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Agrément Certificate  
**90/2509**  
Product Sheet 1

## TERRAPLEGEL ROOFING SYSTEMS

### TERRAPLEGEL DUTCH PANTILE

#### PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Terraplegel Dutch Pantile, consisting of preformed, aggregate-coated, galvanized steel tilesheets and accessories for use on roof structures with a minimum pitch angle of 10°.

#### AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



#### KEY FACTORS ASSESSED

**Weathertightness** — the product, with a proper underlay, has satisfactory resistance to the passage of rain and snow (see section 5).

**Strength and stability** — the product has adequate resistance to the effects of wind loading likely to be met in service (see section 6).

**Properties in relation to fire** — the product may be unrestricted under the national Building Regulations (see section 7).

**Durability** — the polyester coating and galvanizing will protect the steel substrate against corrosion and will give the product a service life in excess of 30 years (see section 10).

The BBA has awarded this Agrément Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Simon Wroe  
Head of Approvals — Materials

Greg Cooper  
Chief Executive

Date of First issue: 15 December 2011

Originally certificated on 1 August 1990

*The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at [www.bbacerts.co.uk](http://www.bbacerts.co.uk)*

*Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.*

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# Regulations

In the opinion of the BBA, Terraplegel Dutch Pantile, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



## The Building Regulations 2010 (England and Wales)

|              |              |                                                                                                         |
|--------------|--------------|---------------------------------------------------------------------------------------------------------|
| Requirement: | B3(2)        | Internal fire spread (structure)                                                                        |
| Requirement: | B4(2)        | External fire spread                                                                                    |
| Comment:     |              | The product may be unrestricted under these Requirements. See sections 7.1 and 7.2 of this Certificate. |
| Requirement: | C2(b)        | Resistance to moisture                                                                                  |
| Comment:     |              | The product can contribute to meeting this Requirement. See section 5 of this Certificate.              |
| Requirement: | Regulation 7 | Materials and workmanship                                                                               |
| Comment:     |              | The product is acceptable. See section 10.1 and the <i>Installation</i> part of this Certificate.       |



## The Building (Scotland) Regulations 2004 (as amended)

|             |         |                                                                                                                                                                                                                                                                                    |
|-------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Regulation: | 8(1)(2) | Fitness and durability of materials and workmanship                                                                                                                                                                                                                                |
| Comment:    |         | The product can contribute to a construction meeting this Regulation. See sections 9.1, 9.2, 10.1 and the <i>Installation</i> part of this Certificate.                                                                                                                            |
| Regulation: | 9       | Building standards – construction                                                                                                                                                                                                                                                  |
| Standard:   | 2.1     | Compartmentation                                                                                                                                                                                                                                                                   |
| Standard:   | 2.2     | Separation                                                                                                                                                                                                                                                                         |
| Comment:    |         | The product can contribute to satisfying these Standards, with reference to clauses 2.1.15 <sup>(2)</sup> , 2.2.7 <sup>(2)</sup> and 2.2.10 <sup>(1)</sup> respectively. See sections 7.1 and 7.2 of this Certificate.                                                             |
| Standard:   | 2.8     | Spread from neighbouring buildings                                                                                                                                                                                                                                                 |
| Comment:    |         | The product may be unrestricted under this Standard, with reference to clause 2.8.1 <sup>(1)(2)</sup> . See sections 7.1 and 7.2 of this Certificate.                                                                                                                              |
| Standard:   | 3.10    | Precipitation                                                                                                                                                                                                                                                                      |
| Comment:    |         | The product can contribute to satisfying this Standard, with reference to clauses 3.10.1 <sup>(1)(2)</sup> and 3.10.8 <sup>(1)(2)</sup> . See section 5 of this Certificate.                                                                                                       |
| Standard:   | 7.1(a)  | Statement of sustainability                                                                                                                                                                                                                                                        |
| Comment:    |         | The product can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.                                                            |
| Regulation: | 12      | Building standards – conversions                                                                                                                                                                                                                                                   |
| Comment:    |         | Comments made in relation to this product under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1 <sup>(1)(2)</sup> and Schedule 6 <sup>(1)(2)</sup> .<br>(1) Technical Handbook (Domestic).<br>(2) Technical Handbook (Non-Domestic). |



## The Building Regulations (Northern Ireland) 2000 (as amended)

|             |       |                                                                                                        |
|-------------|-------|--------------------------------------------------------------------------------------------------------|
| Regulation: | B2    | Fitness of materials and workmanship                                                                   |
| Comment:    |       | The product is acceptable. See section 10.1 and the <i>Installation</i> part of this Certificate.      |
| Regulation: | B3(2) | Suitability of materials                                                                               |
| Comment:    |       | The product is acceptable. See sections 9.1 and 9.2 of this Certificate.                               |
| Regulation: | C4(b) | Resistance to ground moisture and weather                                                              |
| Comment:    |       | The product can contribute to meeting this Regulation. See section 5 of this Certificate.              |
| Regulation: | E4(2) | Internal fire spread – Structure                                                                       |
| Regulation: | E5(b) | External fire spread                                                                                   |
| Comment:    |       | The product may be unrestricted under these Regulations. See sections 7.1 and 7.2 of this Certificate. |

## Construction (Design and Management) Regulations 2007

## Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 2 *Delivery and site handling* (2.1 and 2.2), and 8 *Resistance to damage* of this Certificate.

# Additional Information

## NHBC Standards 2011

NHBC accepts the use of Terraplegel Dutch Pantile, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.2 *Pitched roofs*.

## General

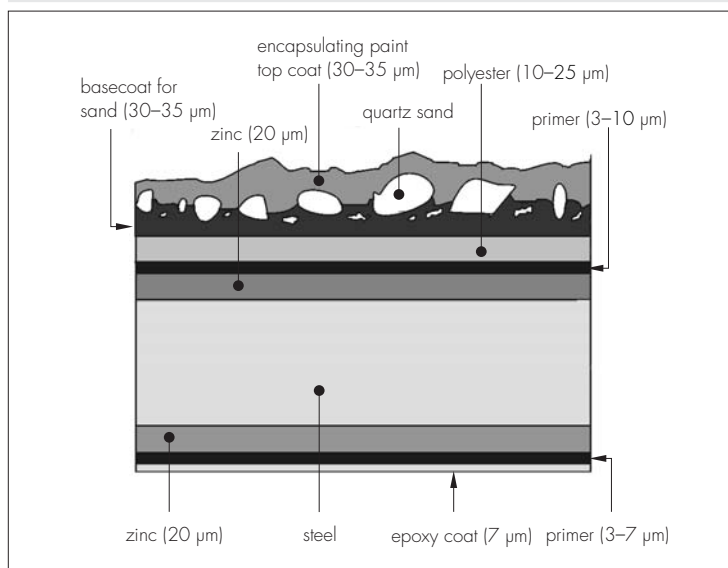
Terraplegel Dutch Pantile is manufactured in Sweden by Kami AB and marketed in the UK by Monier Redland Ltd, Sussex Manor Business Park, Gatwick Road, Crawley, West Sussex RH10 9NZ. Tel: 01293 618418, Fax: 01293 614548, e-mail: roofing.redland@monier.com

## Technical Specification

1.1 Terraplegel Dutch Pantile tilesheets are manufactured from 0.5 mm or 0.9 mm thick, galvanized steel sheet grade Z275 to BS EN 10346 : 2009. Coils of pre-coated steel are de-coiled, roll-formed, cut to the required length and pressed in a continuous operation to form the profiled roofing sheets.

1.2 The weatherface is sprayed with a polyester basecoat 30  $\mu\text{m}$  to 35  $\mu\text{m}$  thick. Graded quartz sand granules are applied with a second application of polyester paint 30  $\mu\text{m}$  to 35  $\mu\text{m}$  thick. The underside is coated with a primer and epoxy coating (see Figure 1). The tilesheets are oven cured.

Figure 1 Section through Terraplegel Dutch Pantile (not to scale)



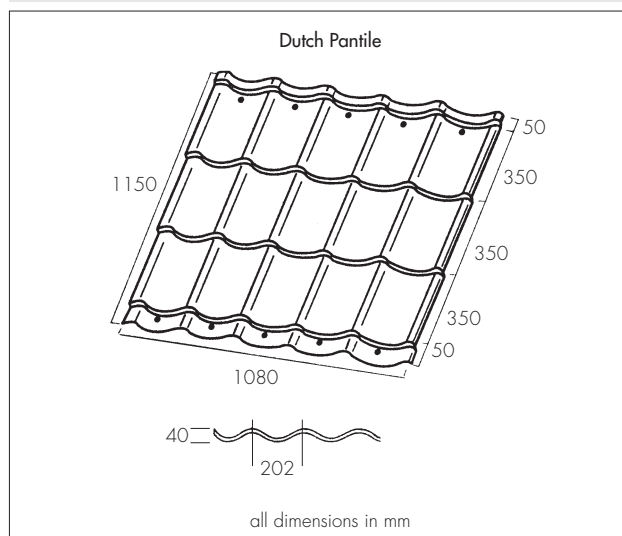
1.3 The tilesheets have the appearance of singly cambered Dutch tiles (see Figure 2) and are available in a width of 1.08 m (cover width 1.01 m) and standard lengths<sup>(1)</sup> (in metres) of:

|                         |      |
|-------------------------|------|
| 3-Plegel <sup>(2)</sup> | 1.15 |
| 4-Plegel                | 1.50 |
| 6-Plegel                | 2.20 |
| 9-Plegel                | 3.25 |
| 12-Plegel               | 4.30 |

(1) Lengths greater than 4.30 m are available upon request.

(2) As shown in Figure 2.

Figure 2 3-Plegel dimensions



1.4 An end lap of 100 mm is provided by interlocking the top and bottom edges of successive sheets.

1.5 The tilesheets are available in six colours, red, dark red, grey, green, black and brown.

1.6 Accessories with the same granular finish as the tilesheets are:

1-Plegel make-up panel — a one step tilesheet. Supplied in lengths of 0.45 m

- English ridge plate — a flat-sided ridge plate. Supplied in lengths of 2 m
- barrel ridge — a ridge plate with the shape of a traditional ridge tile. Supplied in lengths of 2.1 m
- verge trims — available in three sizes and used to cover the tilesheet edges and the sides of verges. Supplied in lengths of 2 m
- end cap — used to cover the end of the barrel ridge.

1.7 Accessories with a smooth polyester paint finish are:

- valley gutter — for use at angled intersections of the roof. Supplied in lengths of 2 m
- eaves plate — for use between tilesheet and rainwater gutter. Supplied in lengths of 2 m
- junction sheet — for use at junction between profiled sheet to flat sheet. The flat side of the junction sheet is folded together with the flat sheet.

1.8 Other accessories include:

- self-drilling screws — 35 mm long and 4.8 mm diameter with a self-sealing washer and coated head for use fixing the roofing sheets to battens.
- profiled seal band — profiled EPDM filler blocks for use between tilesheet, ridge cap and eaves to prevent the passage of water and snow
- touch-up paint — for use on surface repairs and minor coating damage
- preformed butyl overlap tape (15 mm by 3 mm).

1.9 Quality control is exercised over raw materials, during manufacture and on the final product.

## 2 Delivery and site handling

2.1 Terraplegel Dutch Pantile tilesheets are delivered to site in packs containing up to 200 m<sup>2</sup>, on Kami export packaging with a temporary waterproof cover. The packaged product is suitable for unloading using a fork-lift truck.

2.2 The weight of the tilesheets is approximately 5.7 kg·m<sup>-2</sup> for the 0.5 mm thick sheet and 8.5 kg·m<sup>-2</sup> for the 0.9 mm thick sheet.

2.3 During transport, sheet edges and corners must be protected to prevent damage.

2.4 On site the pallets should be stored on a firm, dry base away from the possibility of damage, covered to prevent water ingress, and as close as possible to the building where they are to be installed. To prevent damage to the coating on installation, the tilesheets must be lifted from the stack not dragged across it.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Terraplegel Dutch Pantile.

### Design Considerations

#### 3 General

3.1 Terraplegel Dutch Pantile is suitable for use on a timber or steel structure with a sarking felt or underlay at a minimum pitch of 10°.

3.2 On roof constructions with pitches between 10° and 12°, the product should be installed on simple structures only (ie without features such as hips, valleys, rooflights or skew roofs).

#### 4 Practicability of installation

The product should be installed by a competent roofing contractor, experienced with this type of product (see section 11.2).

#### 5 Weathertightness



The product, used with a suitable underlay, has satisfactory resistance to the passage of rain and snow.

#### 6 Strength and stability

6.1 The product has adequate resistance to the effects of wind suction likely to be met in service.

6.2 The tilesheets weigh considerably less than conventional roofing materials. Therefore, they must be securely attached to the structure to prevent wind uplift under adverse conditions.

## 7 Properties in relation to fire



7.1 A sample of the product, when tested to EN ISO 1716 : 2002 gave a PCS value of less than 4.0 MJ·m<sup>-2</sup>. The product can therefore be considered to fulfil all the requirements for the characteristic 'external fire performance for roof coverings' without the need for further testing, in accordance with European Decision 2000/553/EC.

7.2 This performance may not be achieved by all colours of the product and the designations of a particular colour should be confirmed by test or assessment, as required by the relevant national building regulation.

## 8 Resistance to damage

The 0.9 mm thick tilesheet is unlikely to be deformed by heavy impacts or maintenance traffic, but some deformation is possible on the 0.5 mm thick roofing tilesheets. Damaged tilesheets can be replaced, but care should be taken to prevent damage to adjacent tiles.

## 9 Maintenance



9.1 Impacts or maintenance traffic may damage the coating and affect the appearance of the tilesheets. Areas where the coating is damaged may be re-coated using the touch-up paints, available from the Certificate holder.

9.2 For maintenance work, roof ladders or crawling boards should be used but care is still required to prevent damage.

## 10 Durability



10.1 The polyester coating and galvanizing will protect the steel substrate against corrosion and will give the product a service life in excess of 30 years.

10.2 The colour stability of the tilesheet is satisfactory but a noticeable colour difference may develop on damaged areas recoated with touch-up paints.

# Installation

## 11 General

11.1 The standard of installation of Terraplegel Dutch Pantile should comply with the requirements of BS 8000-6 : 1990.

11.2 The product should be installed by competent tilesheet roofing contractors strictly in accordance with the Terraplegel installation manual.

11.3 The roof construction must be adequate to resist the loadings detailed in Eurocodes BS EN 1991-1-1 : 2002, BS EN 1991-1-4 : 2005, and their respective UK National Annexes, or BS 6399-1 : 1996 and BS 6399-2 : 1997. The maximum permitted rafter or roof truss spacing is 1800 mm for 0.9 mm thick roofing sheets, and 1200 mm for 0.5 mm tilesheets although this is reduced for smaller batten sizes (see Table 1). The roof construction should be in accordance with the relevant requirements of BS 5534 : 2003.

Table 1 Permitted rafter or roof truss spacing

| Batten size (mm) | Maximum truss spacing (mm) |
|------------------|----------------------------|
| 25 x 38          | 600                        |
| 50 x 38          | 1200                       |

11.4 Rafters and roof trusses must be securely tied to the building structure with galvanized steel straps.

11.5 The roof and batten spaces must be adequately ventilated in accordance with BS 5250 : 2002.

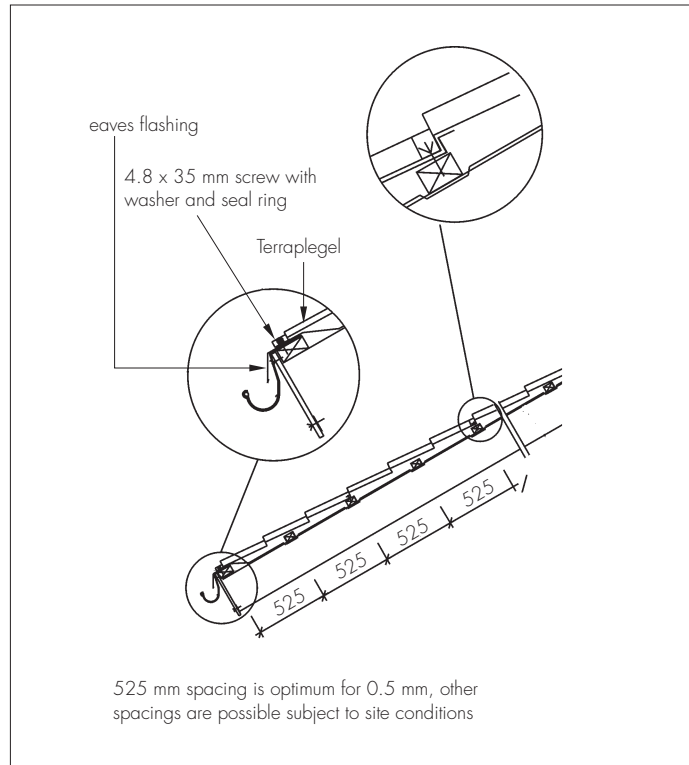
11.6 The underlay must be to BS 8747 : 2007, Annex B, Type 1F or 5U, or covered by an Agrément Certificate and installed in accordance with that Certificate.

11.7 To prevent electrochemical corrosion, direct contact with copper or its alloys should be avoided and copper roofs should not drain onto the installation.

## 12 Procedure

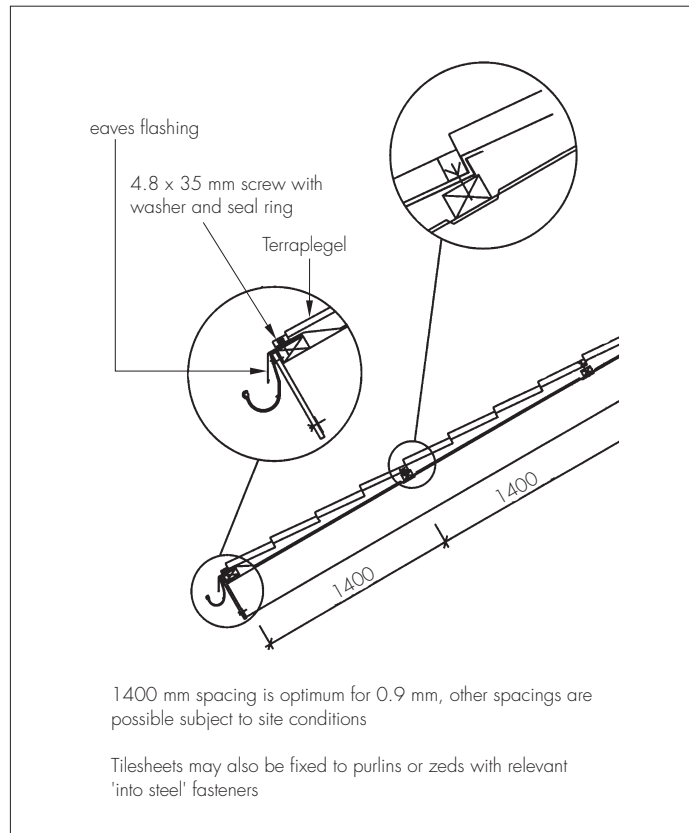
12.1 For 0.5 mm thick tilesheets, battens are laid over the underlay and roof trusses/rafters at 525 mm centres, and fixed at each intersection (see Figure 3).

Figure 3 Eaves and fixing details (for 0.5 mm thick tilesheet)



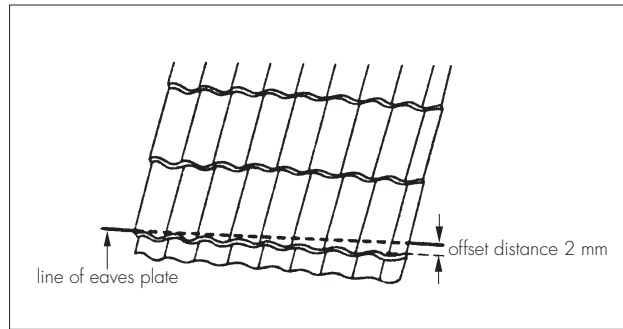
12.2 For 0.9 mm thick tilesheets, battens or steel purlins are laid over the underlay roof trusses and rafters at 1400 mm centres and fixed at each intersection (see Figure 4).

Figure 4 Eaves and fixing details (for 0.9 mm thick tilesheet)



12.3 Installation commences from the right-hand verge or hip. To compensate for the overlap of the tilesheets (which carries each successive tilesheet 2 mm towards the eaves), the right-hand side of the first tilesheet is offset by 2 mm compared to the eaves plate (see Figure 5).

Figure 5 Starting position for right-hand tilesheet

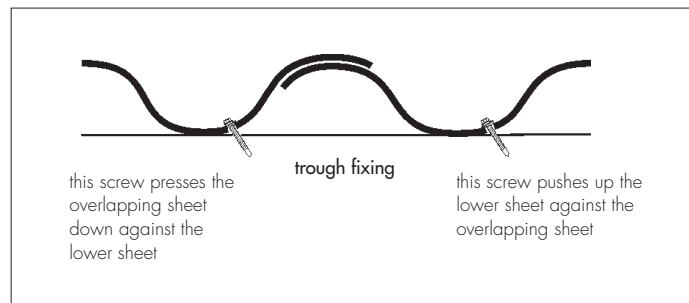


12.4 From the ridge to the eaves, the tilesheets are fastened to alternate battens (for 0.5 mm sheet) or each purlin (for 0.9 mm sheet) through the trough of the tilesheets, using 4.8 mm diameter by 35 mm self-drilling screws at a minimum overall rate of six screws per square metre. More fixings may be required depending on the calculated wind loading on the roof. Along the verge the tilesheets are fastened to every batten.

12.5 Each tilesheet must be securely fastened to the battens/purlins before subsequent tilesheets are laid. Where lengths of tilesheets are to be joined, the eaves tilesheet is laid first. Consecutive tilesheets are overlapped by 100 mm and joined together using the overlap screws, through alternate profiles into a fixed counter batten.

12.6 Adjacent tilesheets should be staggered and overlapped by one corrugation. They should be joined using the self-drilling screws to form a tight side lap (see Figure 6). The tilesheets should extend over the eaves by 30 mm.

Figure 6 Overlap fixing detail



12.7 Where required the tilesheets and accessories should be carefully cut using non-abrasive tools, formed and installed to provide a weathertight finish. Care should be taken to remove swarf and steel cuttings, and cut edges should be protected by applying the touch-up paint.

12.8 Flashings and accessories should be fastened using the overlap screws, nails or rivets.

12.9 Profiled ventilated filler blocks are secured in position along the eaves and ridges to prevent the passage of rain and snow.

## Technical Investigations

### 13 Tests

Tests were carried out, and the results assessed, to determine:

- impact resistance
- damage in handling
- scratch resistance
- effect of artificial weathering
- abrasion resistance
- effect of salt spray.

### 14 Investigations

14.1 An assessment was made of:

- strength of the product including resistance to loading
- durability of the fixings
- resistance to wind uplift.
- weathertightness of the overlaps
- compatibility of materials in contact

14.2 An assessment was made of independent data on heat of combustion to EN ISO 1716 : 2002.

14.3 A visit was made to a site in progress to assess the practicability of installation and ease of repair.

14.4 Visits were made to established sites to assess the performance in use.

14.5 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

## Bibliography

- BS 5250 : 2002 *Code of practice for control of condensation in buildings*  
BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*  
BS 6399-1 : 1996 *Loading for buildings — Code of practice for dead and imposed loads*  
BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*  
BS 8000-6 : 1990 *Workmanship on building sites — Code of practice for slating and tiling of roofs and claddings*  
BS 8747 : 2007 *Reinforced bitumen membranes (RBMs) for roofing — Guide to selection and specification*  
BS EN 1991-1-1 : 2002 *Eurocode 1 : Actions on structures — General actions— Densities, self-weight, imposed loads for buildings*  
NA to BS EN 1991-1-1 : 2002 *UK National Annex to Eurocode 1 : Actions on structures — General actions— Densities, self-weight, imposed loads for buildings*  
BS EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*  
NA to BS EN 1991-1-4 : 2005 *UK National Annex to Eurocode 1 : Actions on structures — General actions — Wind actions*  
BS EN 10346 : 2009 *Continuously hot-dip coated steel flat products — Technical delivery conditions*  
BS EN ISO 1716 : 2002 *Reaction to fire tests for building products — Determination of the heat of combustion*

## Conditions of Certification

### 15 Conditions

15.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

15.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

15.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

15.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

15.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

15.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.