14001 certified.

SECTION FOUR - Application

4.1 General

To achieve a successful and safe installation, it is essential to ensure that products are fixed to a sound, rigid substrate (refer to section 3.2).

It is recommended that total replacement rather than capping of existing timbers be adopted where possible. By capping and effectively sealing moist and perhaps already rotten timber, an environment which is more conducive to fungal attack may result. The capping board will tend to 'insulate' the rot and promote conditions whereby the fungus can multiply and potentially spread to adjoining roof timbers.

4.1.1 Access

It is recommended that full scaffold platform or purpose made deck system including guard-rails is used on all installations. Where ladders are used for access these should always be secured and fully supported. (See Section 6)

4.1.2 Survey/Preparation

To be carried out after removal of redundant materials and before installation of Cellular PVC-U (PVC-UE) products.

Inspection of existing timbers is important. Any defective timber should be replaced or treated in accordance with BRE digests 299 and 345 and/or Section 2.6 of this Code.

If the existing construction incorporates a waterproof breathable membrane, this should be inspected and replaced if damaged.

Where the survey identifies asbestos containing materials appropriate advice should be sought. See 6.2.3 of this code.

Elevations should be checked for level plumb and general flatness before installation of cellular PVC-U (PVC-UE) products.

Elevations should have battens around the perimeter, all openings and at intermediate centres not exceeding 600mm. It is recommended that batten centres be reduced to 400mm for installations above two storeys or where coloured cladding products are used.

In general battens should be fixed at 90° to the orientation of the cladding profile.

Studwork should be at maximum 600mm centres. If the intermediate space is filled with insulation this should be protected by a waterproof breathable membrane.

Supplementary battens should be incorporated to ensure the minimum air space is maintained.
4.2 Sequence of Installation for Horizontal Cladding

4.2.1 Perimeter Trims

Perimeter trims should be installed to the limit of the access equipment before cladding with cellular PVC-U (PVC-UE) products commences. Check manufacturer’s current literature for full range of trims to cater for individual design criteria.

4.2.2 Starter Trims

To be fixed level at maximum 600mm centres (white cladding) to the bottom edge of elevations. (Fig.1) Ventilation is normally achieved by the batten thickness. This free air gap can be neatly finished with a suitable depth angle ventilator thus restricting insect ingress. Continuity of the ventilation path will exist via cladding board intersections and ends and can also be arranged at the top of the cladding by venting into the eaves.

Fig.1

4.2.3 Edge Trims

To be fixed to the timber bearers at maximum 600mm centres to abutments and sides of openings. (Fig.2). Available in single and two part options, two part trims are recommended when cladding vertically and diagonally. Two part trims offer ease of application when cladding planks are cut to length or finish in tight recesses.

Fig.2
4.2.4 **Top Edge Trims**

To be fixed level and at maximum 600mm centres to the top edge of the clad area or at the underside of window cills (Fig. 3A). Two part trims offer ease of application when cladding planks are cut to length or finish in tight recesses.

The top cladding board should be cut to suit with a minimum clearance of 8-10mm. The off cut can be used as a packer to maintain level with the face fixed nail being covered by the push fit finishing trim. (Fig. 3B)

**Fig. 3A**

**Fig. 3B**

4.2.5 **Drip Trims**
To be fixed level and at maximum 600 mm centres above openings i.e.: window/door heads. (Fig 4) Ensure the trim is fitted to maintain airflow and where necessary omit the bottom horizontal trim.

4.2.6 Corner Trims

To be fixed at maximum 600mm centres to corner return edges (see fig 5). Available in single and two part options, the latter offers flexibility by allowing either external or internal use.
To be fixed at maximum 600 mm centres as a continuous vertical cover between consecutive panels of cladding. (Fig 6) Ensure joints are made over supporting battens and both planks are securely nailed.

Fig.6

4.2.8 Butt Joints

As an alternative to the centre joint trim, individual joints should be fitted between plank ends of continuous runs of horizontal cladding, symmetrically staggered for appearance. Ensure joints are made over supporting battens and both planks are securely nailed.

An allowance should be made of 4/5mm clearance at each plank end for thermal expansion.

4.2.9 Fixing Procedures

The first plank should be firmly located on the starter trim, checked for level and nailed through the fixing groove on the tongue/ top edge. To ensure the cladding is secured correctly, fixings should commence at the centre and work progressively outwards. All plank ends should be fixed and at maximum 600mm intermediate centres. (Fig.7)

Fig.7

An allowance should be made of 4/5mm clearance at each plank end for thermal expansion.

Fit subsequent planks over the preceding row, ensuring that the interlocking tongue and groove is firmly closed and nail heads are concealed by the overlap of the next board. Check the cladding boards are level, visually and with a sprit level every two rows.
Should the top cladding plank require cutting provide necessary support by using an off cut of the board as a packing piece to maintain the line of the cladding face. Top edge trims provide cover for the fixings. However, cutting can sometimes be avoided by using an alternative plank width for the last plank.

In general, product design and manufacturers instructions accommodate for thermal movement. However, installers should satisfy themselves with regard to limit lines on profiles, spacer lugs, expansion gaps and correct nails as specified in product literature.

4.3 **Sequence of Installation for Vertical Cladding**

4.3.1 **Perimeter Trims**

Perimeter trims should be installed to the limit of the access equipment before cladding with cellular PVC-U (PVC-UE) products commences.

4.3.2 **Starter Trims**

Not required for vertical cladding. See Edge trims and Drip trims.

4.3.3 **Drip Trims**

To be fixed level and at a maximum of 250-300mm fixing points to the bottom batten edge of elevations and above openings i.e.: window/door heads. (Fig.8A) A suitable allowance should be made inside the trim for the first plank (Fig.8B) Ensure the trim is fitted to maintain airflow.
4.3.4 **Top Edge Trims**

Available as single or two part trim and should be fixed level and to the top edge of elevation and below a window cill (Fig 9).

![Fig.9](image)

4.3.5 **Edge Trims**

Acting as a starter trim it should be fixed to the vertical battens, to the vertical edges at a maximum of 400mm fixing distance of abutments and openings. A two part option simplifies installation.

4.3.6 **Corner Trims**

Two part trims simplify installation and should be fixed at a maximum 400 mm fixing distance return edges. (Fig 9 and 10)

![Fig.10](image)

4.3.7 **Centre Joint Trims**

Have limited application in vertical cladding however if used due consideration must be given to the drainage of the horizontal joint trim. Alternatively where vertical height exceeds 5m use drip trim horizontally between lengths.

4.3.8 **Butt joints**

Are unsuitable for vertical cladding.
4.3.9 **Fixing Procedures**

Each elevation should be planned to ensure a balanced visual aspect. This may require both starter and finishing planks to be cut or for the use of an alternative width planks to be incorporated.

The starter plank should be aligned plumb, packed with an off cut to maintain line of face of the cladding and located into the vertical edge trim and nailed to the intermediate on both edges at a maximum of 600mm centres.

To ensure planks are secured correctly fixing should commence from the one edge and work progressively outwards. The planks should be set so as to provide a 4/5mm clearance at drip trim edge and inside the top edge trim. The gap should be maintained across the elevation for expansion and drainage. Fit subsequent planks over the preceding row ensuring that the interlocking tongue and groove is firmly closed and the nail heads are concealed by the overlap.

Check for visual appearance and ensure planks are plumb every two rows. The finishing plank should be cut vertically, interlocked with the adjoining plank, packed to maintain the line of the face of the cladding and nailed as described. When fitting top part of two part trims ensure that the adjoining elevation is complete before fitting top part of angle trims. (Fig.11)
4.4 Sequence of Installation for Diagonal or Herringbone Cladding

4.4.1 Fixing procedures

Vertical cladding procedures should be followed for batten configuration and trim system layout. Once the correct angles of the initial starting boards have been determined the remaining boards should be set out and cut from the previous one also ensure that there is the statutory 4-5mm expansion gap left either side of the trim (Fig.12A). A minimum allowance of 8mm should always be made when finishing into the top edge trim. (Fig.12B)

4.5 Mistakes to avoid

- Do not fix below 0°C and above 30°C.
- Do not spring boards in between two fixed points i.e. abutments; previously fixed planks.
- Do not exceed maximum fixing centres.
- Do not fix to insecure substrates.
- Do not use incorrect fixings.
- Do not omit expansion gaps as published in manufacturer’s instructions.

4.6 Final Inspection – things to look for

4.6.1 Horizontal Cladding

- Check that appropriate trims have been used in the correct location.
- Check that adequate expansion and contraction tolerances have been observed. (4/5mm at each plank end).
- Ensure fixing centres are correct.
- Check for the air space behind the cladding – 10mm minimum, 19 - 25mm recommended.
- No obstructions should exist directly behind the cladding system e.g. thermal insulation fixed immediately behind the system.
- Check that the correct fixings have been used to fix the cladding profiles. E.g. 30mm x 2.65mm gauge (A4 grade) stainless steel nails at each intersection.
- Check that all joints have been planned to give a neat symmetrical and balanced appearance and are made over support battenning.
- Ensure window intersections are watertight and trimming has been completed neatly.
- Always use a breathable membrane as secondary waterproofing.

4.6.2 Vertical / Diagonal Cladding
Cladding battens are located horizontally at specified fixing distances.
Where required additional vertical counter battens should be vertically and at intersections and ends of the clad area.
When installing cladding vertically and diagonally a drip trim should be used at the base of the clad area.
For ease of application two part trims should be used on vertical and diagonal cladding installations.
Ensure the angles of the roof have been observed when installing cladding as a herringbone pattern, as the cladding will need to run parallel with the roofline.
When installing cladding diagonally the battens should run vertically. The initial battens should be closer together 150mm-400mm to locate the first planks as these are small sections and need to be fixed securely.

SECTION FIVE - Repairs and Renovations

5.1 General Maintenance

Cellular PVC-U (PVC-UE) profiles are self-finished and low maintenance. Occasional washing with a non-abrasive mild detergent and water is beneficial in removing surface grime and maintaining a pristine appearance, especially in heavily polluted atmospheres. Care should be taken to flood the surface when cleaning to prevent scratching of the surface.

In common with other plastic based materials solvents should not be used for cleaning.

Exercise care to prevent contact with, and staining by creosote or bitumen-based products. Other common building materials are easily cleaned off without damage.

As with all PVC products, paint can adversely affect the impact strength of PVC sections, and the application of dark colours may lead to risk of thermal distortion.

5.2 Surface Repairs

Prior to any surface repair advice should be sought from the manufacturer regarding continuity of guarantees.

5.2.1 Scratches and Small Abrasions

Starting with 180 grit wet and dry on a block of wood, keep the paper wet at all times to prevent clogging. Move along the profile until all the scratches have been removed.

Wash the surface of the board to remove any 180 grit remaining and then repeat the exercise with 360 grit and 1000 grit wet and dry washing the surface after each application.

Give the board a final wash with clean water, removing all traces of grit and polish the whole board with a proprietary household, non-abrasive cream cleaner.

5.2.2 Large Scratches and Gouges (less than 3mm deep)

Remove any raised areas level with the board surface using medium glass paper.

Score the surface of any indentation with skin intact and fill the damaged area with automotive type body filler.

Repeat as 5.2.1 and finish, where appropriate with a good quality satin finish polyurethane paint. Dark colours are not recommended for use externally.

5.3 Replacement Procedures

Replacement of a single board can be achieved; alternatively removal of the affected boards may require removal of trims and nails in and around the area of damage.
Check battens, waterproof breathable membrane, and substrate and repair as necessary.

When fitting a single board, or the final board of a clad are, reduce the rear edge of the interlock leg to 1 or 2 mm angling the cut upwards towards the inside face of the cladding. Apply low modulus silicone sealant to the modified
groove and the groove of the existing board. Carefully snap the last board into place if required face fix with stainless steel nails at each batten and conceal with suitable trim as required.

SECTION SIX - Safety and Precautions

6.1 General

The following notes are set out as guidance to all trades who are required to work on or over a roof at any period during its construction, and at any time after completion, for the purposes of repair and maintenance. Attention is drawn to the Health and Safety at Work etc. Act 1974, which applies to the employer, employee and the self-employed.

6.2 Safety

6.2.1 Regulations


Particular attention is drawn to Regulations 35 and 36 of The Construction (Working Places) Regulations 1966, which lay down requirements for the protection of persons who work on sloping roofs and on or near fragile materials.

6.2.2 Access

Where a person is liable to slip or fall more than 1.98m from the lower edge of a sloping roof, a barrier should be provided at that edge to prevent such a fall. Alternatively, the work should be done from a securely supported working platform, which is not less than 440mm wide and is fitted with guard rails and toe boards. The Regulations also require precautions to be taken when access ladders are used. These requirements are given in Regulations 31 and 32 of the Construction (Working Places) regulations 1966. The requirement to secure ladders should be particularly noted.

Guidance on the erection and use of scaffolding is given in BS 5973.

6.2.3 Handling and Cutting Asbestos Products

The use of asbestos and asbestos containing products is controlled by the Asbestos Regulations, 1969. The Regulations require that any dust liberated during the handling and working of these products should be maintained at a low level

In all circumstances it is recommended that clarification should be sought from the local office of H M Inspectorate.

6.3 Precautions

Access ladders to scaffold/towers should extend and project not less than 1.07m above the landing.
APPENDIX A

LIST OF STANDARDS AND RELEVANT DOCUMENTS

| BS 476-7:1997 | Method of classification of the surface spread of flame products |
| BS 607:2004 | Eaves gutters and fittings made from PVC-U |
| BS 747:2002 | Specification for roofing felts |
| EN 3506-1+2:1998 | Mechanical properties of corrosion resistant stainless steel fasteners |
| BS 4016:1997 | Specification for building papers (breather type) |
| BS 4576-1:1998 | Unplasticised polyvinyl chloride (PVC-U) rainwater goods and accessories |
| BS 5250:2002 | Code of practice for control of condensation in buildings |
| BS 5268-2:2002 | Structural use of timber |
| BS 5534:2003 | Code of practice for slating and tiling |
| BS 5589:1989 | Code of practice for the preservation of timber |
| BS5889 (Type A) | Specification for one part gun grade silicone based sealants |
| BS 5973 | Code of practice for access and working scaffolds and special scaffold structures in steel |
| BS 6100:1989 | Glossary of building and civil engineering terms |
| BS 6105 | Specification for corrosion-resistant stainless steel fasteners |
| BS 6367 | Code of practice for drainage of roofs and paved areas |
| BS 6399-2:1997 | Loading for buildings, Code of Practice for wind loads |
| BS 7619:2009 | Specification for extruded cellular Unplasticised PVC profiles |
| BS 8200:1985 | Code of practice for design of non-load bearing external vertical enclosures of buildings |
| BS EN 12200:2000 | Specification for pipes, fittings and the system |
| EN 20105-A02 | Methods of test for colour fastness of textiles and leather |
| ISO 14001 | Environmental Management Standards |

BRE DIGESTS 299 and 345
BRE Green Guide 2009

Health and Safety at Work Act 1974

Factories Act 1961
The construction (Working Places) Regulations 1966
The Construction (General Provisions) Regulations 1961
The Construction (Health and Safety) Regulations 1966

Asbestos Regulations HSE 1969

Building Regulations - Approved Document C2
CDM Regulations

NHBC Chapter 6.2:1992
APPENDIX B: Timber species suitable for use as structural timbers

Douglas fir
Larch
Scotch pine
Corsican pine
European spruce
Hemlock
Southern pine
Sitka spruce
Redwoods