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BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

CA Building Products

Certificate No 07/4428

DETAIL SHEET 3

RIVER-THERM ROOF SYSTEM

Product

- *THIS DETAIL SHEET RELATES TO THE RIVER-THERM[1] ROOF SYSTEM.*
- *The system is for use as structural roofing with a minimum finished fall of 1° and self-curved roofs of minimum radius 30 m, where access is available for maintenance and repair.*
- *The product is weathertight and structural within the limits set out in this Certificate.*
- *The roof system is suitable for buildings used for industrial, commercial, retail and leisure purposes as well as residential and non-residential buildings such as schools and hospitals.*

(1) River-Therm is a registered trademark.

Technical Specification

1 Description

1.1 The River-Therm Roof System is a roof covering of interlocking profiled sheets installed, via a patented spacer and lining system to the roof purlins. The external roof sheets are secured to the spacer system with specially designed blocks, using foot pressure, eliminating the need for specialist fixing tools. The profile is designed to withstand foot traffic both on the seams and in the pans.

1.2 The profiled sheets may be used on self-curved roofs with a minimum radius of curvature of 30 m. Mechanically, smooth, curved roofs down to 6 m radius may be constructed but these are outside the scope of this Certificate.

1.3 Each component is supplied to a specification by the Certificate holder. The roof system comprises:

External profile sheets

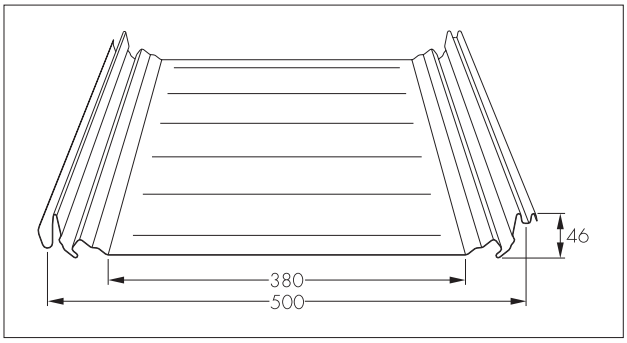
- external sheet profile type RT-500 (see Figure 1), sheets are roll formed to the full length of the roof eliminating the need for end laps. Sheet lengths greater than 12 m are generally rolled on site
- 0.55 mm profiled steel sheets available in:
  - Colorcoat HPS 200 [200 µm thick[1][2]] on zinc/aluminium-coated steel, grade S220 GD +ZA255 to BS EN 10327 : 2004; or
- 0.8 mm profiled aluminium alloy sheets, grade EN AW 5754 H28 in mill finish or stucco embossed or
- 0.8 mm profiled aluminium alloy sheets grade EN AW 5754 H18 coil coated with PVDF[3].

(1) Other thicknesses are available, but are outside the scope of this Certificate.

(2) Colorcoat HPS 200 is covered by BBA Certificate No 91/2717.

(3) Euramax Coil Coated Aluminium Sheet is covered by BBA Certificate No 93/2922.

Figure 1 Type RT-500 profile (all dimensions in mm)



External profile accessories

- RT-block used to secure external sheets to spacer system, manufactured from black polyamide reinforced nylon. [When using stucco embossed outer sheet alternative RT-block is used manufactured from white POM (poliossimetilene) reinforced with 5% fibreglass]
- RT-block fixing — type SC32 No12 gauge 32 mm long No 2 point carbon steel, self-drilling fastener, zinc plated 8 µm thick used to fix the RT-block to the Therma-bar Plus spacer (two fixings per RT-block)
- RT-lock block — used to create a fixed point on curved roof applications. Manufactured from black glass filled nylon
- RT-lock block fixing — type TTC81 No 14 gauge 81 mm long No 2 carbon steel self-drilling fastener, zinc-plated used to fix the RT-lock block through the sheet to the Therma-bar Plus spacer (two fixings per RT-lock block).

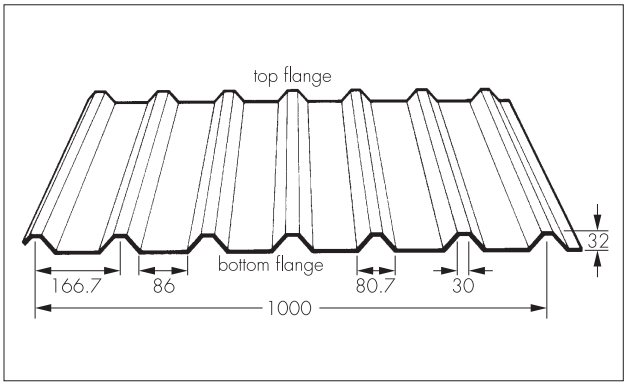
External profile fillers

- RT-filler — filler blocks, suitable for closing ridge of external profile
- RT-eaves filler — filler blocks, suitable for eaves of external profile.

Liner panel profile

- CA 32 1000RL – 0.7 mm profiled steel sheets, formed from zinc/aluminium-coated steel, grade S220 GD +ZA255 to BS EN 10327 : 2004 and finished with a two-coat primer/polyester system on the reverse side and 25 µm thick Colorcoat Bright White lining enamel on the visible side (see Figure 2).

Figure 2 Type CA 32 1000RL (all dimensions in mm)



Liner panel fixings and sealants

- Liner panel fasteners — type TSC20G19, No 12 gauge, 20 mm long No 2 point carbon steel, self-drilling fastener, zinc plated 8 µm with galvanized bonded washer to seal holes created by the fastener preventing moisture vapour from transferring via the fastener into the roof cavity. For purlins from 4 mm to 10 mm thick, a type TSL36G19 No 12 gauge, 36 mm long No 5 point carbon steel, self-drilling fastener, zinc plated 8 µm with galvanized bonded washer is used.
- Liner panel sealant – there are two types:
  - Therma-foil Plus – an aluminium foil tape incorporating a butyl sealant strip and is used to seal side laps. This contributes to the liner panel acting as the vapour control layer (VCL) and increasing the airtightness of the system
  - Therma-strip 6 mm by 5 mm sealant – butyl sealant used to seal end laps for improved moisture vapour transmission rates (MVTR) and extended life. Therma-strip ensures that the liner panel acts as the VCL
- polyethylene filler – 25 mm wide and manufactured to suit the liner panel.

Other River-Therm accessories

- Therma-bar Plus – 1.5 mm thick galvanized steel, grade Fe E350G Z275 to BS EN 10326 : 2004, manufactured to suit module
- Therma-block – virgin polypropylene spacer block used to provide additional space in the roof construction and isolate the Therma-bar Plus from the Therma-block fastener. Therma-blocks are supplied 50 mm or 100 mm high, depending on U value requirements and are designed to cut through Therma-quilt insulation during installation
- Therma-stool – 2 mm thick, galvanized steel grade Fe E350G Z275 to BS EN 10326 : 2004, 95 mm high and 75 mm wide used with 0.20 $Wm^{-1}K^{-1}$ U value construction
- 50 mm Therma-block fastener – type SSC82, 6.3 mm diameter (14 gauge) by 82 mm long stainless steel (314), self-drilling fastener used to fix the block to Therma-stool used with 0.20 $Wm^{-1}K^{-1}$ U value construction
- 100 mm Therma-block fastener – type TTC 132 No 14 gauge, 6.3 mm diameter by 132 mm long with drill-point No 2, carbon steel, self-drilling fastener, zinc plated and coated with Delta tone, is used to fix the block to mild steel purlins from 1.5 mm to 3.5 mm thick. For purlins from 4 mm to 10 mm thick, a type TTL 145, No 12 gauge, 5.5 mm diameter by 145 mm long with drill-point No 5, fastener of the same material is used
- Ridge zed bar — used at ridge locations to hold filler in place and lock ridge detail and manufactured from 1.5 mm thick galvanized

steel, grade Fe E350G Z275 to BS EN 10326 : 2004

- SSC45516 fastener — No 12 x 25 mm long No 2 point 304 stainless steel, self-drilling fastener with bonded stainless steel, washer, used to secure sheet pan to ridge zed when creating a fixed point at the ridge
- Therma-channel — used in place of Therma-bar Plus at ridge and eaves locations and manufactured from 1.5 mm thick galvanised steel, grade Fe E350G Z275 to BS EN 10326 : 2004
- Therma-quilt insulation – is a non-hygroscopic glassfibre material available with a thermal conductivity of 0.039 $Wm^{-1}K^{-1}$ of thickness 110 mm or 180 mm in rolls giving a cover width of 1000 mm without gaps between adjacent rolls.

1.4 The sequence of components for the system (see Figure 3) is:

- Liner panels type CA 32 1000RL fixed with appropriate fasteners (see section 1.3) and side laps sealed with Therma-foil Plus, end laps sealed with Therma-strip with solid polyethylene fillers at eaves
- Therma-quilt insulation — laid continuously from ridge to eaves with tight abutments at roll ends
- Therma-bar Plus and Therma-block (with Therma-stool for 0.20 $Wm^{-1}K^{-1}$ U value constructions) fixed with appropriate fasteners (see section 1.3) supplied by the Certificate holder
- external profile type RT-500 and appropriate RT-blocks with vented eaves and solid ridge foam fillers.

1.5 Customised accessories are supplied by the Certificate holder, but are outside the scope of this Certificate.

1.6 Openings for rooflights and through fittings can be incorporated in the River-Therm Roof System, but are outside the scope of this Certificate.

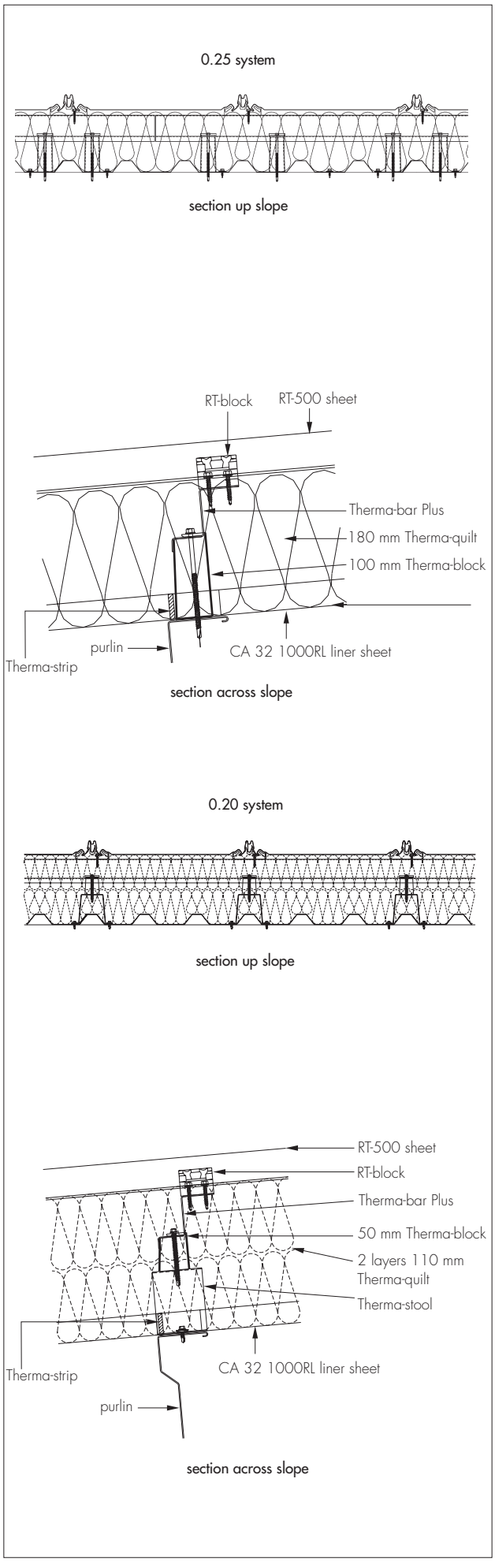
1.7 Quality control on incoming materials includes checks on:

- dimensions
- chemical composition
- mechanical properties
- coating thicknesses.

1.8 Regular checks are made on finished panels for:

- dimensions
- rolling damage to coatings
- compatibility with RT-block
- resistance to in-plane movement when clipped in to RT-block
- walkability of RT-500 sheet.

Figure 3 River-Therm Roof System



2 Delivery to site and storage

2.1 Detailed guidance on transportation, handling and storage is available from the Certificate holder. External sheets of lengths greater than 12 m are generally rolled on site. Reference should be made to the Certificate holder for advice as to whether factory or on-site rolling is most suitable for a particular project.

2.2 The roof and liner sheets are delivered in banded bundles (sequential packaging is available) and should be handled carefully when off-loading by fork-lift to avoid damage of the sheets, and the edges protected when hoisting into position using soft, wide slings. Lifting beams must be used when moving sheets in excess of 8 m.

2.3 Individual sheets should be handled with care to prevent damage to the surface finish, the edges or corners. Damaged sheets should not be installed, further information is available from the Certificate holder.

2.4 The roof and liner sheets and their accessories should be stored under cover in the original packing and in a dry, well-ventilated position. River-Therm roof and liner sheets should be kept away from building activities where contamination by lime or cement would cause staining.

2.5 When stacked on site, packing between sheets should be aligned vertically to ensure that the weight is transmitted directly through the packs and not the sheets. Sheets should be kept clear of the ground and stacked with a slight fall to shed any moisture that may penetrate the covers. Stacked sheets should be protected by tarpaulins or plastic covers, held clear of the stacked material to allow ventilation.

Design Data

3 General

3.1 The River-Therm Roof System is satisfactory for use on buildings as a structural roof system, with slopes down to 1°, where access is available only for maintenance and repair. The system is also suitable for self-curved roofs of radius greater than 30 m. Mechanically curved roofs with a minimum radius of 6 m may be constructed but are outside the scope of this Certificate.

3.2 The system can be fixed to steel, concrete or timber purlins. However, the design information given in this Certificate is relevant only to fixing to mild steel purlins. Advice from the Certificate holder should be sought to determine the type of fasteners and design data required.

3.3 If architectural features and rooflights are required then, in common with all metal roofs, special care and attention is necessary to ensure correct detailing and installation.

4 Practicability of installation

The system is practicable to install using methods and designs within the scope of this Certificate and in accordance with the Certificate holder's *River-Therm Installation Guide and Component Specification*. All site installations must be carried out by, or under the direct supervision of, personnel who have had full training by the Certificate holder on all aspects of the system and its components. Guidance can be obtained from the Certificate holder.

5 Weathertightness

5.1 When installed in accordance with the manufacturer's instructions (see Certificate holder's *River-Therm Installation Guide and Material Specification*) and this Certificate, the ridge, eaves, verge details and roof sheets will be weatherproof, with respect to rain and wind-driven moisture, when used on roofs with slopes greater than 1° (or self-curved roofs of radius greater than 30 m), and within exposure conditions related to the recommended maximum design wind pressures given in section 7.

5.2 The weathertightness of the system will not be adversely affected by normal service deflections.

6 Maintenance and repair

6.1 River-Therm roofs should be regularly inspected for accidental damage and build-up of dirt and debris. Damage must be repaired and accumulated dirt and debris must be removed. The frequency of inspections will depend on the environment and use of the building. Typically roofs will be inspected on completion, 12 months after completion and then every three years.

6.2 In industrial or marine areas it may be necessary to clean the installation periodically by hosing with water and a neutral detergent to remove potentially corrosive deposits and restore its appearance. It may be necessary to clean soffits in any environment.

6.3 Damaged sheets can be removed and replaced. Small damaged areas of the coated material may be re-coated using the appropriate touch-up paint system. Full details of methods for removal and replacement can be obtained from the Certificate holder.

6.4 If regular access to the roof is necessary (eg for maintenance of equipment), appropriate access and safety precautions should be provided.

7 Structural performance

7.1 The roof will have adequate strength and stiffness to sustain the specified loads when the system is designed in accordance with this Certificate. Load/span values for the RT-500 profile in steel and aluminium are given in Table 1.

Table 1 Load span values

Span (mm)	Maximum positive loading (snow) kNm^{-2}		Maximum negative loading (wind) kNm^{-2}	
	Steel sheets	Aluminium sheets	Steel sheets	Aluminium sheets
600	8.0	8.0	5.3	6.2
800	7.8	7.8	5.0	5.5
1000	7.6	7.6	4.7	4.8
1200	7.5	7.5	4.4	4.1
1400	7.3	7.3	3.6	3.3
1600	7.1	7.1	2.8	2.6
1800	7.0	7.0	2.1	1.9

General notes:

- the above data has been prepared in accordance with BS 5427-1 : 1996, based on test data from CERAM Building Technology using 0.55 mm steel and 0.8 mm aluminium roof sheets.
- the self-weight of the RT-500 sheeting has been taken into account in preparing the above data.
- the tables are for uniformly distributed loads on multiple spans. All spans are assumed to be equal or within 15% of the largest span.
- the span is the distance between purlins or Therma-bar Plus rails if fitted to a structural deck.
- the partial safety factors used in generating the above data are dead loads: 1.4 in same direction to wind load and 1.0 in opposite direction to wind load.
- imposed loads: 1.6 for normal loads, 1.05 for exceptional snow drifting. Wind loading: 1.4. Attachment eg (fixing capacity, halter pull-off) — 2.0.
- positive deflection limit = span/200 and negative deflection limit = span/90.
- for single or double spans, excessive loads or spans, different deflection criteria, different factors of safety and different metals, advice should be sought from the Certificate holder.

7.2 Each installation must be checked by a suitably-qualified structural engineer. The design work required includes:

- checking the design requirements usually based on BS 5950-6 : 1995
- evaluation of the various design loads (dead, imposed and wind) on both the outside and inside surfaces of the roof system
- checking that loads do not exceed the permissible values given in Table 1
- checking the adequacy of the fasteners between the Therma-bar Plus/-blocks/-stools and the main purlin.

7.3 Crawling boards or purpose walkways should be provided during installation of liner sheets.

7.4 External sheets are capable of withstanding normal foot traffic and impact due to normal handling, installation and service. If damaged during use they should be replaced (see section 14.1).

7.5 A fixed point should be designed into the roof, generally at the ridge. The standard way of achieving this on a pitched roof is to fix the outer sheets to the ridge zed using four SSC45S16 fasteners in the pan of each sheet. On a curved roof it is usual to use one row of RT-lock-blocks on adjacent purlins either side of the highest point of the roof. These are fixed through the valley of the seam of the sheet using two RT-lock block fixings (see section 1.3).

7.6 The roof system is able to accommodate movement of the outer sheets due to thermal expansion/contraction so long as it is installed in accordance with this Certificate and the Certificate holder's instructions.

8 Condensation risk

8.1 In common with all metal roof constructions, there is a risk of condensation. This can arise either as interstitial condensation within the roof construction or as surface condensation at thermal bridges.

Surface condensation

8.2 The internal temperature at which surface condensation will occur on the internal surfaces of the roof is dependent on both the internal relative humidity and the external temperature. For roof constructions comprising 180 mm (compressed to 175 mm) or 220 mm thicknesses of insulation, it has been shown by computer modelling that the risk of condensation occurring on the internal surfaces (including those below the thermal bridging formed by the Therma-bar Plus and Therma-block fixings) is negligible.

8.3 In buildings likely to experience sustained high internal relative humidities there is a risk of condensation forming on and around the fixing screws penetrating the purlin. The designer should anticipate the areas of the structure that could be at risk from local sources of humidity and take the necessary measures to prevent any such problems.

Interstitial condensation

8.4 The River-Therm Roof System has been favourably assessed for the risk of damage due to interstitial condensation. In the assessments, it has been assumed that the following details have been observed. The assessment is not valid without these details in place:

- liner panel laps are adequately sealed – this is achieved by using 6 mm by 5 mm Therma-strip sealant for end laps and 40 mm or 50 mm wide Therma-foil Plus for the side laps
- the ribs of the RT-500 profile are ventilated by air passing along them from and to a continuous gap of 3 mm wide at the eaves.

8.5 Computer modelling predicts that for buildings in internal humidity classes 1 to 4 (see Table 2) interstitial condensation is unlikely to be a significant problem under the normal climatic conditions experienced in the UK, provided the liner remains adequately sealed (see section 14.1).

Table 2 Internal humidity classes

Humidity class (BS 5250)	Building types
1	Storage areas
2	Offices, shops
3	Dwellings with low occupancy
4	Dwellings with high occupancy, sports halls, kitchens, canteens; buildings heated with un-flued gas heaters
5	Special buildings, eg laundries, breweries, swimming pools.

8.6 For buildings in internal humidity class 5 and in buildings or areas of a building with special internal design conditions, a hygrothermal assessment of the proposed roof system should be undertaken using the guidance given in BS 6229 : 2003, BS 5250 : 2002 and BS 5925 : 1991 to establish whether special provisions are required.

8.7 For those conditions that apply in section 8.6 an additional vapour control layer and breather membrane within the roof system and/or additional ventilation or air-conditioning may be required to maintain the internal conditions within acceptable limits. Advice should be sought from the Certificate holder's technical department.

8.8 A separate vapour control layer must always be installed when the roof is used for a dwelling.

9 Thermal insulation

9.1 The thermal performance of each building incorporating the roof system must be evaluated in accordance with the relevant national Building Regulations, and is the responsibility of the overall designer of the building.

9.2 Typical U values for roofs, calculated in accordance with BS EN ISO 10211-2 : 2001, are given in Table 3.

Table 3 U values ($Wm^{-2}K^{-1}$)

Purlin spacing	U Value	
(m)	0.20 system[1]	0.25 system[2]
0.6	0.23	0.28
0.8	0.22	0.27
1.0	0.21	0.26
1.2	0.21	0.26
1.4	0.20	0.25
1.6	0.20	0.25
1.8	0.20	0.25

(1) 0.20 system comprises CA 32 1000RL liner, 95 mm high Therma-stool, 50 mm Therma-block, Therma-bar Plus, two layers of 110 mm thick Therma-quilt insulation of thermal conductivity 0.039 $Wm^{-1}K^{-1}$ and RT-500 outer sheets.

(2) 0.25 system comprises CA 32 1000RL liner, 100 mm Therma-block, Therma-bar Plus, 180 mm Therma-quilt insulation of thermal conductivity 0.039 $Wm^{-1}K^{-1}$ compressed to 175 mm and RT-500 outer sheets.

9.3 The roof system contributes to meeting the requirements of the national Building Regulations, thus:

England and Wales

The roof system cannot achieve[1]:

– 0.16 Wm^2K^{-1} required for 'notional' dwellings in SAP 2005.

- roofs, subject to insulation thickness and purlin spacing, can achieve[1] (see Table 3):
  – 0.25 $Wm^{-2}K^{-1}$ for a 'notional' building, other than a dwelling, in the Simplified Building Energy Model SBEM
  – 0.25 $Wm^{-2}K^{-1}$ limit average value specified in Approved Documents L1A, Table 2 and L2A Table 4
  – 0.35 $Wm^{-2}K^{-1}$ limit value for an individual roof element specified in Approved Documents L1A, Table 2 and L2A, Table 4.
- junctions shown in Figure 7 adequately limit heat loss by conduction and, when installed to limit air infiltration (see sections 10.1 and 10.2), comply with the requirements of *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings* TSO 2002, and the Accredited Construction Details (version 1.0). The relevant default psi values quoted in BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*, Table 3, may be used for these junctions in SAP or SBEM calculations.

(1) Where a proposed building roof U value is not better than that specified for the 'notional' building, additional energy saving measures will be required within the building envelope and/or services in order to achieve the required overall carbon dioxide emission rate reduction of about 20% for dwellings and 23 to 28% for buildings other than dwellings. Further information should be sought from the Certificate holder.

Scotland

- the roof system cannot achieve the U value of 0.16 $Wm^{-2}K^{-1}$ specified for:
  – a 'notional' domestic roof with reference to clause 6.1.6[1] and SAP 2005
  – a 'notional' non-domestic pitched room (>10°) with reference to clause 6.1.3[2] and when 'Scotland' is selected in SBEM[3].
- roofs, subject to insulation thickness and purlin spacing, can achieve[3] (see Table 3):
  – 0.20 $Wm^{-2}K^{-1}$ maximum average specified in Table to clause 6.2.1[1]
  – 0.25 $Wm^{-2}K^{-1}$ maximum average value specified in Table to clause 6.2.1[1][2]
  – 0.35 $Wm^{-2}K^{-1}$ maximum value for an individual roof element specified in Table to clause 6.2.1[1][2].

- junctions shown in Figure 7 adequately limit heat loss by conduction and, when installed to limit air infiltration (see sections 10.1 and 10.3), comply with the requirements of the Accredited Construction Details (Scotland) in relation to clauses 6.2.3[1] and 6.2.4[2]. The relevant default psi values quoted in BRE Information Paper 1/06, Table 3, may be used for these junctions in SBEM calculations.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

(3) Wherever a proposed building roof value is not better than that specified for the 'notional' building, additional energy saving measures will be required within the building envelope and/or services in order to achieve the required overall carbon dioxide emission rate reduction of about 18% to 25% for domestic buildings and 23% to 28% for non-domestic buildings. Further information should be sought from the Certificate holder.

Northern Ireland

The roof system cannot achieve[1]:

– 0.16 $Wm^{-2}K^{-1}$ required for 'notional' dwellings in SAP 2005[1].

- roofs, subject to insulation thickness and purlin spacing, can achieve[1] (see Table 3):
  - 0.25 $Wm^{-2}K^{-1}$ for a 'notional' building other than a dwelling specified in SBEM
  - 0.25 $Wm^{-2}K^{-1}$ limit average value specified in Technical Booklets F1, Table 2.2 and F2, Table 2.4
  - 0.35 $Wm^{-2}K^{-1}$ limit value for an individual roof element as specified in Technical Booklets F1, Table 2.2 and F2, Table 2.4.
- junctions shown in Figure 7 adequately limit heat loss by conduction and, when installed to limit air infiltration (see sections 10.1 and 10.4), comply with the requirements of the Accredited Construction Details (version 1.0). The relevant default psi values quoted in BRE Information Paper IP/06, Table 3, may be used for these junctions in SBEM calculations.

(1) Where a proposed building roof U value is not better than that specified for the relevant 'notional' building, additional energy saving measures will be required within the building envelope and/or services in order to achieve the required overall carbon dioxide emission rate reduction of about 20% for dwellings and 23 to 28% for buildings other than dwellings. Further information should be sought from the Certificate holder.

10 Air permeability

10.1 To minimise air leakage, the liner must be installed and sealed in accordance with the Certificate holder's recommendations at all laps, penetrations and around the perimeter. The standard River-Therm construction, correctly installed, has been shown to be capable of achieving a level of performance equal to or less than 3 $m^3h^{-1}m^{-2}$ when tested after installation at a pressure of 50 Pa.

10.2 Completed buildings in England and Wales are subject to pre-completion testing for airtightness in accordance with the requirements of section 20B of Approved Documents L1A and L2A.

10.3 Completed buildings in Scotland are only subject to pre-completion airtightness testing if the target air permeability of the proposed building is less than 10 $m^3h^{-1}m^{-2}$, or if the figure is between 10 $m^3h^{-1}m^{-2}$ and 15 $m^3h^{-1}m^{-2}$ and the designer does not wish to use the 15 $m^3h^{-1}m^{-2}$ default figure in the proposed building, in accordance with clauses 6.2.5[1] and 6.2.6[2].

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

10.4 In Northern Ireland, completed buildings are subjected to pre-completion testing for airtightness in accordance with the requirements of Technical Booklets F1, sections 2.46 to 2.54 and F2, Sections 2.57 to 2.61.

11 Performance in relation to fire

11.1 The external sheets of the River-Therm Roof System have been assessed as having a notional AA designation in accordance with BS 476-3 : 2004.

11.2 The following surfaces have been assessed in accordance with the national Building Regulations, using data from tests to BS 476-6 : 1989 and BS 476-7 : 1997:

- Therma-quilt insulation – Class 1 classification
- underside of liner panels – Class 0 classification.

12 Durability

12.1 The durability of type RT-500 profile will depend upon the coating material, the immediate environment, aspect faced, and use. Colour changes will be slight and uniform.

12.2 When used in the context of this Certificate, uncoated RT-500 sheets will have the minimum service life given in section 12.9.

12.3 Maintenance painting may be necessary to restore the appearance of coated sheets or to extend their design life, and should be considered at the intervals given in Table 4.

Table 4 Service life

Sheet material	Minimum service life (years)[1]	
	Environment	
	Rural or suburban	Industrial or coastal
HPS 200 coated steel[2]	30 for CD1 colours 20 for CD2 colours	25 for CD1 colours 15 for CD2 colours
PVDF[3] coated aluminium[4]	20	15

(1) Minimum service life is that when first maintenance painting is required.

(2) Full details of HPS 200 coated materials are given in BBA Certificate No 91/2717.

(3) PVDF is also referred to as PVF_2.

(4) Full details of PVDF coated materials are given in BBA Certificate No 93/2922.

12.4 For coated sheets, if the building has an exposed eaves detail and is in an aggressive environment, or if there are corrosive conditions inside, a more durable specification of the reverse side coating should be used. Details can be obtained from the Certificate holder.

12.5 A planned maintenance cycle (see section 6) should be introduced if an extended design life is required. The Certificate holder can recommend a suitable system for maintenance painting.

12.6 Colour changes will be slight and uniform on any one elevation.

12.7 Uncoated aluminium sheets must not come into contact with the materials listed below. Where problems of incompatibility are likely to occur, barriers (eg paints, tapes or pads, appropriate to the materials and environment) should be incorporated:

in any conditions

- ungalvanized mild steel
- copper and its alloys (including the run-off from copper roofs)
- timber treated with fire retardants
- mortar
- alkali-bearing materials

in damp conditions

- timber preserved with copper compounds
- other metals (ie bimetallic contact)

in coastal environments

- lead
- stainless steel

in industrial environments

- lead.

12.8 Under normal exposure conditions aluminium sheets do not need painting for corrosion resistance but, if desired, can be painted using conventional techniques for the materials.

12.9 Roofing constructed with uncoated aluminium sheet will have a minimum service life of 40 years in rural and suburban environments and a minimum 25 years in more aggressive areas, eg severe industrial or coastal environments.

Installation

13 General

13.1 Installation of the River-Therm Roof System is to be carried out by suitably competent personnel in accordance with the Certificate holder's Installation Guide. The Certificate holder will provide full training for sub-contractors who have not fixed the system previously.

13.2 The contractor may sub-divide the roof erection into areas (ie lining, insulation, top sheets and flashing) able to be completed within one working day. Alternatively, the whole roof area is covered with the liner panels and the roof installed as described in the Certificate holder's Installation Guide.

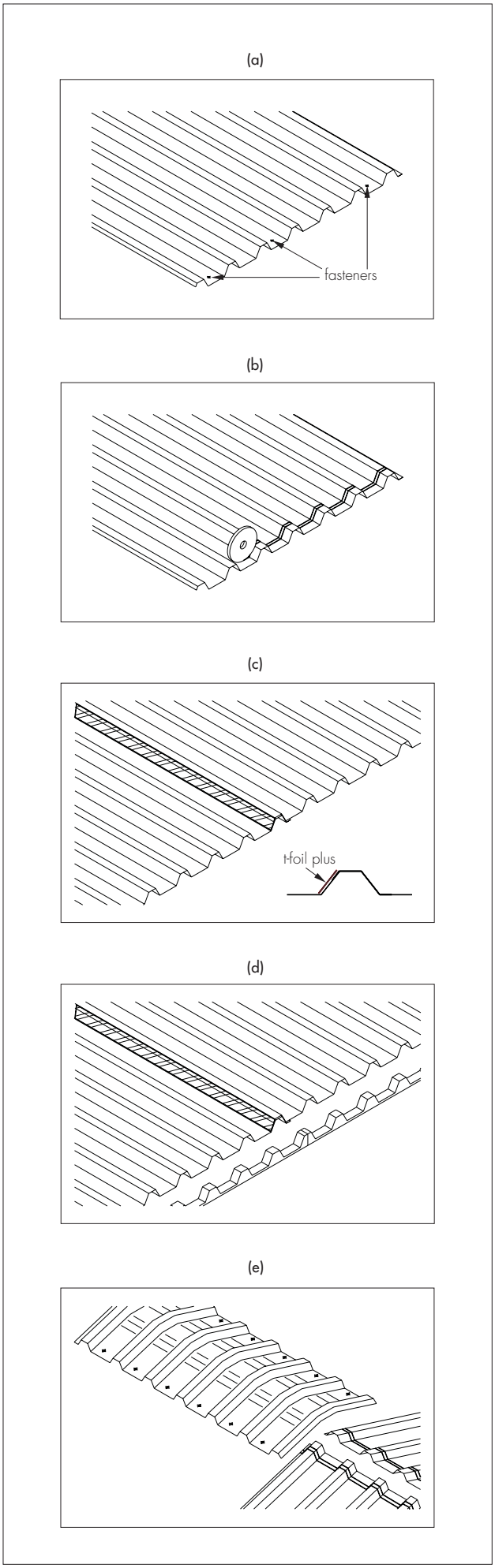
13.3 Roof surfaces can be slippery when wet and the designer, contractor, and others should consider these characteristics when they prepare the Health and Safety Plan for the contract.

14 Procedure

14.1 The liner panels are fixed to the purlins (see Figure 4a), using liner panel fasteners (see section 1.3) in alternate valleys of the liner at each purlin. The panels are sealed with one run of Therma-strip (6 mm by 5 mm) for all end laps (see Figure 4b), and one run of Therma-foil Plus for all side laps (see Figure 4c). Swarf or debris is removed from the panels. Solid polyethylene fillers are introduced at details, such as ridge, eaves, hips, valleys, to ensure continuity of the vapour control layer (see Figure 4d). Damaged panels should be replaced and sealed in the manner described above.

14.2 Therma-crank ridge liners should be used where appropriate and fixed and sealed to the liner panels as above (see Figure 4e).

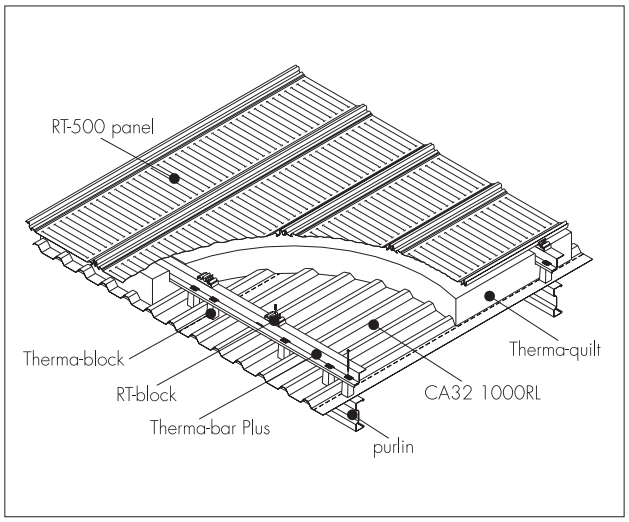
Figure 4 Installation of steel liner sheets



14.3 The Therma-quilt is laid in one continuous run from ridge to eaves (where lengths are insufficient to enable this, a firm abutment is required).

14.4 The Therma-bar Plus and Therma-blocks are fixed through the Therma-quilt and liner panels (see Figure 5) to the roof purlin or Therma-stool, using the appropriate fasteners described in section 1.3. Therma-channels are used in place of Therma-bar Plus at ridge and eaves respectively.

Figure 5 Insulation



14.5 The external roof sheet type RT-500 is fixed to the Therma-bars using the appropriate RT-block. The first run of RT-blocks should be positioned with the centre of the RT-block directly over the centre of the side lap of the liner panel. It is important that the blocks are set out within the tolerances specified by the Certificate holder.

14.6 The next run of RT-blocks should be positioned using the River-Therm setting-out template at ridge and eaves, and intermediate purlins at approximately 5 m intervals and fixed with the appropriate fasteners.

14.7 The first RT-500 sheet is clipped into the first row of RT-blocks and then into the blocks that have been fixed in the second row. At the remainder of purlins the RT-block is first clipped to the sheet and then secured to the purlin [see Figure 6 (a) to (c)]. The next sheet is clipped into the RT-blocks and over the previous sheet [see Figure 6 (d) to (f)] and the next row of RT-blocks installed as described in section 14.6.

14.8 Fixed point details should be completed by fixing the sheet pan to the ridge zed bar with four SSC45516 fasteners or using RT-lock blocks for curved roofs.

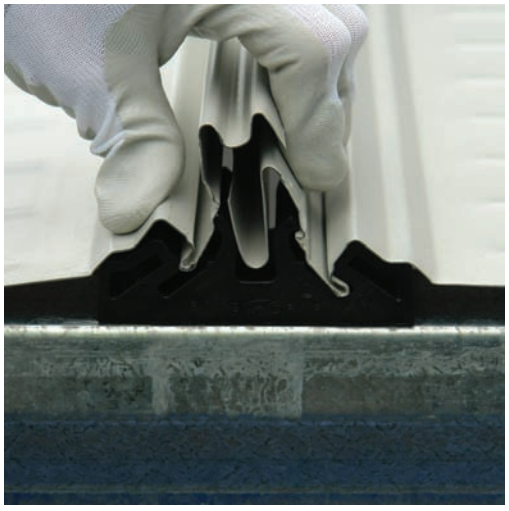
14.9 Typical construction details are given in Figure 7.

Figure 6 Installing external weather-skin sheets

(a) Underlap of sheet being clipped into RT-block

(b) Sheet being fully inserted into RT-block

(c) RT-block being secured to Therma-bar Plus

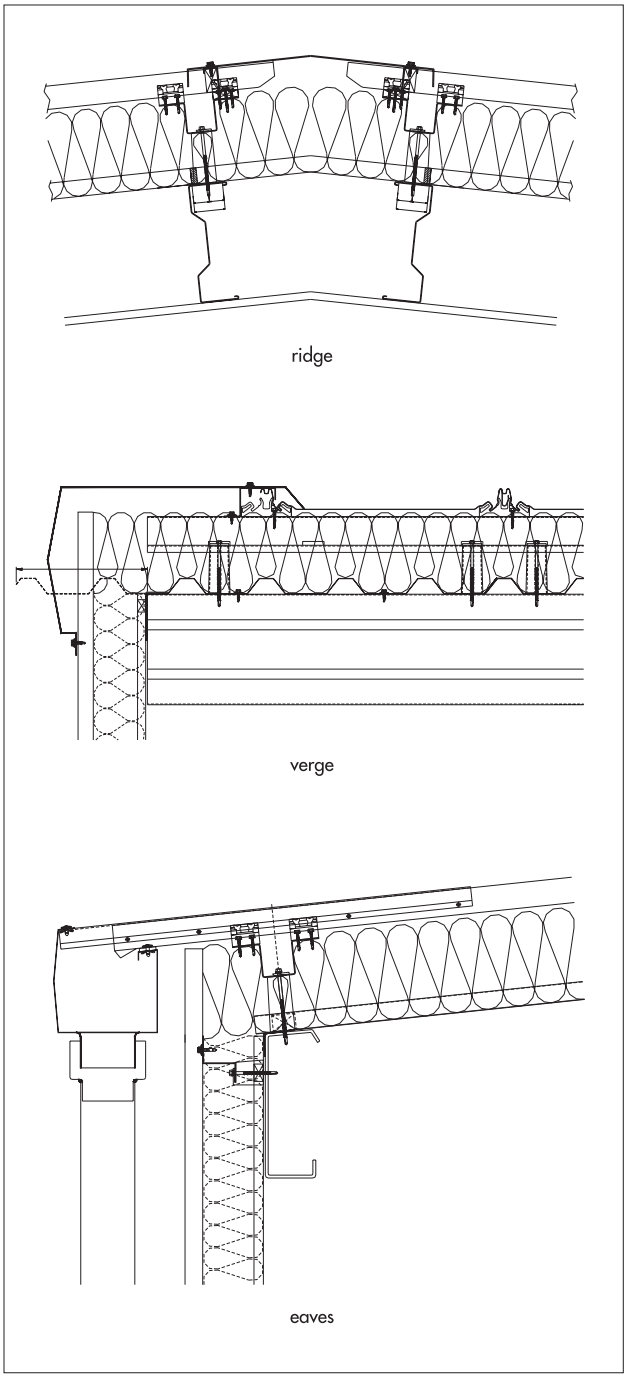


(d) Overlap of sheet being clipped into RT-block

(e) Foot pressure used to fully insert sheet into RT-block

(f) Foot pressure used to clip overlap of sheet onto underlap of preceding sheet

Figure 7 Ridge, eaves and verge details



Technical Investigations

The following is a summary of the technical investigations carried out on the River-Therm Roof System.

15 Tests

15.1 Test were carried out on the product to establish:

- resistance to dead and imposed (snow) loading
- resistance to wind loading
- behaviour of fixings and profile under static and cyclic loading
- resistance to impact
- behaviour under concentrated loads
- behaviour under thermal movement.

16 Investigations

16.1 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained relating to the quality and composition of materials used.

16.2 An assessment was made of:

- structural adequacy of roof system with steel and aluminium RT-500 profiled sheets
- performance in fire
- practicability of installation
- condensation risk and thermal transmittance (evaluated by calculation)
- weathertightness of the roof sheets and joints.

16.3 Existing information, relating to the durability of the system and compatibility of materials in contact, has been examined.

16.4 A visit was made to a site to assess the practicability of installation.

Additional Information

CA Building Products has been assessed by the Health and Safety Executive (HSE) as being capable of carrying out the necessary tests to establish a non-fragile assembly in accordance with the HSE document ACR(M)001 : 2005 for the system. This aspect is outside the scope of this Certificate and is entirely the responsibility of the Certificate holder. Further details are available from the Certificate holder.

Bibliography

BS 476-3 : 2004 *Fire tests on building materials and structures — Classification and method of test for external fire exposure to roofs*

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

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

BS 5250 : 2002 *Code of practice for control of condensation in buildings*

BS 5427-1 : 1996 *Code of practice for the use of profiled sheet for roof and wall claddings on buildings — Design*

BS 5925 : 1991 *Code of practice for ventilation principles and designing for natural ventilation*

BS 5950-6 : 1995 *Structural use of steelwork in building — Code of practice for design of light gauge profiled steel sheeting*

BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*

BS EN 10326 : 2004 *Continuously hot-dip coated strip and sheet of structural steels — Technical delivery conditions*

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BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

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