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**Agrément Certificate**

**20/5731**

Product Sheet 1

## STRUCTURAL LINER TRAY

### TACTRAY 90 STRUCTURAL LINER TRAY

This Agrément Certificate Product Sheet <sup>(1)</sup> relates to Tactray 90 Structural Liner Tray, for use as a structural support for roof finishes with pitches of between 10° and 70°, on new and existing domestic and non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.

#### 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

**Structural performance** — the liner tray will remain structurally stable and deflections will not be excessive under normal service conditions if installed in accordance with the requirements of this Certificate (see section 6).

**Weathertightness** — the liner tray will resist the passage of wind-driven rain and snow when installed with roof finishes of suitable quality (see section 7).

**Condensation risk** — the risk of condensation forming under normal service conditions is negligible (see section 8).

**Behaviour in relation to fire** — the internal surface of the liner tray has an A1 classification as defined by the various national Building Regulations (see section 10).

**Durability** — durability of the liner tray will depend on the location, environment, coating finish and quality of roof finishes (see section 12).



The BBA has awarded this 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

Date of First issue: 2 March 2020

Hardy Giesler  
Chief Executive Officer

*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 **MUST** check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.*

*Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.*

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## Regulations

In the opinion of the BBA, Tactray 90 Structural Liner Tray, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



### The Building Regulations 2010 (England and Wales) (as amended)

<b>Requirement:</b>	<b>A1</b>	<b>Loading</b>
Comment:		The product has sufficient strength and stiffness to sustain the design loads in accordance with sections 6.1 and 6.2 of this Certificate.
<b>Requirement:</b>	<b>B2</b>	<b>Internal fire spread (linings)</b>
Comment:		The internal surface of the product has a Class A1 rating. See section 10.1 of this Certificate.
<b>Requirement:</b>	<b>C2(c)</b>	<b>Condensation in roofs</b>
Comment:		The product is acceptable. See sections 8.1 to 8.3 of this Certificate.
<b>Requirement:</b>	<b>L1(b)(iii)</b>	<b>Conservation of fuel and power</b>
Comment:		The product can contribute to satisfying this Requirement. See section 9.1 of this Certificate.
<b>Regulation:</b>	<b>7(1)</b>	<b>Materials and workmanship</b>
Comment:		The product is acceptable. See section 12.1 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b>	<b>26</b>	<b>CO<sub>2</sub> emission rates for new buildings</b>
<b>Regulation:</b>	<b>26A</b>	<b>Fabric energy efficiency rates for new dwellings (applicable to England only)</b>
<b>Regulation:</b>	<b>26A</b>	<b>Primary energy consumption rates for new buildings (applicable to Wales only)</b>
<b>Regulation:</b>	<b>26B</b>	<b>Fabric performance values for new dwellings (applicable to Wales only)</b>
Comment:		The product can contribute to satisfying the requirements of these Regulations. See section 9.1 of this Certificate.



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

<b>Regulation:</b>	<b>8(1)(2)</b>	<b>Fitness and durability of materials and workmanship</b>
Comment:		The product can contribute to a construction satisfying this Regulation. See sections 11 and 12 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b>	<b>9</b>	<b>Building standards applicable to construction</b>
Standard:	<b>1.1(a)(b)</b>	<b>Structure</b>
Comment:		The product has sufficient strength and stiffness to transmit the design load, with reference to clause 1.1.1 <sup>(1)(2)</sup> , in accordance with sections 6.1 and 6.2 of this Certificate.
Standard:	<b>2.5</b>	<b>Internal linings</b>
Comment:		The internal surface of the product has a Class A1 rating, with reference to clause 2.5.1 <sup>(1)(2)</sup> . See section 10.1 of this Certificate.
Standard:	<b>3.15</b>	<b>Condensation</b>
Comment:		The product is acceptable. See sections 8.1 to 8.3 of this Certificate.
Standard:	<b>6.1</b>	<b>Carbon dioxide emissions</b>
Standard:	<b>6.2</b>	<b>Building insulation envelope</b>
Comment:		The product can contribute to satisfying, in full or part, clauses 6.1.2 <sup>(1)</sup> (Table 6.2), 6.2.4 <sup>(1)</sup> or 6.2.5 <sup>(1)</sup> . See section 9.1 of this Certificate.

**Standard:** 7.1(a)(b) **Statement of sustainability**  
**Comment:** The product can contribute to satisfying 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 applicable to conversions**  
**Comment:** All comments given for 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>.  
(1) Technical Handbook (Domestic).  
(2) Technical Handbook (Non-Domestic).



## The Building Regulations (Northern Ireland) 2012 (as amended)

**Regulation:** 23(a)(i) **Fitness of materials and workmanship**  
(iii)(b)(i)  
**Comment:** The product is acceptable. See section 12.1 of this Certificate.

**Regulation:** 29 **Condensation**  
**Comment:** The product is acceptable. See section 8.3 of this Certificate.

**Regulation:** 30 **Stability**  
**Comment:** The product has sufficient strength and stiffness to sustain the design loads in accordance with sections 6.1 and 6.2 of this Certificate.

**Regulation:** 34 **Internal fire spread — Linings**  
**Comment:** The internal surface of the product has a Class A1 rating. See section 10.1 of this Certificate.

**Regulation:** 39(a)(i) **Conservation measures**  
**Regulation:** 40(2) **Target carbon dioxide emission rate**  
**Comment:** The product can satisfy the requirements of these Regulations on airtightness. See section 9.1 of this Certificate.

## Construction (Design and Management) Regulations 2015

## Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.2) of this Certificate.

## Additional Information

### NHBC Standards 2020

In the opinion of the BBA, the Tacray 90 Structural Liner Tray, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards, Part 7 Roofs, Chapter 7.2 Pitched Roofs*.

## Technical Specification

### 1 Description

1.1 The Tacray 90 Structural Liner Tray comprises trays of interlocking, profiled steel sheets, attached to the building frame by means of self-drilling, self-tapping fasteners. When secured, timber counter battens are screwed to the tray upstands and conventional roof finishes added.

1.2 The trays are roll formed from 0.75 mm, 1 mm, 1.25 mm or 1.5 mm Fe E 350 G grade steel, with a galvanized thickness coating of Z275 to BS EN 10346 : 2015. They are also available with a 25 µm polyester paint applied over a primer and the galvanizing.

1.3 The trays are available in standard lengths of 1 to 18 m, with 19 to 34 m lengths available to special order, and have a span of 500 mm and a profile depth of 90 mm (see Figure 1).

1.4 Tactray 90 is rolled to provide underlapping and overlapping legs. A small 'tab' is pressed onto the overlapping upstand, to securely locate the underlapping leg (see Figures 1 and 2).

1.5 The trays continue with butt joints at the supports/purlins longitudinally. High performance butyl beads and non-setting bedding mastic of 10 mm diameter are used at the end of butt joints and all ridge / eaves / valley / hip junctions. (see Figure 2).

Figure 1 General arrangement

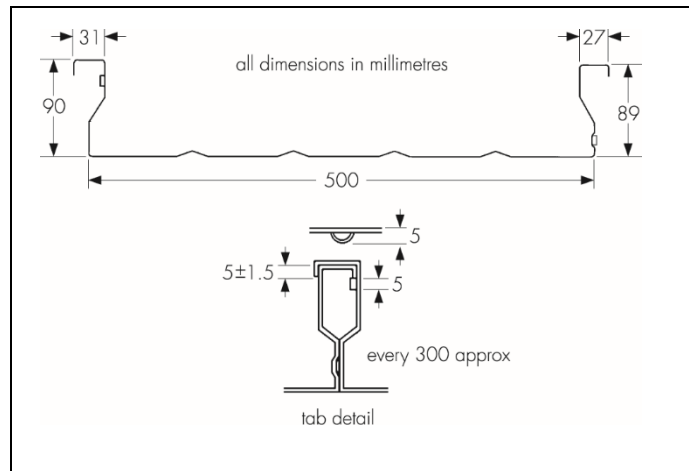
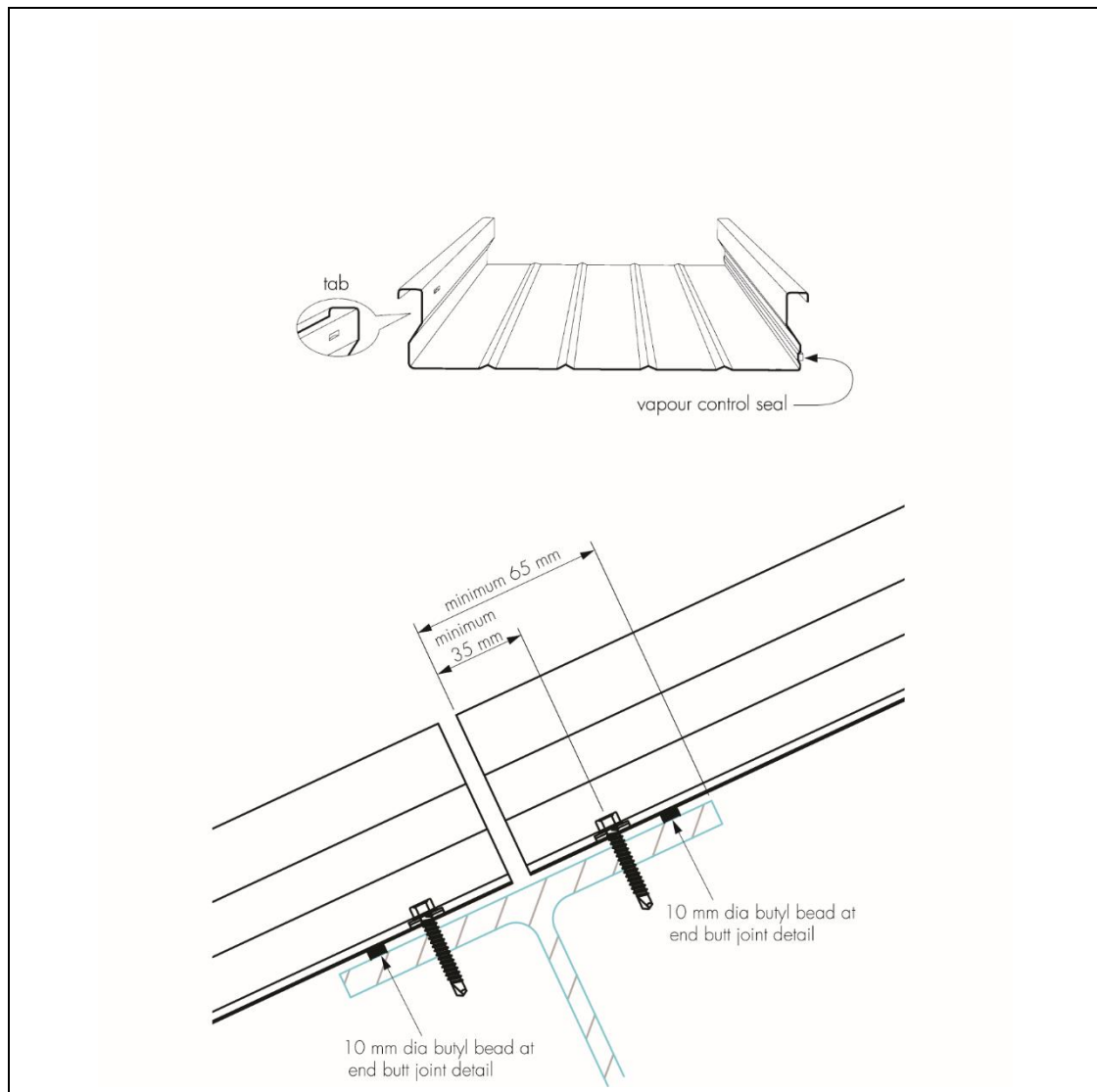


Figure 2 Tactray 90 profile and vapour control, and details of longitudinal joints



1.6 Self-drilling, self-tapping fasteners (see section 1.8) incorporating an ethylene propylene diene monomer (EPDM) washer are used for fixing the sheet to the building framework and for securing the timber counter battens, in accordance with the fixing specification detailed in the Tactray 90 literature (*The complete building envelope solution — Tactray 90*). Typically, three fasteners are required at intermediate supports, and five at the ends of trays (butt joints, eaves, ridge, valley and hip purlins or supports).

1.7 A vapour control seal is incorporated during the manufacturing process. This comprises polyethylene foam and is rolled into the side laps of the profile during the roll forming process of the sheets (see Figure 2).

1.8 Accessories used with the system (can be supplied by the Certificate holder), but outside the scope of assessment, include:

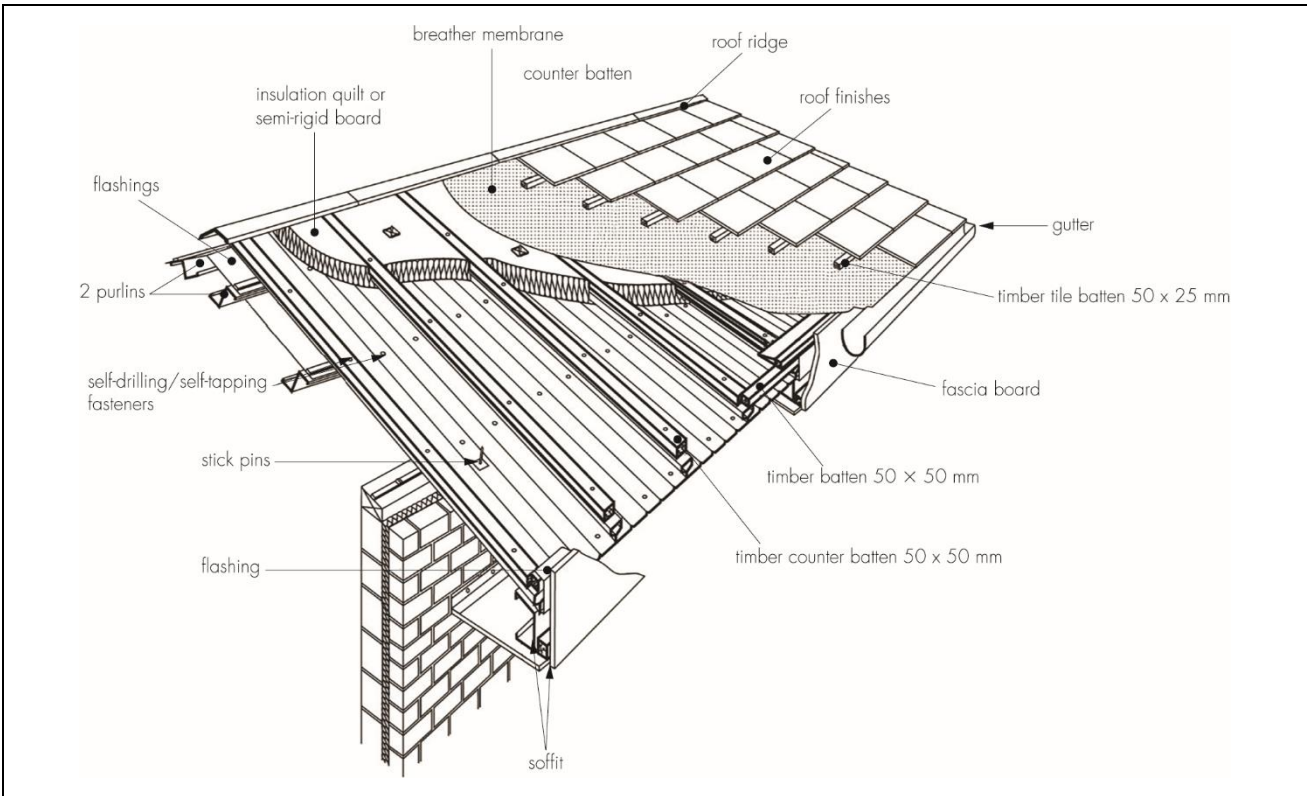
- insulation — Tacmat Plus Insulation, quilt 600 mm compressed to 500 mm width, available thickness 100 to 240 mm  
— Tacboard Plus Insulation, semi rigid 1200 mm wide x 2400 mm long board, available thickness 30 to 200 mm
- timber battens and counter battens in accordance to BS 5534:2014 — one or two 50 by 50 mm battens and counter battens secured to the upstands. Counter battens fixed at 600 mm centres
- 50 x 25 mm secondary counter battens, fixed at 600 mm centres, when required
- breather membrane with maximum vapour resistance of  $0.25 \text{ MN.s.g}^{-1}$
- steel flashing — galvanized underside as standard, with optional white or other colours
- 10 mm IDL high performance butyl beads, bedding mastic — to be inserted between the tray and the flashing at the ridges and eaves

- self-adhesive insulation hangers (ie stick pins), to be fixed at 3 m intervals on steep pitches to prevent sliding of insulation
- self-drilling, self-tapping fasteners – zinc-coated 5.5 and 6.5 mm diameter, hardened carbon steel screws

1.9 Supplementary Tactray 90 system components are supplied by manufacturers recommended by the Certificate holder (outside the scope of this Certificate) and comprise:

- roof battens — of appropriate size, organically treated in accordance to BS 5534: 2014
- roof finishes — laid to provide the finished roof and primary weatherproof membrane (see Figure 3)

**Figure 3 Cross-sectional section of Tactray 90 construction**



## 2 Manufacture

2.1 The Tactray 90 trays are roll formed from galvanized, or galvanized and polyester-coated steel, using conventional metalworking techniques.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

## 3 Delivery and site handling

3.1 Tactray 90 trays are transported to site in packs surrounded by wooden battens. The pack is stacked with two trays side by side, with up to 20 trays per bundle.

3.2 Individual trays should be handled with care to prevent damage to the edges, corners or finishes. Damaged trays should not be used. The packs should be handled using lifting equipment with a spreader beam and webbing slings set at a maximum of 2 m centres.

3.3 Tactray 90 and its accessories should be stored under cover in the original packing and in a dry, well-ventilated position. Tactray 90 should be kept away from building activities; contamination by lime or cement will cause staining.

3.4 When stacked on site, any supports between packs 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.

3.5 As the durability of the roof system is dependent upon the integrity of the insulation and vapour barrier, care must be taken in handling and storing the following items:

- Tacmat Plus insulation — store indoors or under a waterproof covering
- Breather membrane – damaged barriers should not be used
- Tacboard Plus insulation – store indoors or under a waterproof covering

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Tactray 90 Structural Liner Tray.

### Design Considerations

#### 4 Use

4.1 The Tactray 90 Structural Liner Tray is satisfactory for use as a structural support for roofs with pitches between 10° and 70° and finished with tile or slate roof coverings.

4.2 The product with other components such as tiles, slates, insulation etc, is weathertight and structurally stable within the limits set out in this Certificate.

#### 5 Practicability of installation

The product is designed to be installed by a competent general builder or a roofing contractor experienced with this type of product. The Certificate holder can provide guidance to contractors and assistance in design.

#### 6 Structural performance



6.1 Tactray 90 trays will have adequate strength and stiffness to sustain specified loads when used in accordance with this Certificate. Load/span tables are given for the trays in Tables 1 and 2.

**Table 1 Design resistance to wind, snow and permanent actions (allowable deflection limited to span/200)**

Positive UDL (kN·m <sup>-2</sup> ) design resistance													
Thickness (mm)	Span condition	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.6	6.0
0.75	Single	2.57	2.05	1.71	1.47	1.28	1.14	0.99	0.78	0.63	0.52	0.43	0.37
1.00	Single	4.61	3.69	3.07	2.63	2.30	2.05	1.70	1.40	1.13	0.89	0.71	0.58
1.25	Single	7.19	5.75	4.79	4.11	3.59	2.87	2.32	1.85	1.42	1.12	0.90	0.73
1.50	Single	10.30	8.24	6.87	5.86	4.50	3.56	2.89	2.23	1.72	1.35	1.08	0.88
0.75	Double	2.39	1.73	1.31	1.03	0.84	0.69	0.58	0.50	0.43	0.37	0.33	0.29
1.00	Double	4.16	3.00	2.28	1.80	1.45	1.20	1.01	0.86	0.74	0.65	0.57	0.51
1.25	Double	6.12	4.40	3.33	2.61	2.11	1.74	1.46	1.24	1.07	0.93	0.82	0.73
1.50	Double	8.39	6.01	4.53	3.55	2.86	2.35	1.97	1.68	1.45	1.26	1.11	0.98
0.75	Multi	2.83	2.05	1.57	1.24	1.01	0.83	0.70	0.60	0.52	0.45	0.40	0.36
1.00	Multi	4.92	3.57	2.72	2.15	1.75	1.45	1.22	1.04	0.90	0.79	0.70	0.62
1.25	Multi	7.25	5.24	3.98	3.14	2.54	2.10	1.77	1.51	1.30	1.14	1.00	0.89
1.50	Multi	9.95	7.17	5.43	4.27	3.45	2.85	2.39	2.04	1.76	1.53	1.35	1.20
Negative UDL (kN·m <sup>-2</sup> ) design resistance													
Thickness (mm)	Span condition	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.6	6.0
0.75	Single	2.57	2.05	1.71	1.45	1.11	0.88	0.71	0.59	0.49	0.39	0.31	0.25
1.00	Single	4.61	3.69	3.07	2.52	1.93	1.52	1.23	0.94	0.72	0.57	0.45	0.37
1.25	Single	7.19	5.75	4.79	3.53	2.71	2.14	1.63	1.22	0.94	0.74	0.59	0.48
1.50	Single	10.30	8.24	6.39	4.69	3.59	2.84	2.03	1.52	1.17	0.92	0.74	0.60
0.75	Double	2.85	2.10	1.62	1.30	1.06	0.86	0.71	0.59	0.50	0.43	0.37	0.33
1.00	Double	4.74	3.48	2.68	2.14	1.74	1.45	1.23	1.06	0.92	0.80	0.70	0.62
1.25	Double	6.88	5.05	3.87	3.08	2.51	2.08	1.76	1.51	1.30	1.13	0.99	0.80
1.50	Double	9.11	6.64	5.08	4.03	3.27	2.72	2.29	1.96	1.70	1.48	1.23	1.00
0.75	Multi	3.33	2.47	1.92	1.54	1.26	1.03	0.85	0.72	0.61	0.52	0.45	0.40
1.00	Multi	5.56	4.11	3.18	2.54	2.08	1.74	1.48	1.27	1.10	0.95	0.76	0.62
1.25	Multi	8.11	5.98	4.60	3.67	3.00	2.50	2.12	1.82	1.57	1.24	0.99	0.80
1.50	Multi	10.76	7.89	6.06	4.82	3.93	3.27	2.76	2.37	1.95	1.54	1.23	1.00



**Table 2 Design resistance to wind, snow and permanent actions (allowable deflection limited to span/300)**

Positive UDL (kN·m <sup>-2</sup> ) design resistance													
Thickness (mm)	Span condition	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.6	6.0
0.75	Single	2.57	2.05	1.71	1.47	1.28	1.14	0.94	0.71	0.55	0.43	0.35	0.28
1.00	Single	4.61	3.69	3.07	2.63	2.30	1.76	1.29	0.97	0.75	0.59	0.47	0.39
1.25	Single	7.19	5.75	4.79	4.11	3.18	2.24	1.63	1.23	0.95	0.75	0.60	0.49
1.50	Single	10.30	8.24	6.87	5.77	3.86	2.71	1.98	1.49	1.14	0.90	0.72	0.59
0.75	Double	2.39	1.73	1.31	1.03	0.84	0.69	0.58	0.50	0.43	0.37	0.33	0.29
1.00	Double	4.16	3.00	2.28	1.80	1.45	1.20	1.01	0.86	0.74	0.65	0.57	0.51
1.25	Double	6.12	4.40	3.33	2.61	2.11	1.74	1.46	1.24	1.07	0.93	0.82	0.73
1.50	Double	8.39	6.01	4.53	3.55	2.86	2.35	1.97	1.68	1.45	1.26	1.11	0.98
0.75	Multi	2.83	2.05	1.57	1.24	1.01	0.83	0.70	0.60	0.52	0.45	0.40	0.36
1.00	Multi	4.92	3.57	2.72	2.15	1.75	1.45	1.22	1.04	0.90	0.79	0.70	0.62
1.25	Multi	7.25	5.24	3.98	3.14	2.54	2.10	1.77	1.51	1.30	1.14	1.00	0.81
1.50	Multi	9.95	7.17	5.43	4.27	3.45	2.85	2.39	2.04	1.76	1.50	1.20	0.98
Negative UDL (kN·m <sup>-2</sup> ) design resistance													
Thickness (mm)	Span condition	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.6	6.0
0.75	Single	2.57	2.05	1.71	1.45	1.11	0.79	0.57	0.43	0.33	0.26	0.21	0.17
1.00	Single	4.61	3.69	3.07	2.43	1.62	1.14	0.83	0.63	0.48	0.38	0.30	0.25
1.25	Single	7.19	5.75	4.79	3.16	2.12	1.49	1.09	0.82	0.63	0.49	0.40	0.32
1.50	Single	10.3	8.24	6.25	3.94	2.64	1.85	1.35	1.01	0.78	0.61	0.49	0.40
0.75	Double	2.85	2.10	1.62	1.30	1.06	0.86	0.71	0.59	0.50	0.43	0.35	0.28
1.00	Double	4.74	3.48	2.68	2.14	1.74	1.45	1.23	1.04	0.80	0.63	0.51	0.41
1.25	Double	6.88	5.05	3.87	3.08	2.51	2.08	1.76	1.36	1.05	0.82	0.66	0.54
1.50	Double	9.11	6.64	5.08	4.03	3.27	2.72	2.25	1.69	1.30	1.02	0.82	0.67
0.75	Multi	3.33	2.47	1.92	1.54	1.26	1.03	0.85	0.72	0.55	0.43	0.35	0.28
1.00	Multi	5.56	4.11	3.18	2.54	2.08	1.74	1.39	1.04	0.80	0.63	0.51	0.41
1.25	Multi	8.11	5.98	4.60	3.67	3.00	2.48	1.81	1.36	1.05	0.82	0.66	0.54
1.50	Multi	10.76	7.89	6.06	4.82	3.93	3.09	2.25	1.69	1.30	1.02	0.82	0.67

**Notes for Tables 1 and 2**

- the Tables indicate total load-carrying capacity of the profile, excluding its self-weight
- limiting loads are derived from the lowest value for bending stress or deflection at the noted limit
- when bending stress governs, the relevant load factor is 1.5
- minimum bearing is 65 mm for all supports
- when deflection governs, the relevant values given are: span/300 (suitable for roofing slates or tiles), span/200 (suitable for metallic or flexible roof finishes) and should be selected according to the roof finishes; span is the distance between consecutive supports
- UDL stands for uniformly distributed load.



6.2 Design wind load must be evaluated in accordance with the recommendations of BS EN 1991-1-4 : 2005 and its UK National Annex. The design imposed snow loads must be evaluated in accordance with the recommendations of BS EN 1991-1-3 : 2003 and its UK National Annex. The permanent actions should be calculated from the unit weights given in BS EN 1991-1-1 : 2002 and its UK National Annex from the actual known weights of the roofing materials used.

6.3 The fixing of the roof finishes and the timber battens, should be carried out in accordance with BS 5534 : 2014.

6.4 The magnitude of temporary actions during construction must not exceed the values given in Tables 1 and 2. The design values given in Tables 1 and 2 do not assume a contribution to the resistance of the system to wind uplift given by the permanent actions eg self-weight of roofing finishes.

## 7 Weathertightness

7.1 The long-term weathertightness of a roof constructed using Tactray 90 will depend upon the quality of the roof finishes.

7.2 In strong winds, care should be taken when using the Tactray 90 structural liner trays without the final weather-resistant covering, as this may affect their integrity.

## 8 Condensation risk



8.1 In common with all metal roof construction, there is a risk of condensation, which 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 humidity and the external temperatures. It has been demonstrated by computer modelling that the risk of condensation occurring on the internal surfaces (including those below the thermal bridges) is negligible.

### Interstitial condensation



8.3 The product has been assessed for the risk of damage and harmful effects on the building due to interstitial condensation. The assessment predicts that for buildings under the normal climatic conditions experienced in the UK with internal temperature and humidity up to 25°C and 70% RH, interstitial condensation is unlikely to be a significant problem. Therefore, the risk of reducing the thermal and structural performance of the whole roof system due to interstitial condensation will be limited. This assessment is only valid if the following conditions are fulfilled in accordance with the Certificate holder's instructions and this Certificate:

- the trays are effectively sealed at the side lap with the polyethylene foam strip
- adjacent trays are clamped during the installation process to hold webs together and maintain close alignment
- closures at ridges and eaves are properly sealed
- the fixings securing the trays to the structure must incorporate an EPDM washer to prevent moisture transmission through the fixing holes
- the roof tile underlay (ie breather underlay) has a vapour resistance lower than  $0.25 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}$

8.4 For 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 5250 : 2011, BS 5925 : 1991 and BS 6229 : 2018, to establish whether special provisions are required.

8.5 Guidance on the evaluation and control of internal atmospheric conditions is given in BS 5250 : 2011 and BS 5925 : 1991.

## 9 Air permeability



9.1 In-situ air-tightness testing indicates that the product is capable of achieving a level of performance of  $4.10 \text{ m}^3$  per h per  $\text{m}^2$ , when tested in accordance with BS 5368-1: 1976, after installation, at a pressure differential of 50 Pa.

9.2 The airtightness of the roof is reliant on the careful sealing of the liner. The airtightness of a roof is dependent on maintaining the integrity of seal throughout. In addition to sealing at all joints, the liner must be suitably sealed at the perimeter and all penetrations. Details of sealing at all laps, eaves, ridges, hips, valleys and penetrations must be in accordance with the Tactray 90 literature.

9.3 The airtightness of the building will also be dependent on the performance of the other building elements. Provided these also incorporate appropriate design details and building techniques, air infiltration through the building fabric should be minimal and the building reasonably airtight.

9.4 Completed buildings are subject to pre-completion testing for airtightness in accordance with the requirements of the relevant national Building Regulations.

## 10 Performance in relation to fire



10.1 The internal surface of the lining sheets when specified as galvanized steel or polyester coated will have a Class A1 rating as defined by the various national Building Regulations and in accordance with Commission Decision 2005/403/EC.

10.2 The designation of other specifications should be evaluated and confirmed by reference to the requirements of the documents supporting the national Building Regulations.

## 11 Maintenance

As the product is constructed with insulation and roof finishes, and has suitable durability, maintenance is not required apart from occasional cleaning the internal surface. Where a change of colour is required, an approved proprietary paint system should be used.

## 12 Durability



12.1 Where the maximum internal humidity is maintained within the limits described in section 8.2, the galvanized coating will adequately protect the steel for up to 60 years. If this environment cannot be guaranteed, the polyester-coated product should be used.

12.2 This performance may not be achieved in chemically corrosive environments, or where a high level of physical damage is likely. In this case, a marine powder coated finish will be offered/suggested, to give adequate protection of the system.

12.3 All materials not specifically described in this Certificate which will come into contact with the trays should be checked for any adverse effects on the durability of the trays before use.

## 13 Reuse and recyclability

The steel can be recycled.

## Installation

### 14 General

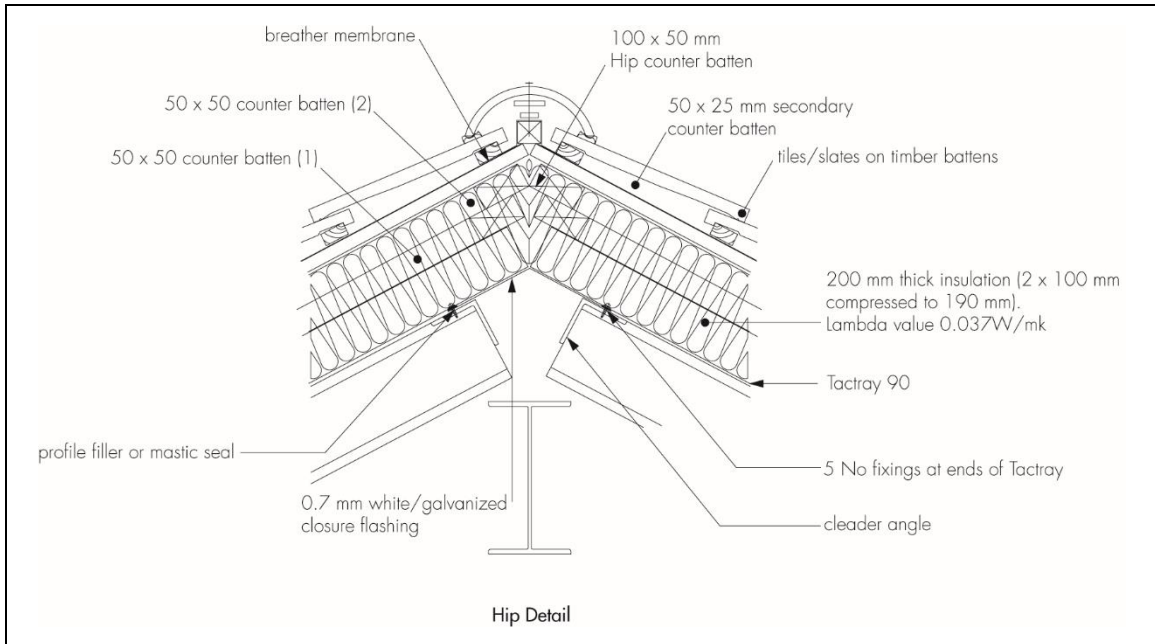
14.1 Installation of the Tacray 90 Structural Liner Tray is carried out by specialist roofing contractors trained and approved by the Certificate holder, using their technical literature containing comprehensive recommendations for fixing the Tacray 90 Structural Liner Tray.

14.2 Tacray 90 trays can withstand normal site handling and usage, but if any trays are significantly damaged they should not be used.

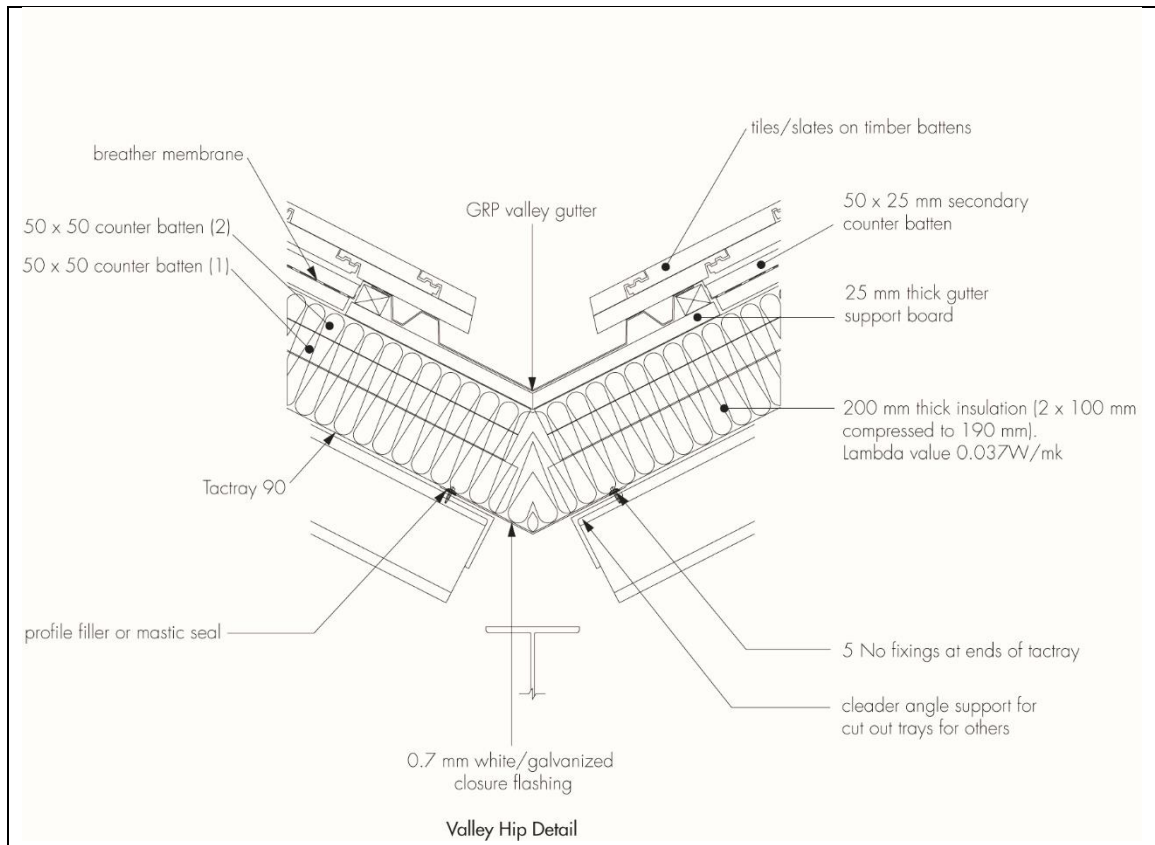
14.3 Each Tacray 90 tray must be properly checked to ensure the vapour control seal is continuous along its side lap. Trays with any discontinuities in their vapour control seal must not be used.

14.4 Trays can be cut with a reciprocating saw on site to allow for ridge, valley or hip junctions (see Figures 4, 5 and 6). Various flashing details are available.

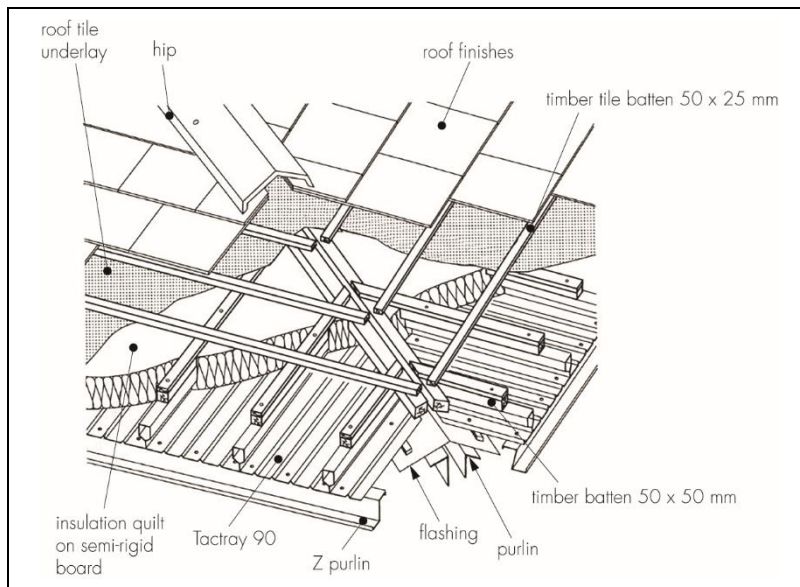
**Figure 4 Duo pitch ridge detail**



**Figure 5 Preformed valley hip detail**



**Figure 6 Hips**



14.5 The fixings used in the installation of the product will depend upon the type of substrates it is being secured to. Fasteners are supplied with the product and details can be found in the Tacray 90 literature.

## 15 Procedure

15.1 The polyethylene foam filler, or 10 mm non setting mastic, is inserted between the underside of the tray and the closure flashing at the eaves, ridge and valley/hip providing additional vapour-tightness to the stiffeners in the pan of the profile [see Figure 7(1)].

15.2 A setting-out line is established and the first full length is fixed, using a minimum of three self-drilling fasteners at intermediate purlins and five self-drilling fasteners at eaves, ridge, valley/hip and ends of the tray with EPDM washers on the fasteners to ensure additional vapour tightness [see Figure 7(1)]. If the purlins are of softwood timber, it is advisable to use five fasteners on each purlin.

15.3 The next length is lifted into position to butt tightly against the first sheet, ensuring that the underlapping sheet is securely located on the tab provided.

15.4 Mole C-clamps, or similar, should be used at eaves, ridge and intermediate purlin positions to clamp together the lengths of Tacray 90 before fixing [see Figure 7(2)].

15.5 The roof is completed following the fastening details given in section 15.2 and the procedure given in sections 15.3 and 15.4. If a reduced width is required for the end tray, it can be trimmed down and back lapped to the required cover width in increments of 100 mm. Once back lapped, the two sections are stitched together at 300 mm centres with rivets and sealed to maintain the integrity of the vapour tightness [see Figure 8(a)].

15.6 When the underside is used as a soffit, appearance is important. At the verge, the end tray is cut at the required position and dual closure and support flashing is installed [see Figure 8(b)]. The flashing is secured to the tray by means of rivets at 300 mm centres, and provides the end supports for the counter batten and an end closure to the tray. The cut end is either concealed in the cavity or positioned above a wall or rafter section.

15.7 Trimming panels to accommodate roof lights or other openings are not covered by this Certificate. Advice must be sought from the Certificate holder.

15.8 The 50 by 50 mm counter battens (one or two, depending on the thickness of insulation), are fixed to the upstands of the trays using self-drilling fasteners (see the Certificate holder's technical brochure) at fixing centres not greater than 600 mm [see Figure 7(3)]. When factory fitted counter battens are used, a side lap stitching screw should be fitted through this upstand at approximately 1 metre centres.

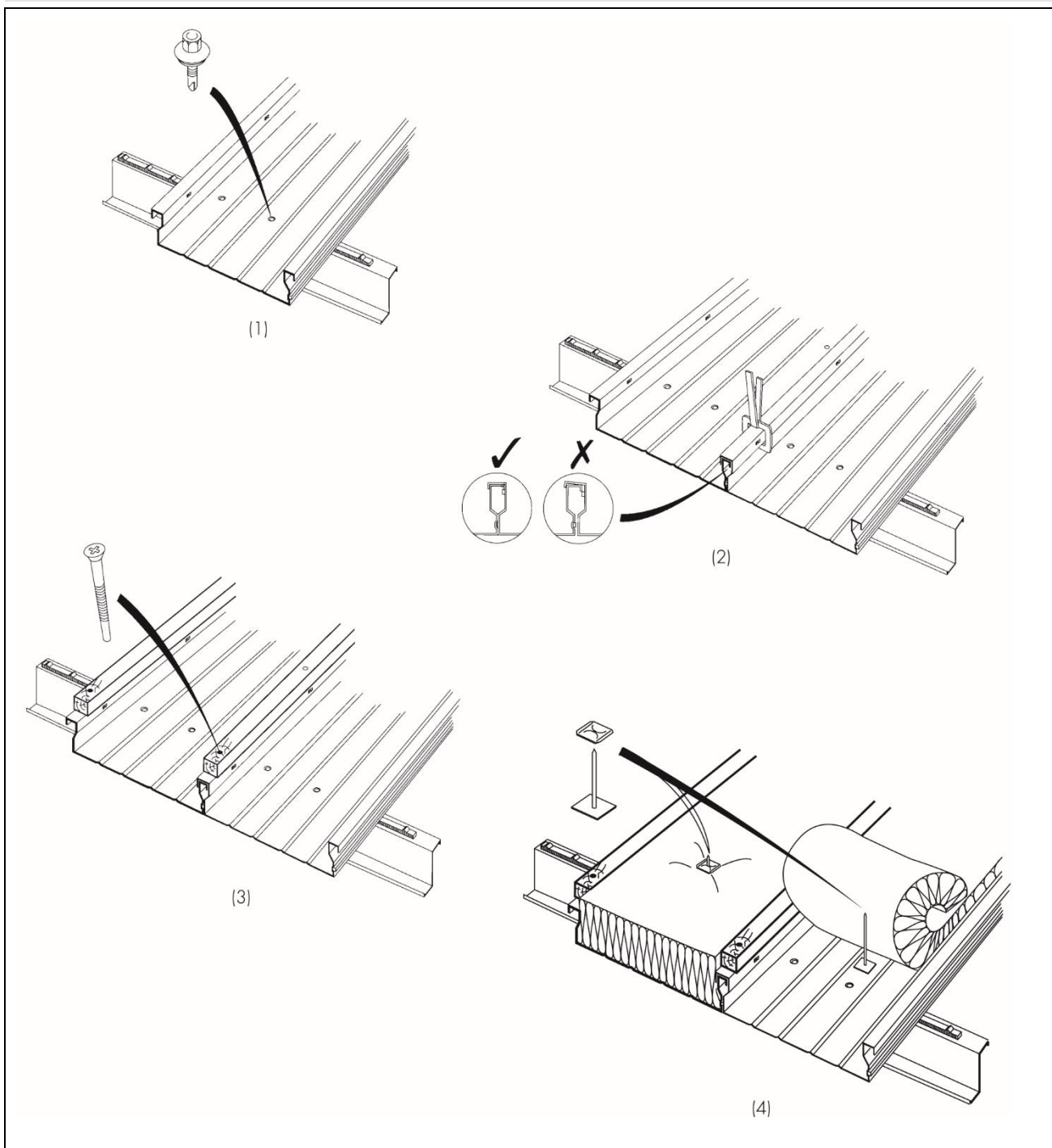
15.9 The insulation quilt is laid in the pans of the trays and the semi rigid insulation boards are laid on top of the counter battens to suit insulation requirements. The use of self-adhesive insulation pins as shown in Figure 7(4) is recommended for added security and to minimise the possibility of slumping. Pins are fixed at 3 m centres, and the spike remaining above the spire clip is cut off for safety.

15.10 The roof tile underlay (breather membrane) is laid across the top of the 50 by 50 mm counter battens and is held in place by a 50 by 25 mm secondary counter batten (see Figure 3). Care should be taken to lap the joints in the conventional manner.

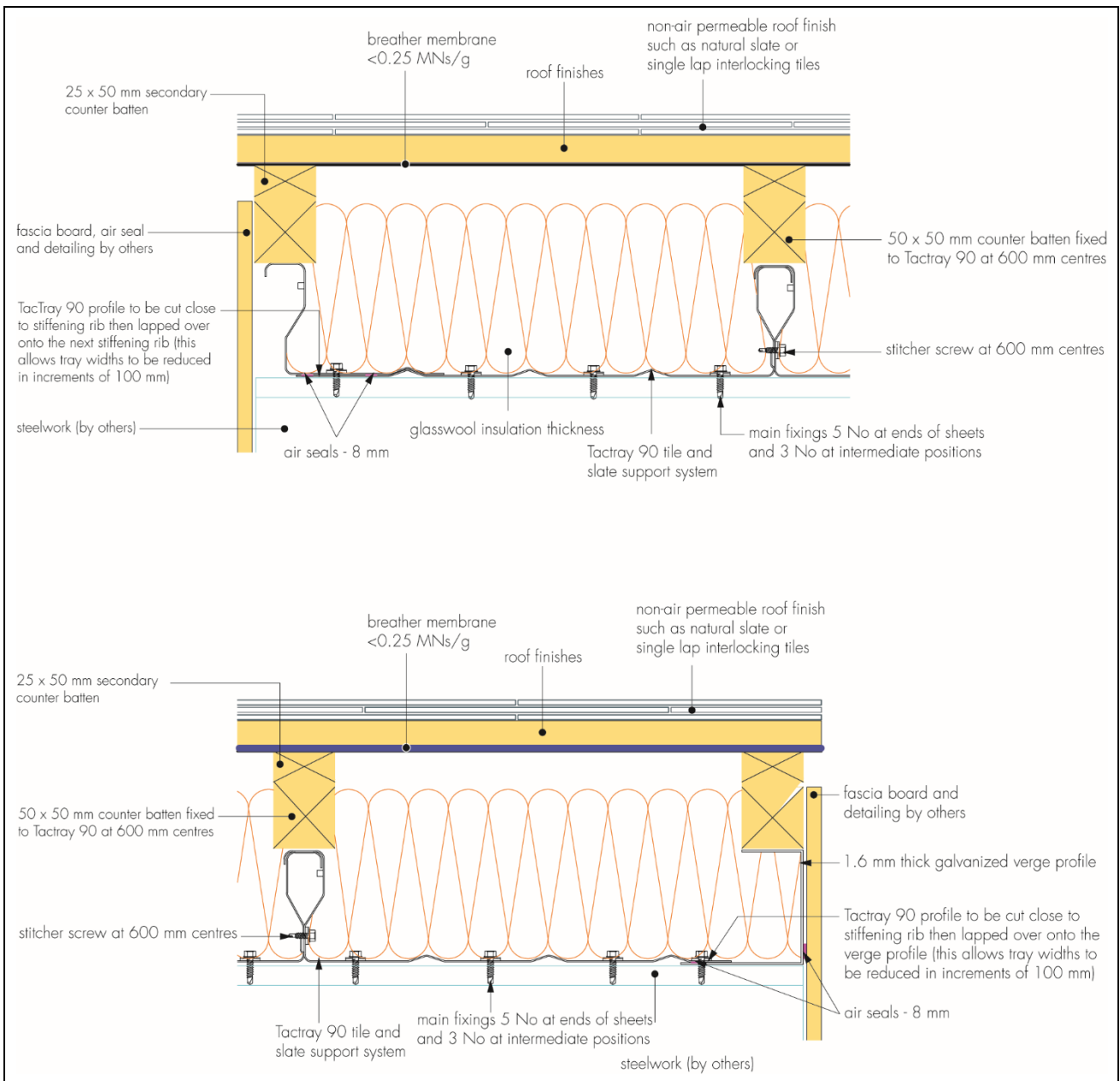
15.11 The timber tiling battens are fixed to the flange of the counter battens with fixings centres calculated according to the weights of the tiles, and in accordance with BS 5534 : 2014.

15.12 Roof finishes are laid in the traditional manner to provide the roof finish and the primary weatherproof barrier.

Figure 7 Procedures



**Figure 8 Reduced width tray**



## Technical Investigations

### 16 Tests

Tests were carried out to establish:

- resistance to dead and imposed (snow) loading
- resistance to wind loading
- behaviour of fixing under static and cycling loading
- fire tests to BS 476-6 : 1989 and BS 476-7 : 1997.

### 17 Investigations

17.1 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the material.

17.2 An assessment was made of:

- structural adequacy (evaluated by tests and calculation)
- performance in fire
- practicability of installation
- condensation risk and thermal transmittance
- weather tightness of the roof sheets and flashings
- durability of the Tactray 90 material.

## Bibliography

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 : 2011 + A1 : 2016 *Code of practice for control of condensation in buildings*

BS 5368-1 : 1976 *Methods of testing windows — Air permeability test*

BS 5534 : 2014 + A1 : 2018 *Slating and tiling for pitched roofs and vertical cladding — Code of practice*

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

BS 6229 : 2018 *Flat roofs with continuously supported flexible waterproof coverings — Code of practice*

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 1991-1-3 : 2003 + A1 : 2015 *Eurocode 1 : Actions on structures — General actions — Snow loads*

NA + A2 : 18 to BS EN 1991-1-3 : 2003 + A1 : 2015 *UK National Annex to Eurocode 1: Actions on structures — General actions — Snow loads*

BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1 : Actions on structures – General actions — Wind actions*

NA to BS EN 1991-1-4 : 2005 + A1 : 2010 *UK National Annex to Eurocode 1 : Actions on structures — General actions — Wind actions*

BS EN 10346 : 2015 *Continuously hot-dip coated steel flat products — Technical delivery conditions*



### 18 Conditions

18.1 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.

18.2 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.

18.3 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.

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

18.5 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
- actual 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.

18.6 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.