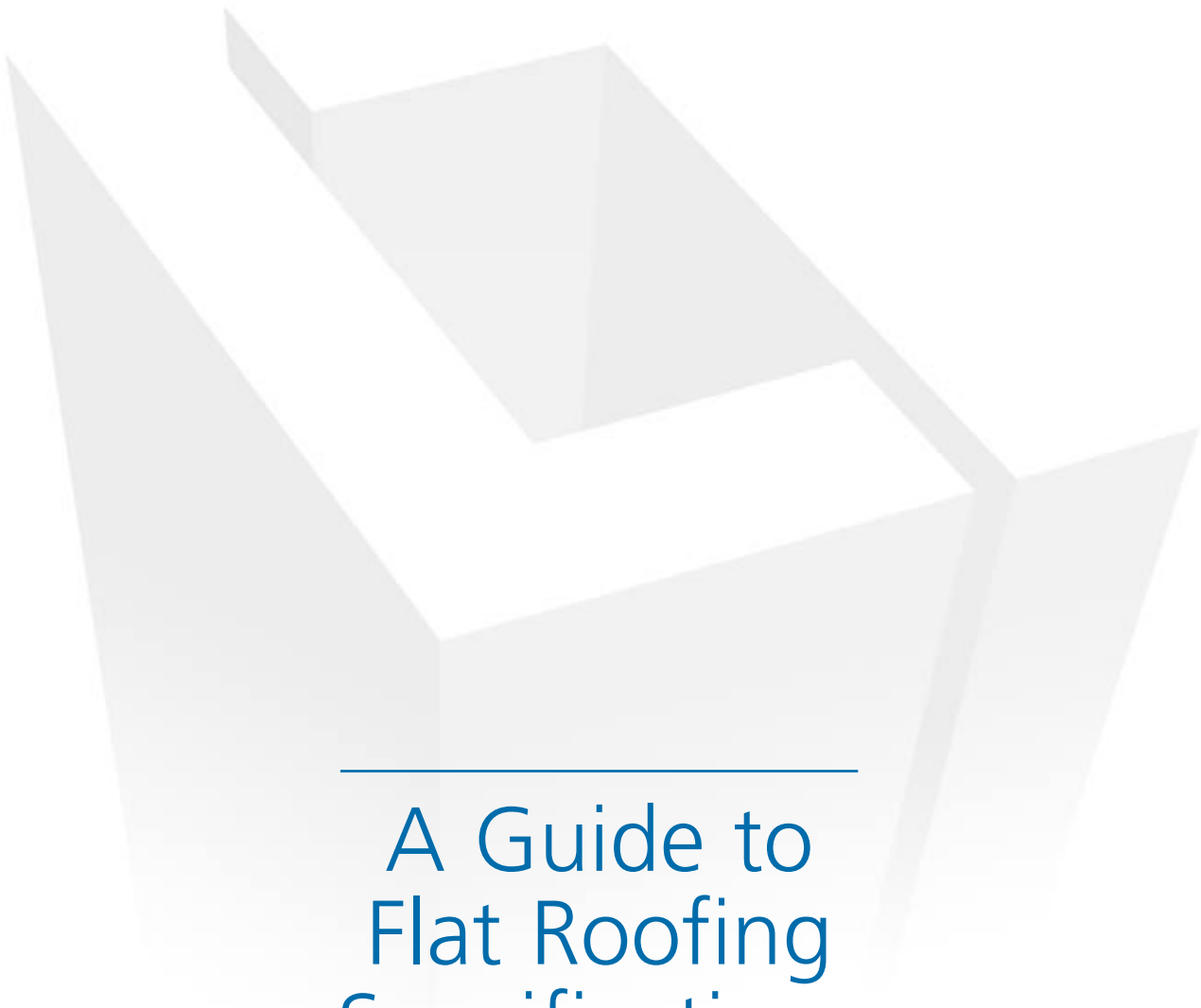
ROOFING SYSTEMS
LANGLEY



A Guide to Flat Roofing Specifications

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Introduction ...

The purpose of this guide, rather than providing detailed instructions for writing specifications, is to highlight the various criteria that need to be considered when choosing a particular system. Indeed, for those who require our insurance-backed guarantee, it is essential that we are involved at the design stage and that we provide fully detailed specifications. This service is, of course, given free and without obligation.

It may be noted that there is often more than one system that would appear to satisfy the requirements of a particular project and here our experience is invaluable in making an informed choice. This is particularly so in the case of built-up roofing versus polymer-modified mastic asphalt roofing.

It is not possible to include all possible specifications or permutations of products so the specifications on the following pages should be regarded as indicative rather than exhaustive.

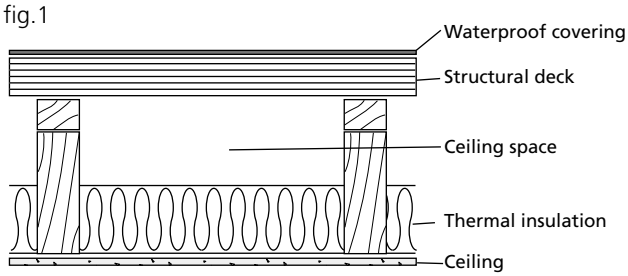
Roof Types

The three main types of roof construction are generally referred to as 'cold roofs', 'warm roofs' and 'protected membrane roofs'.

'Cold Roof'

In this type of construction (fig. 1), thermal insulation, if any, is installed over the ceiling and is therefore usually in the form of an insulating quilt. Even if there is a vapour control layer between the ceiling and the insulation, fixings, laps and penetrations limit the effectiveness of the vapour control layer. It is therefore important to ensure that the space between the top of the insulation and the underside of the roof deck is adequately ventilated to the exterior of the building. Effective ventilation is, however, difficult to achieve and, at best, requires a free-flow of air from one side of the roof to the other and depends on wind speed. Conditions tend to be most severe when the external air is cold and still.

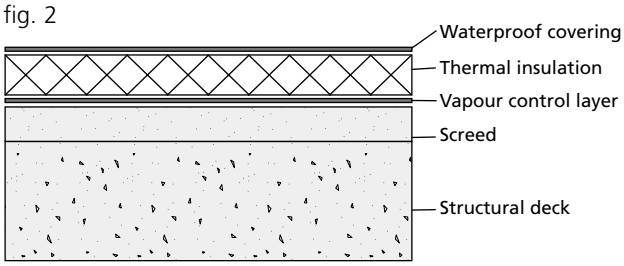
fig.1



'Warm Roof'

More predictable vapour control can be achieved by means of a warm roof construction (fig. 2) where the insulation is installed above the roof deck. The vapour control layer is placed immediately on top of the deck and is connected to the waterproofing layers at perimeters and openings to envelope the insulation. There is therefore less likelihood of the vapour control layer being compromised and sufficient insulation can be used both to avoid the need for ventilation and to ensure that the dew point is above the vapour control layer.

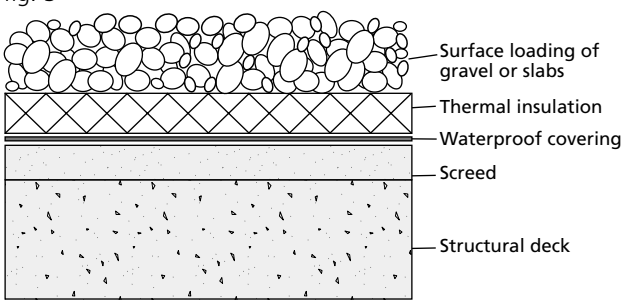
fig. 2



'Protected Membrane Roof'

In this system (fig. 3), the insulation is placed over the waterproofing which also acts as the vapour control layer. Additional benefits are that the waterproofing is protected from mechanical damage, wide temperature fluctuations, heat ageing and ultra-violet radiation. It may also be possible to increase the amount of insulation in future if the need arises. The insulation, which, in this case, is extruded polystyrene, must not be exposed to the elements and must itself be protected from ultra-violet radiation by means of ballast, paving or an in-built cementitious topping. In order to compensate for the seepage of rainwater between and under the insulation, an allowance of 20% is added to the insulation thickness. In this respect, mastic asphalt is ideal for inverted roofs because, in the absence of laps, the insulation sits closer to the surface.

fig. 3



'Hybrid Roofs'

There is a fourth category which is less easy to define, but generally, it comprises those roofs where the roof deck contributes significantly to the thermal insulation, or those where there is already insulation in the roof void and the roof is to be converted to a warm roof by the addition of more insulation on the roof deck. In these cases, it is particularly important to undertake condensation risk calculations to ensure that sufficient insulation is used in the new 'over-deck' system.

Roof Deck Types and Methods of Attachment ...

Built-up Roofing
The following are the main types of roof deck that are likely to be encountered:

Timber boarding
The first layer must be attached by nailing at 150 mm cross centres using extra large headed galvanised steel clout nails. Subsequent layers are fully bonded.

Plywood
The surface should be primed and the first layer of roofing is attached by partial bonding. When using hot bonding bitumen, the joints between the plywood panels should also be taped to prevent bitumen running between the panels. By being laid loose, or tacked in position along one edge, the tapes also act as minor movement joints, spreading the differential movement over a greater width of membrane. Partial bonding is most usually achieved by means of a perforated first layer to obtain controlled spot bonding when the subsequent layer is continuously bonded. Some products now incorporate strips of adhesive, thus avoiding the need for a separate perforated under layer. Vapour control layers may be fully bonded but the joints must be taped.

Woodwool
Woodwool should have a factory-applied felt waterproofing, a factory-applied cementitious screed or a separately-applied sand and cement screed.

Surfaces should be primed and, in all cases, the first layer of roofing is to be attached by partial bonding. When using hot bonding bitumen, the joints between the woodwool panels should be taped to prevent bitumen running between the panels. By being laid loose, or tacked in position along one edge, the tapes also act as minor movement joints, spreading the differential movement over a greater width of membrane. Partial bonding is most usually achieved by means of a perforated first layer to obtain controlled spot bonding when the subsequent layer is continuously bonded. Some products now incorporate strips of adhesive, thus avoiding the need for a separate perforated under layer. Vapour control layers may be fully bonded but joints must be taped.

Profiled Metal
In all cases, a flat board must be used as a base to receive the waterproofing. In nearly all cases, this is provided by the insulation. It is important that the vapour control layer and insulation are able to span the decking troughs without puncturing or fracturing. The attachment to the deck, which must be primed, is intermittent, so particular consideration must be given to wind loading.

Concrete
Concrete decks provide the most stable substrate and usually have a sand and cement screed to form the drainage falls and provide a suitably smooth surface.

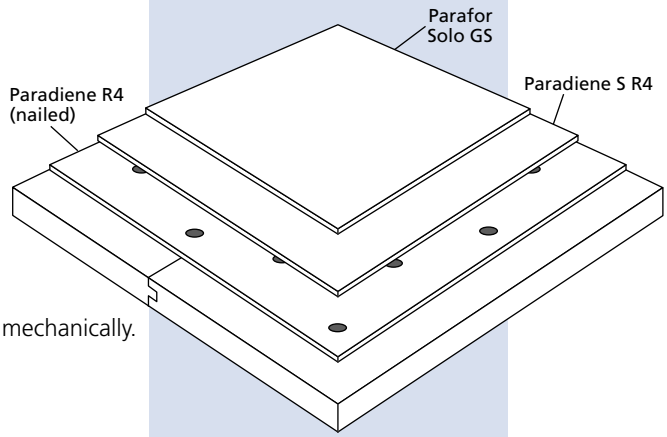
The surface should be primed and the first layer of roofing attached by partial bonding. Partial bonding is most usually achieved by means of a perforated first layer to obtain controlled spot bonding when the subsequent layer is continuously bonded. Some products now incorporate strips of adhesive, thus avoiding the need for a separate perforated under layer. Vapour control layers may be fully bonded.

1. Torch-on Systems ...

1.01.01 Timber Boarded Roof Decks (Cold Roof) Slopes ≤ 5°

Paradiene R4 first layer fixed by nailing.
Paradiene S R4 intermediate layer fully bonded by torching.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** on **Paradiene S R4**.

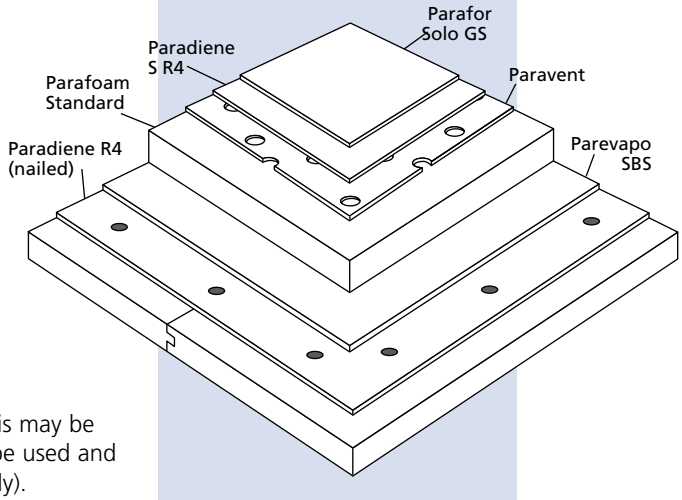


Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. Roof voids must be ventilated.

1.01.02 Timber Boarded Roof Decks (Warm Roof) Slopes ≤ 5°

Paradiene R4 first layer fixed by nailing.
Parevapo SBS vapour barrier (if required) fully bonded by torching.
Parafoam Standard rigid urethane insulation boards fully bonded with hot bitumen or a suitable cold adhesive.
Paravent perforated underlay laid loose.
Paradiene S R4 intermediate layer fully bonded by torching.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** on **Paradiene S R4**.

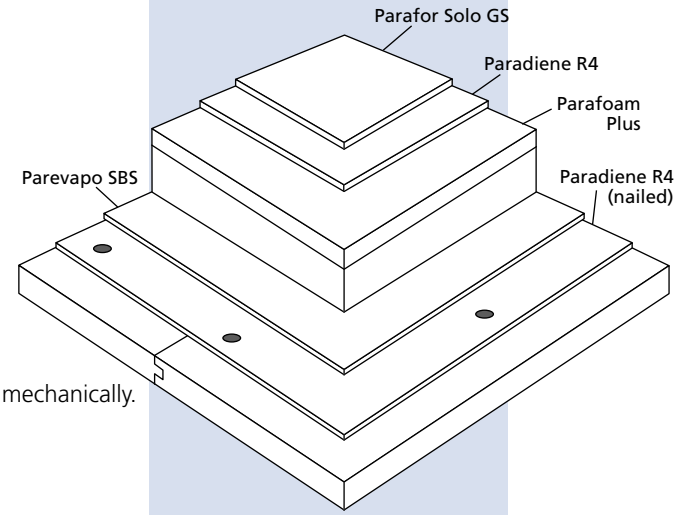


Notes:
1. For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, a fully bonded specification must be used. This may be as in 1.01.03 or an insulation board with a torchable facing may be used and **Paravent** omitted (head laps in the cap sheet secured mechanically).

1.01.03 Timber Boarded Roof Decks (Warm Roof) Slopes ≤ 5°

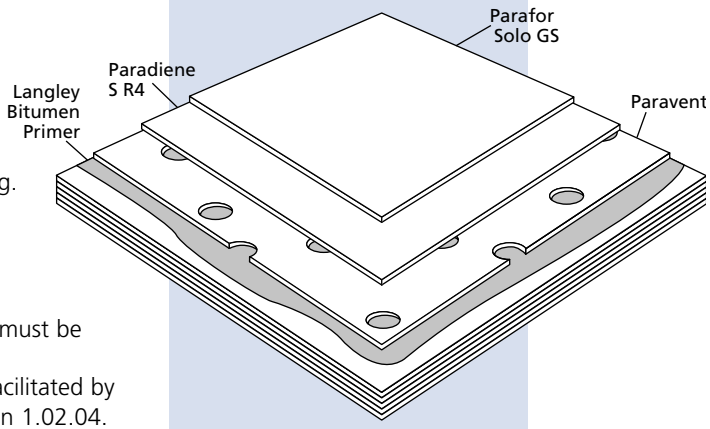
Paradiene R4 first layer fixed by nailing.
Parevapo SBS vapour barrier (if required) fully bonded by torching.
Parafoam Plus cork-faced rigid urethane insulation boards fully bonded with hot bitumen.
Paradiene R4 under layer fully bonded with hot bitumen.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** (torch-applied) on **Paradiene R4**.



Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, grade 115/15 bitumen should be used.

1.02.01 Plywood and Pre-felted or Pre-screeded Woodwool Roof Decks (Cold Roof) Slopes ≤ 5°

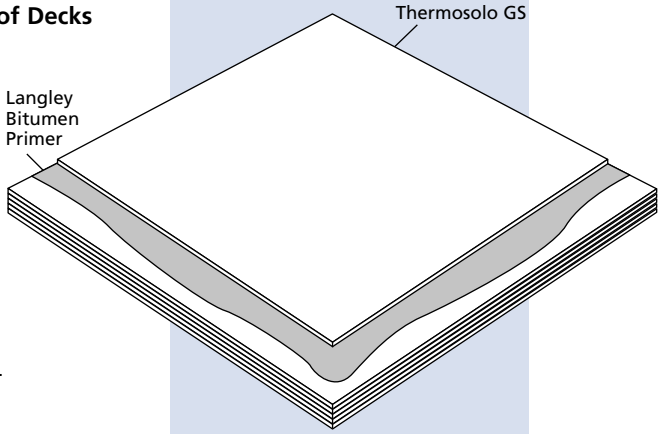


Langley Bitumen Primer.
Taped joints.
Paravent perforated underlay laid loose.
Paradiene S R4 intermediate layer fully bonded by torching.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details are formed with **Parafor Solo GS** on **Paradiene S R4**.

Notes:
1. For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, a fully bonded specification must be used, facilitated by a minimal thickness of insulation such as **Paracork** in specification 1.02.04.
3. Roof voids must be ventilated.

1.02.02 Plywood and Pre-felted or Pre-screeded Woodwool Roof Decks (Cold Roof) Slopes ≥ 1:80

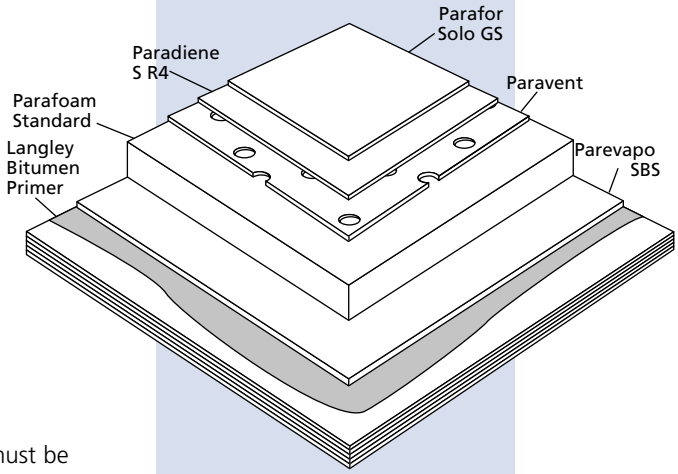


Langley Bitumen Primer.
Thermosolo GS mineral-surfaced, partially-bonded membrane bonded by torching.

Details: **Parafor Solo GS** on **Paradiene S R4** (torch-applied).

Notes:
1 For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 20°, the sheet length must be no more than 4 m.
3. Roof voids must be ventilated.

1.02.03 Plywood and Pre-felted or Pre-screeded Woodwool Roof Decks (Warm Roof) Slopes ≤ 5°



Langley Bitumen Primer.
Taped joints.
Parevapo SBS vapour barrier fully bonded by torching.
Parafoam Standard rigid urethane insulation boards fully bonded with hot bitumen or a suitable cold adhesive.
Paravent perforated underlay laid loose.
Paradiene S R4 intermediate layer fully bonded by torching.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** on **Paradiene S R4**.

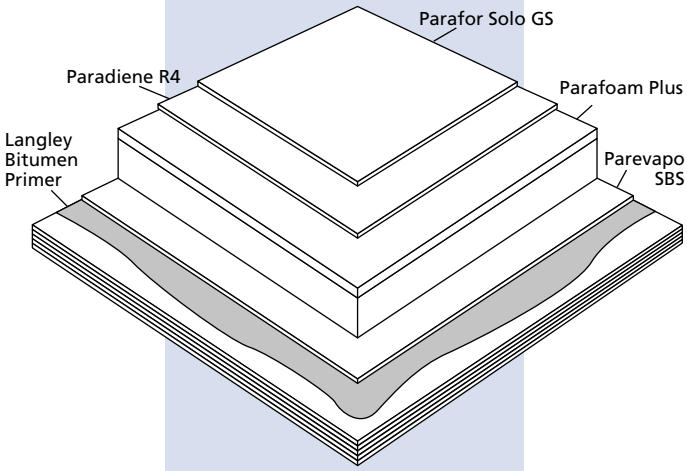
Notes:
1. For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, a fully bonded specification must be used. This may be as in 1.02.04 or an insulation board with a torchable facing may be used and **Paravent** omitted (head laps in the cap sheet secured mechanically).

1.02.04 Plywood and Pre-felted or Pre-screeded Woodwool Roof Decks (Warm Roof) Slopes ≤ 5°

Langley Bitumen Primer.
Taped joints.
Parevapo SBS vapour barrier fully bonded by torching.
Parafoam Plus cork-faced rigid urethane insulation boards fully bonded with hot bitumen.
Paradiene R4 intermediate layer fully bonded with hot bitumen.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, grade 115/15 bitumen should be used.

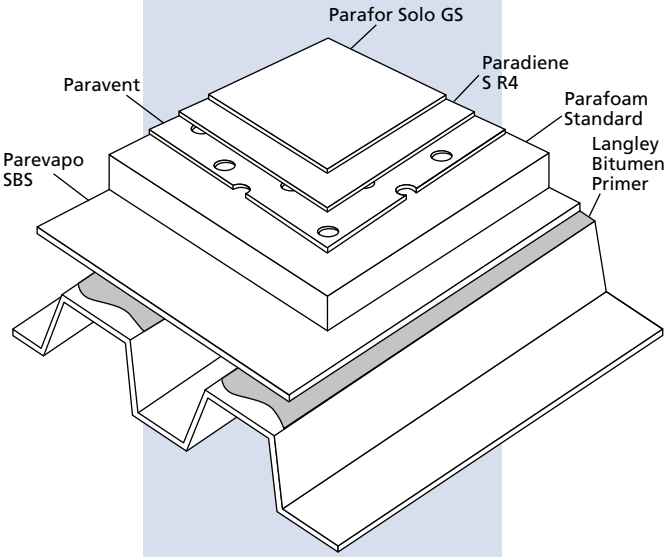


1.03.01 Profiled Metal Roof Decks (Warm Roof) Slopes ≤ 5°

Langley Bitumen Primer.
Parevapo SBS vapour barrier bonded by torching.
Parafoam Standard rigid urethane insulation boards fully bonded with hot bitumen or a suitable cold adhesive.
Paravent perforated underlay laid loose.
Paradiene S R4 intermediate layer fully bonded by torching.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** on **Paradiene S R4**.

Notes:
1. For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, a fully bonded specification must be used such as in 1.03.02. Alternatively, an insulation board with a torchable facing may be used and **Paravent** omitted (head laps in the cap sheet secured mechanically).

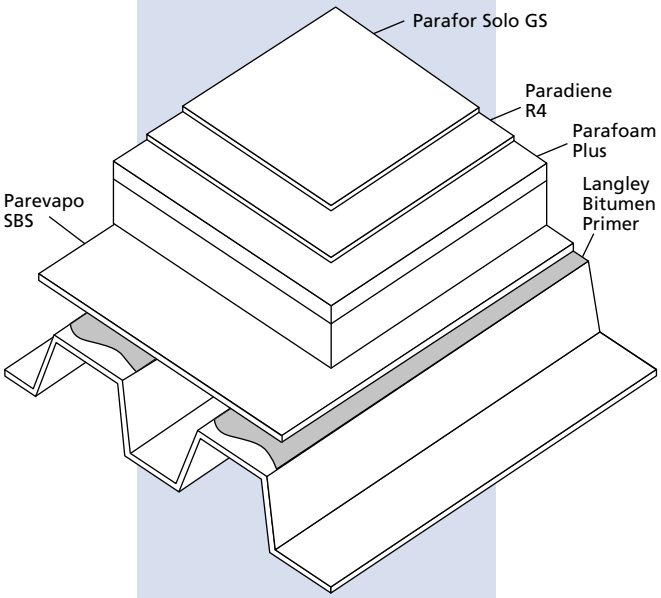


1.03.02 Profiled Metal Roof Decks (Warm Roof) Slopes ≤ 5°

Langley Bitumen Primer.
Parevapo SBS vapour barrier bonded by torching.
Parafoam Plus cork-faced rigid urethane insulation board fully bonded with hot bitumen.
Paradiene R4 under layer fully bonded with hot bitumen.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

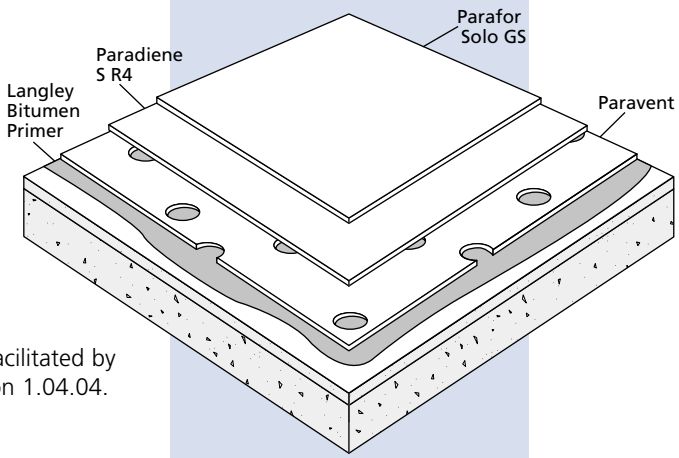
Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, grade 115/15 bitumen should be used.



1.04.01 Concrete Roof Decks (Cold Roof) Slopes ≤ 5°

Langley Bitumen Primer.
Paravent perforated underlay laid loose.
Paradiene S R4 intermediate layer fully bonded by torching.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** on **Paradiene S R4**.

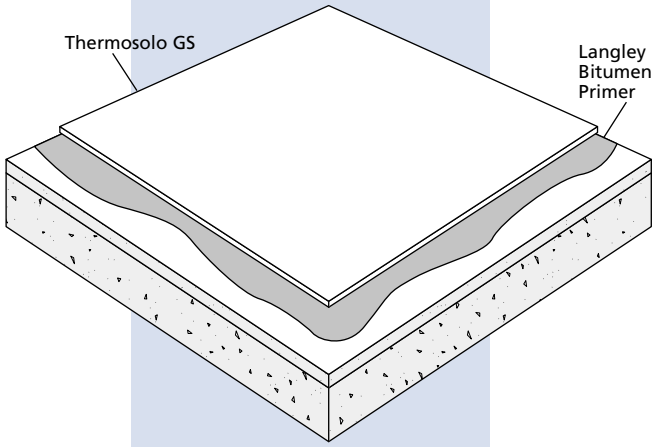


Notes:
1. For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, a fully bonded specification must be used, facilitated by a minimal thickness of insulation such as **Paracork** in specification 1.04.04.

1.04.02 Concrete Roof Decks (Cold Roof) Slopes ≥ 1:80

Langley Bitumen Primer.
Thermosolo GS mineral-surfaced, partially-bonded membrane bonded by torching.

Details: **Parafor Solo GS** on **Paradiene S R4** (torch-applied).

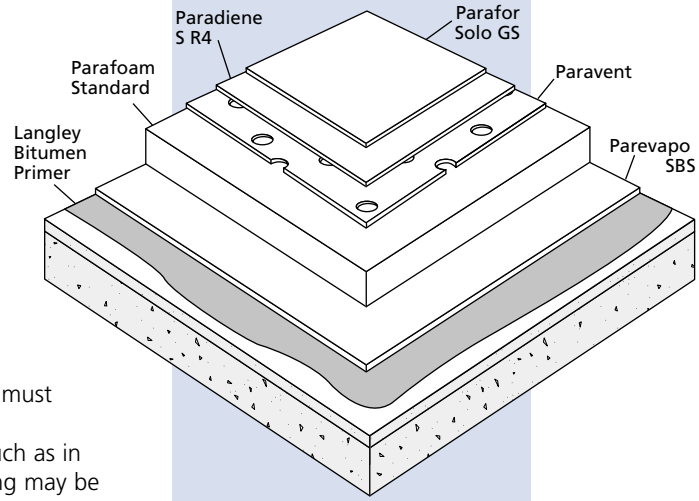


Notes:
1. For slopes over 5° the head laps in the cap sheet must be secured mechanically.
2. For slopes over 20°, the sheet length must be no more than 4 m.
3. Roof voids must be ventilated.

1.04.03 Concrete Roof Decks (Warm Roof) Slopes ≤ 5°

Langley Bitumen Primer.
Parevapo SBS vapour barrier fully bonded by torching.
Parafoam Standard rigid urethane insulation boards fully bonded with hot bitumen or a suitable cold adhesive.
Paravent perforated underlay laid loose.
Paradiene S R4 intermediate layer fully bonded by torching.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** on **Paradiene S R4**.



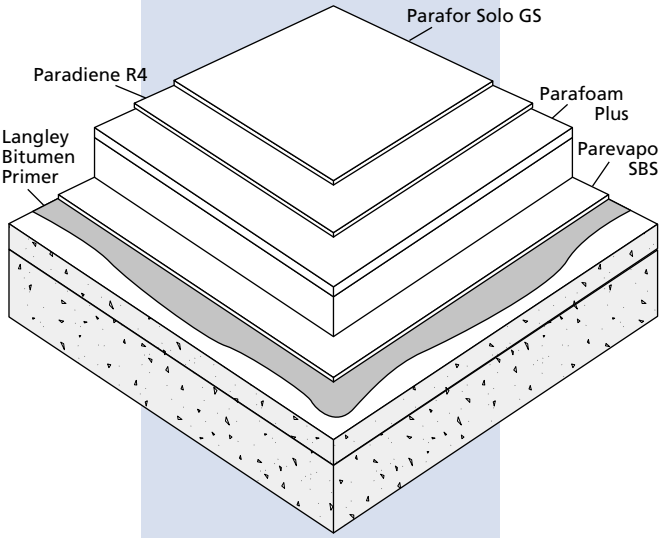
Notes:
1 For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2 For slopes over 10°, a fully bonded specification must be used such as in 1.04.04. Alternatively, an insulation board with a torchable facing may be used and **Paravent** omitted (head laps in the cap sheet secured mechanically).

1.04.04 Concrete Roof Decks (Warm Roof) Slopes ≤ 5°

Langley Bitumen Primer.
Parevapo SBS vapour barrier fully bonded by torching.
Parafoam Plus cork-faced rigid urethane insulation boards fully bonded with hot bitumen.
Paradiene R4 intermediate layer fully bonded with hot bitumen.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, grade 115/15 bitumen should be used.



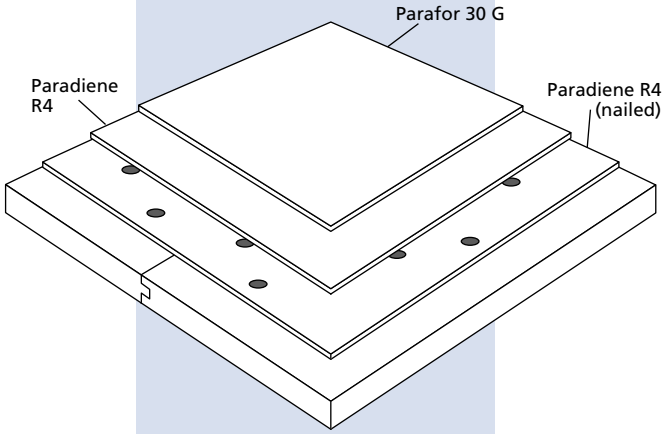
2. Pour and Roll Systems ...

2.01.01 Timber Boarded Roof Decks (Cold Roof) Slopes ≤ 5°

Paradiene R4 first layer fixed by nailing.
Paradiene R4 intermediate layer fully bonded with hot bitumen.
Parafor 30 G mineral-surfaced cap sheet fully bonded with hot bitumen.

Details: **Parafor 30 G** or **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. Roof voids must be ventilated.

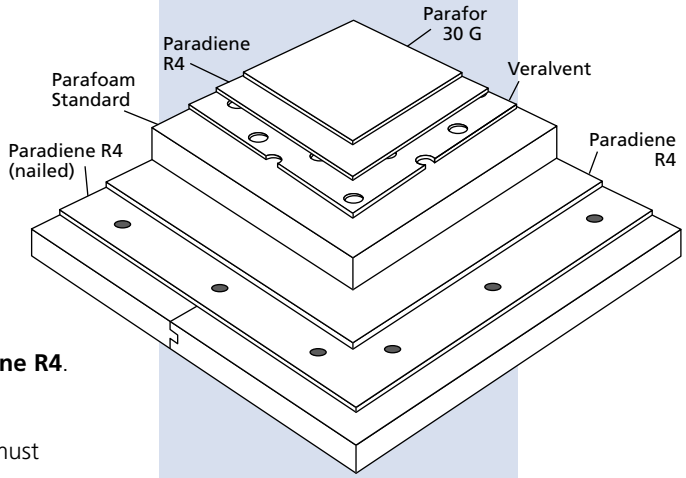


2.01.02 Timber Boarded Roof Decks (Warm Roof) Slopes ≤ 5°

Paradiene R4 first layer fixed by nailing.
Paradiene R4 vapour control layer (if required) fully bonded with hot bitumen.
Parafoam Standard rigid urethane insulation boards fully bonded with hot bitumen.
Veralvent perforated underlay laid loose.
Paradiene R4 intermediate layer fully bonded with hot bitumen.
Parafor 30 G mineral-surfaced cap sheet fully bonded with hot bitumen.

Details: **Parafor 30 G** or **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, a fully bonded specification must be used such as that below.

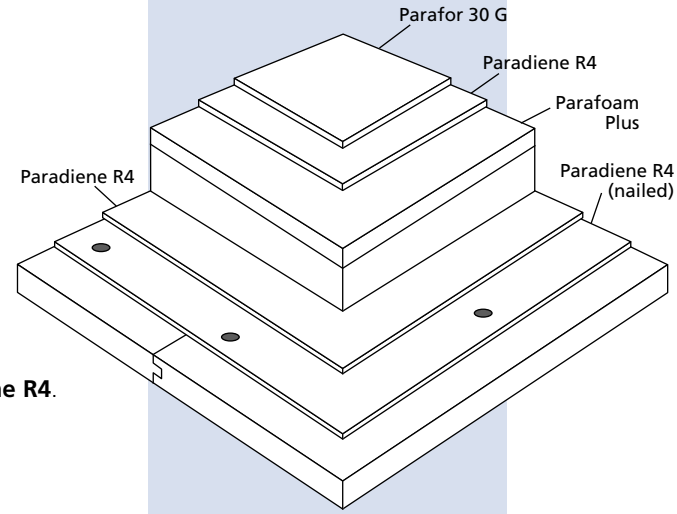


2.01.03 Timber Boarded Roof Decks (Warm Roof) Slopes ≤ 5°

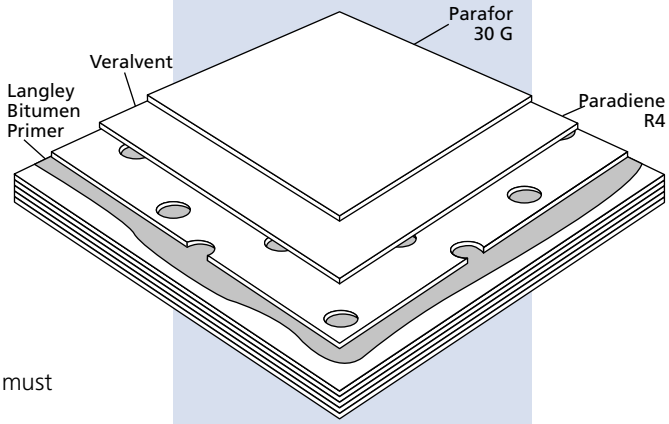
Paradiene R4 first layer fixed by nailing.
Paradiene R4 vapour control layer (if required) fully bonded with hot bitumen.
Parafoam Plus cork-faced rigid urethane insulation boards fully bonded with hot bitumen.
Paradiene R4 intermediate layer fully bonded with hot bitumen.
Parafor 30 G mineral-surfaced cap sheet fully bonded with hot bitumen.

Details: **Parafor 30 G** or **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, grade 115/15 bitumen should be used.



2.02.01 Plywood and Pre-felted or Pre-screeded Woodwool Roof Decks (Cold Roof) Slopes ≤ 5°

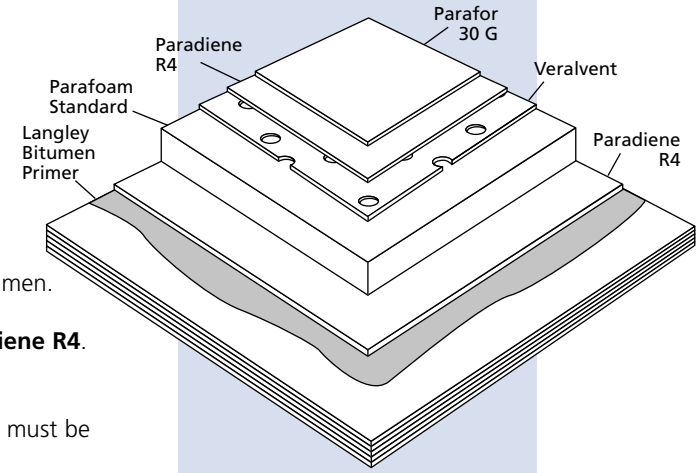


Langley Bitumen Primer.
Taped joints.
Veralvent perforated underlay laid loose.
Paradiene R4 intermediate layer fully bonded with hot bitumen.
Parafor 30 G mineral-surfaced cap sheet fully bonded with hot bitumen.

Details: **Parafor 30 G** or **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, a fully bonded specification must be used, facilitated by a minimal thickness of insulation such as **Paracork** in specification 2.02.03.
3. Roof voids must be ventilated.

2.02.02 Plywood and Pre-felted or Pre-screeded Woodwool Roof Decks (Warm Roof) Slopes ≤ 5°

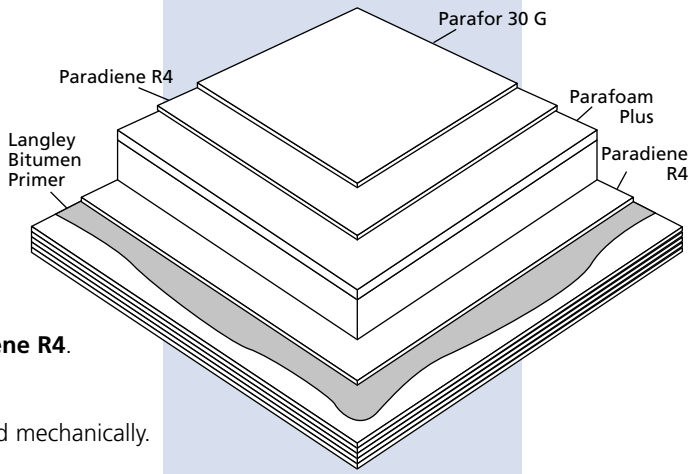


Langley Bitumen Primer.
Taped joints.
Paradiene R4 vapour control layer fully bonded with hot bitumen.
Parafoam Standard rigid urethane insulation boards fully bonded with hot bitumen.
Veralvent perforated underlay laid loose.
Paradiene R4 intermediate layer fully bonded with hot bitumen.
Parafor 30 G mineral-surfaced cap sheet fully bonded with hot bitumen.

Details: **Parafor 30 G** or **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, a fully bonded specification must be used such as 2.02.03.

2.02.03 Plywood and Pre-felted or Pre-screeded Woodwool Roof Decks (Warm Roof) Slopes ≤ 5°



Langley Bitumen Primer.
Taped joints.
Paradiene R4 vapour control layer fully bonded with hot bitumen.
Parafoam Plus cork-faced rigid urethane insulation boards fully bonded with hot bitumen.
Paradiene R4 intermediate layer fully bonded with hot bitumen.
Parafor 30 G mineral-surfaced cap sheet fully bonded with hot bitumen.

Details: **Parafor 30 G** or **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

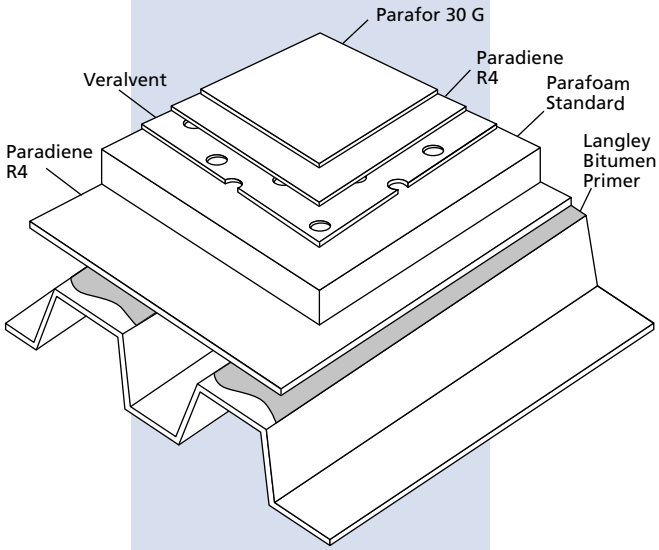
Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, grade 115/15 bitumen should be used.

2.03.01 Profiled Metal Roof Decks (Warm Roof) Slopes ≤ 5°

Langley Bitumen Primer.
Paradiene R4 vapour control layer bonded with hot bitumen.
Parafoam Standard rigid urethane insulation boards fully bonded with hot bitumen.
Veralvent perforated underlay laid loose.
Paradiene R4 intermediate layer fully bonded with hot bitumen.
Parafor 30 G mineral-surfaced cap sheet fully bonded with hot bitumen.

Details: **Parafor 30 G** or **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, a fully bonded specification must be used such as in 2.03.02.

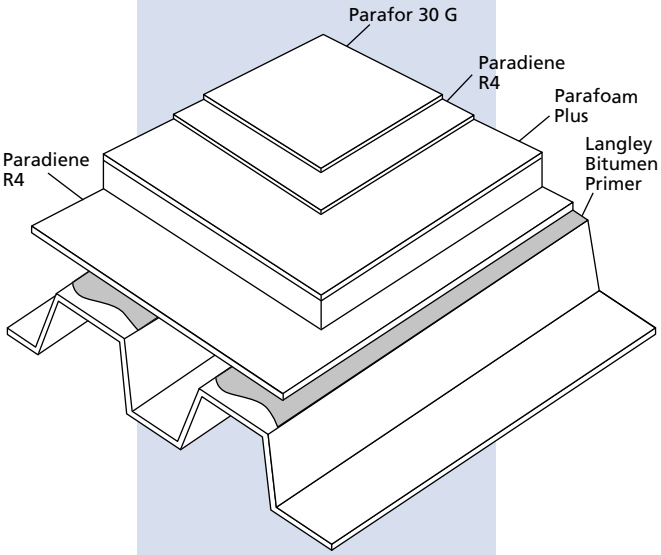


2.03.02 Profiled Metal Roof Decks (Warm Roof) Slopes ≤ 5°

Langley Bitumen Primer.
Paradiene R4 vapour control layer fully bonded with hot bitumen.
Parafoam Plus cork-faced rigid urethane insulation boards fully bonded with hot bitumen.
Paradiene R4 underlayer fully bonded with hot bitumen.
Parafor 30 G mineral-surfaced cap sheet fully bonded with hot bitumen.

Details: **Parafor 30 G** or **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, grade 115/15 bitumen should be used.

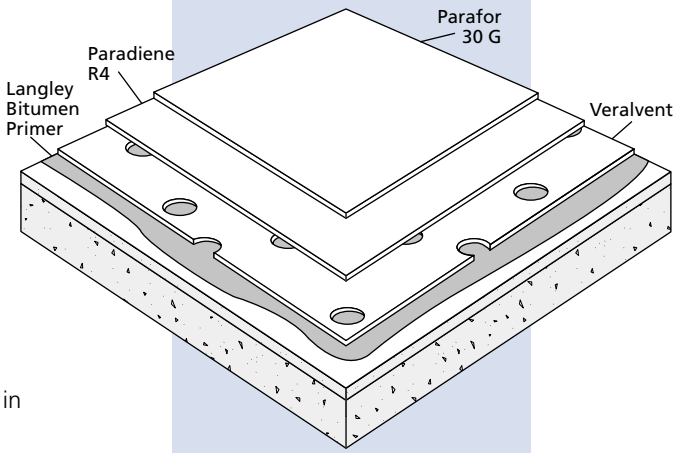


2.04.01 Concrete Roof Decks (Cold Roof) Slopes ≤ 5°

Langley Bitumen Primer.
Veralvent perforated underlay laid loose.
Paradiene R4 intermediate layer fully bonded with hot bitumen
Parafor 30 G mineral-surfaced cap sheet fully bonded with hot bitumen.

Details: **Parafor 30 G** or **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, a fully bonded specification must be used, facilitated by a minimal thickness of insulation such as **Paracork** in specification 2.04.03.
3. Roof voids must be ventilated.

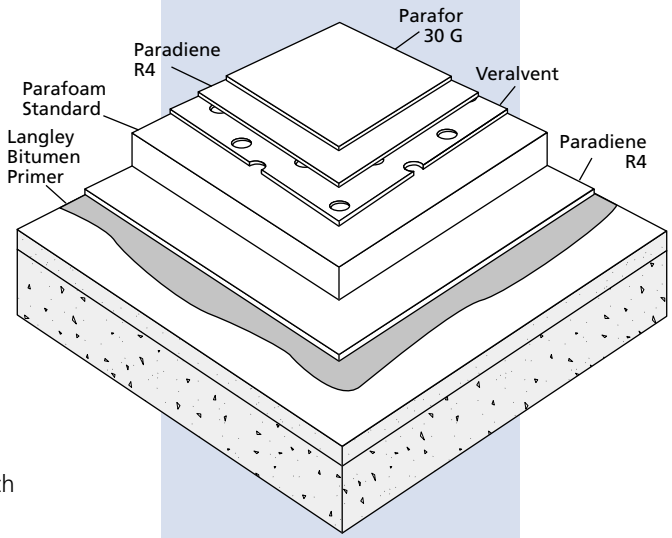


2.04.02 Concrete Roof Decks (Warm Roof) Slopes ≤ 5°

Langley Bitumen Primer.
Paradiene R4 vapour control layer fully bonded with hot bitumen.
Parafoam Standard rigid urethane insulation boards fully bonded with hot bitumen.
Veralvent perforated underlay laid loose.
Paradiene R4 intermediate layer fully bonded with hot bitumen.
Parafor 30 G mineral-surfaced cap sheet fully bonded with hot bitumen.

Details: **Parafor 30 G** or **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5° and up to 10°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, a fully bonded specification must be used such as in 2.04.03.

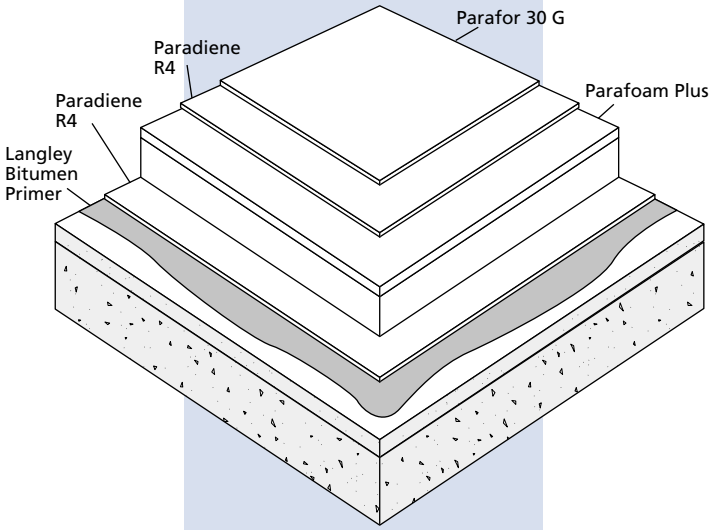


2.04.03 Concrete Roof Decks (Warm Roof) Slopes ≤ 5°

Langley Bitumen Primer.
Paradiene R4 vapour control layer fully bonded with hot bitumen.
Parafoam Plus cork-faced rigid urethane insulation boards fully bonded with hot bitumen.
Paradiene R4 under layer fully bonded with hot bitumen.
Parafor 30 G mineral-surfaced cap sheet fully bonded with hot bitumen.

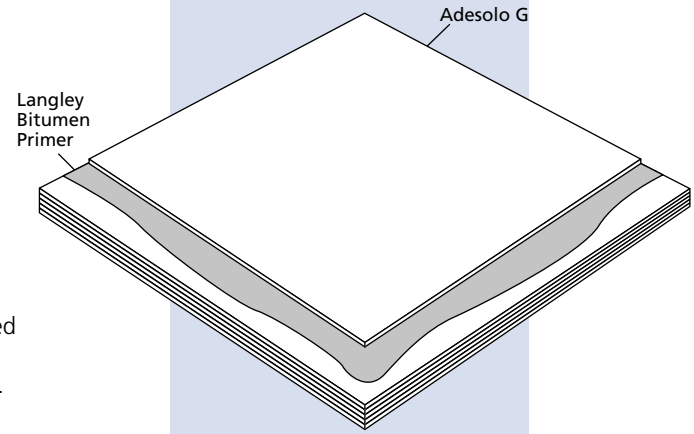
Details are formed with **Parafor 30 G** or **Parafor Solo GS** (torch-applied) on **Paradiene R4**.

Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 10°, grade 115/15 bitumen should be used.



3. Self-adhesive Systems ...

3.01.01 Plywood and Pre-felted or Pre-screeded Woodwool Roof Decks (Cold Roof – Single layer) Slopes ≥ 1:80

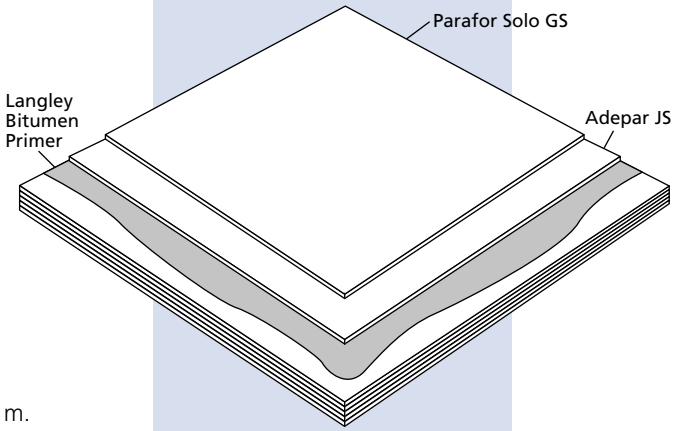


Langley Bitumen Primer
Adesolo G mineral-surfaced membrane bonded by means of its factory-applied self-adhesive strips and laps sealed by torching or hot air welding.

Details: **Parafor Solo GS** on **Paradiene S R4** (torch-applied).

Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 20°, the sheet length must be no more than 4 m.
3. Roof voids must be ventilated.

3.01.02 Plywood and Pre-felted or Pre-screeded Woodwool Roof Decks (Cold Roof – Two-Layer) Slopes ≥ 1:80

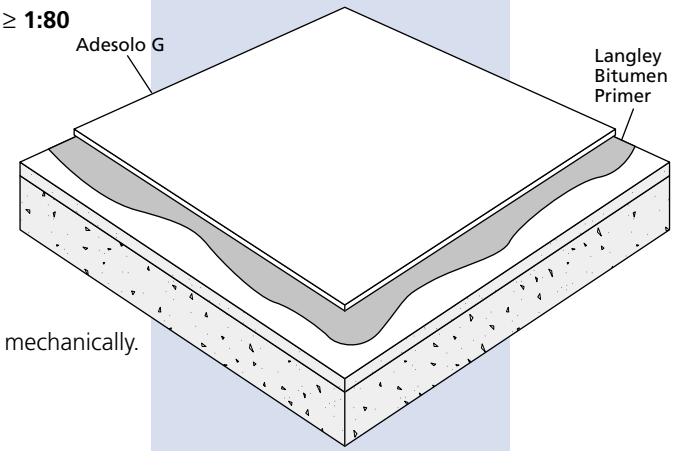


Langley Bitumen Primer
Adepar JS self-adhesive under layer bonded by means of its factory-applied self-adhesive strips and with laps sealed by torching or hot air welding.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** on **Paradiene S R4** (torch-applied).

Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 20°, the cap sheet length must be no more than 4 m.
3. Roof voids must be ventilated.

3.02.01 Concrete Roof Decks (Cold Roof – Single-Layer) Slopes ≥ 1:80



Langley Bitumen Primer
Adesolo G mineral-surfaced membrane bonded by means of its factory-applied self-adhesive strips and laps sealed by torching or hot air welding.

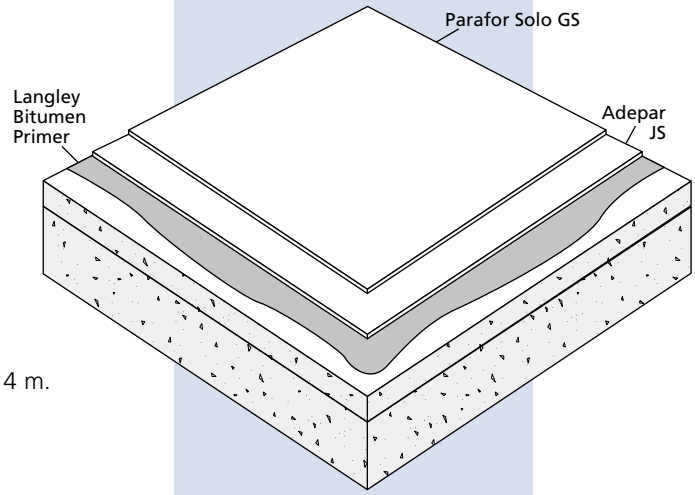
Details: **Parafor Solo GS** on **Paradiene S R4** (torch-applied).

Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 20°, the sheet length must be no more than 4 m.
3. Roof voids must be ventilated.

3.02.02 Concrete Roof Decks (Cold Roof – Two-Layer) Slopes ≥ 1:80

Langley Bitumen Primer
Adepar JS self-adhesive under layer bonded by means of its factory-applied self-adhesive strips and with laps sealed by torching or hot air welding.
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** on **Paradiene S R4** (torch-applied).



Notes:
1. For slopes over 5°, the head laps in the cap sheet must be secured mechanically.
2. For slopes over 20°, the cap sheet length must be no more than 4 m.
3. Roof voids must be ventilated.

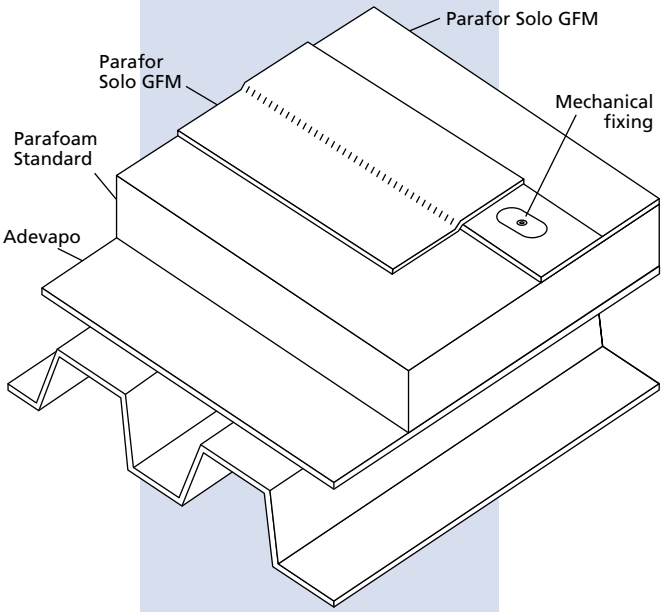
4. Mechanically-Fixed Systems ...

Mechanically-fixed systems are generally used over profiled metal roof decks although suitable fixings are available for other deck types.

4.01 Profiled Metal Decking with Single-Layer Waterproofing (Warm Roof) Slopes ≥ 1:80

Adevapo self-adhesive vapour barrier. **Parafoam Standard** rigid urethane insulation boards fixed mechanically using the specified fixings and washers.
Paradiene FM underlay (where required at perimeters, corners etc.) mechanically-fixed using the specified fixings and washers.
Parafor Solo GFM single-layer waterproofing membrane mechanically-fixed along the selvedge using the specified fixings and washers (fully bonded by torching over the **Paradiene FM**). Laps sealed by torching or hot air welding.

Details: **Parafor Solo GS** on **Paradiene S R4** (torch-applied).

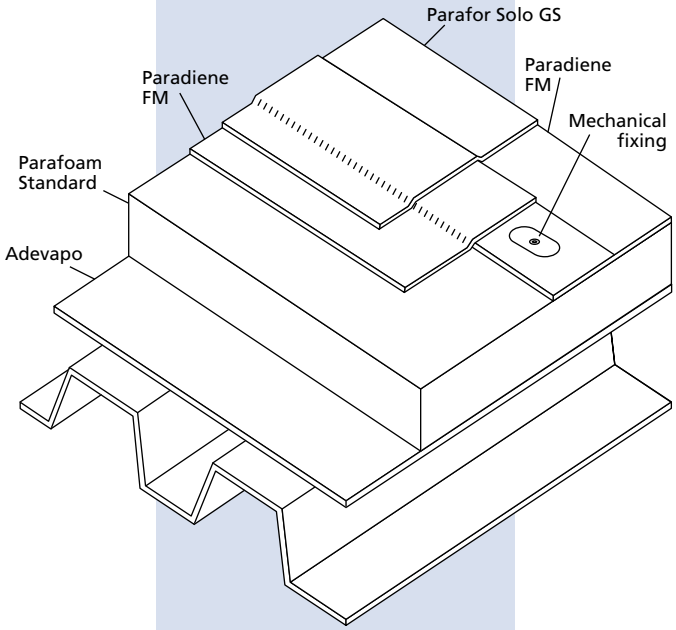


Notes:
1. The density of fixings depends on factors such as wind loading.
2. In all cases, it is necessary to determine the fixing type, spacing and arrangement according to the nature of the building, its location and exposure.

4.02 Profiled Metal Decking with Two-Layer Waterproofing (Warm Roof) Slopes ≥ 1:80

Adevapo self-adhesive vapour barrier.
Parafoam Standard rigid urethane insulation boards fixed mechanically using the specified fixings and washers.
Paradiene FM underlay mechanically-fixed using the specified fixings and washers (laps sealed by torching).
Parafor Solo GS mineral-surfaced cap sheet fully bonded by torching.

Details: **Parafor Solo GS** on **Paradiene S R4** (torch-applied).

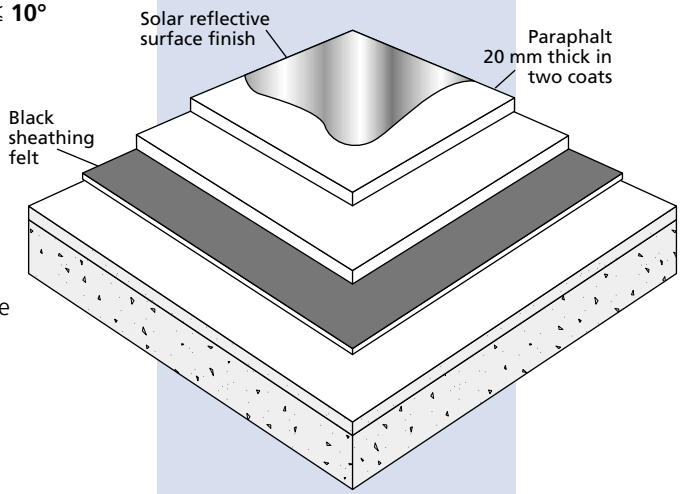


Notes:
1. The density of fixings depends on factors such as wind loading and decking profile.
2. In all cases, it is necessary to determine the fixing type, spacing and arrangement according to the nature of the building, its location and exposure.

5. Mastic Asphalt Roofing ...

5.01 All Roof Decks Except Profiled Metal (Cold Roof) Slopes ≤ 10°

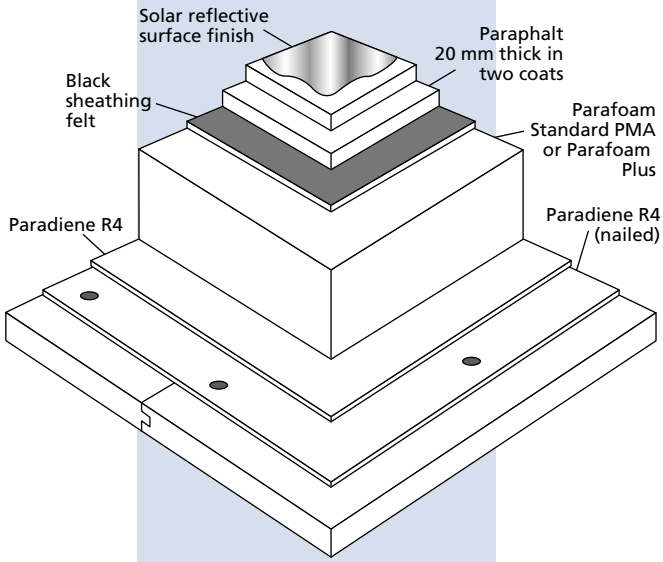
Black sheathing felt.
Paraphalt polymer-modified mastic asphalt roofing 20 mm thick in two coats.
Protective finish of stone chippings, pedestrian tiles or **Paraflect** coating.



Notes:
1. Suitable for maintenance foot traffic only.
2. Roof decks of timber boarding, plywood and woodwool must have free-standing kerbs at abutments with concrete or brick walls etc.
3. Roof voids must be ventilated.
4. For profiled metal roof decks, use 5.03.

5.02 Timber Boarded Roof Decks (Warm Roof) Slopes ≤ 5°

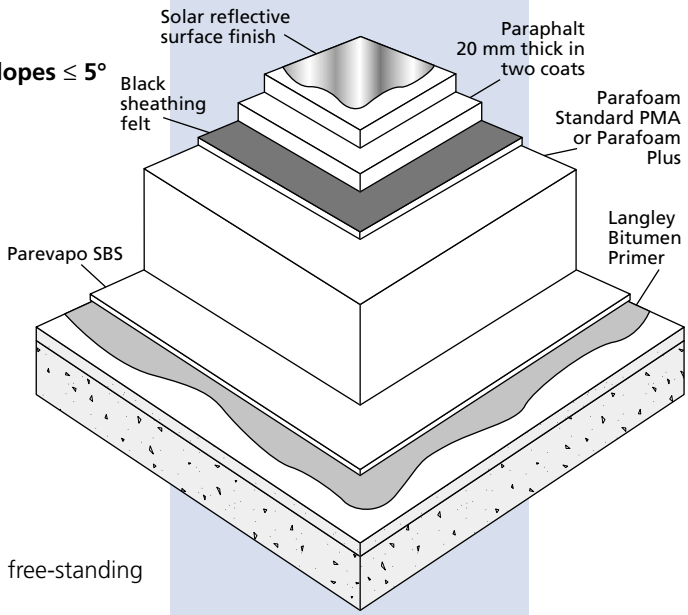
Paradiene R4 first layer fixed by nailing.
Paradiene R4 vapour control layer (if required) fully bonded with hot bitumen.
Parafoam Standard PMA rigid urethane or **Parafoam Plus** cork-faced urethane insulation boards fully bonded with hot bitumen.
Black sheathing felt.
Paraphalt polymer-modified mastic asphalt roofing 20 mm thick in two coats.
Protective finish of stone chippings, pedestrian tiles or **Paraflect** coating.



Notes:
1. Suitable for maintenance foot traffic only.
2. Roof decks of timber boarding must have free-standing kerbs at abutments with concrete or brick walls etc.

5.03 Roof Decks Other Than Timber Boarding (Warm Roof) Slopes ≤ 5°

Langley Bitumen Primer (deck only).
Taped joints (plywood and woodwool).
Parevapo SBS vapour barrier fully bonded by torching (bonded to crowns of metal roof decks).
Parafoam Standard PMA rigid urethane or **Parafoam Plus** cork-faced urethane insulation boards fully bonded with hot bitumen or a suitable cold adhesive.
Black sheathing felt.
Paraphalt polymer-modified mastic asphalt roofing 20 mm thick in two coats.
Protective finish of stone chippings, pedestrian tiles or **Paraflect** coating.

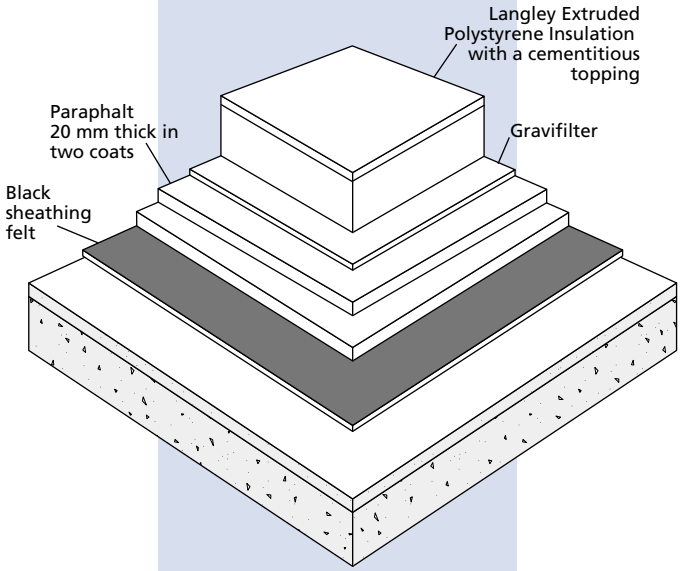


Notes:
1. Suitable for maintenance foot traffic only.
2. Roof decks of plywood, woodwool and profiled metal must have free-standing kerbs at abutments with concrete or brick walls etc.
3. The maximum permissible deflection of metal decks is 1/325 of span.

5.04 Concrete Roof Decks (Inverted Roof) Slopes ≤ 10°

Black sheathing felt.
Paraphalt polymer-modified mastic asphalt roofing 20 mm thick in two coats.
Gravifilter isolating layer.
Langley Extruded Polystyrene Insulation boards.
Protective finish to be incorporated in composite insulation boards, as separately-applied gravel ballast, or paving slabs on plastic corner supports.

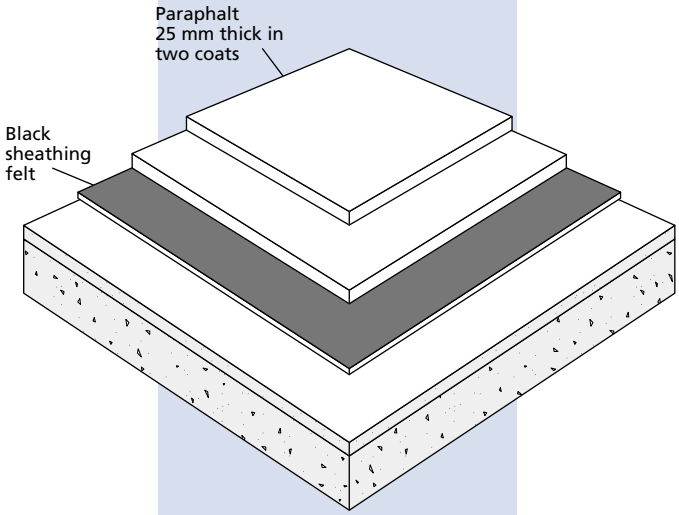
Notes:
1. Other roof decks (except profiled metal) may be suitable depending on load bearing strength, deflection etc.



5.05 Concrete Access Decks (Cold Roof) Falls ≥ 1:80

Black sheathing felt.
Paraphalt polymer-modified mastic asphalt roofing 25 mm thick in two coats, the first being 10 mm thick and the second being 15 mm thick with 15-20% by weight of additional 3 mm aggregate.

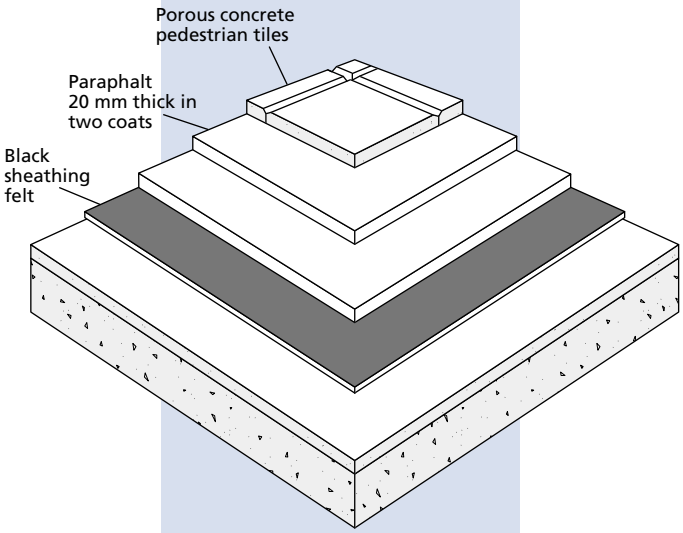
Notes:
1. Not suitable for point loading.
2. For foot traffic only.
3. Roof voids must be ventilated.



5.06 Private Balconies (Cold Roof) Falls ≥ 1:80

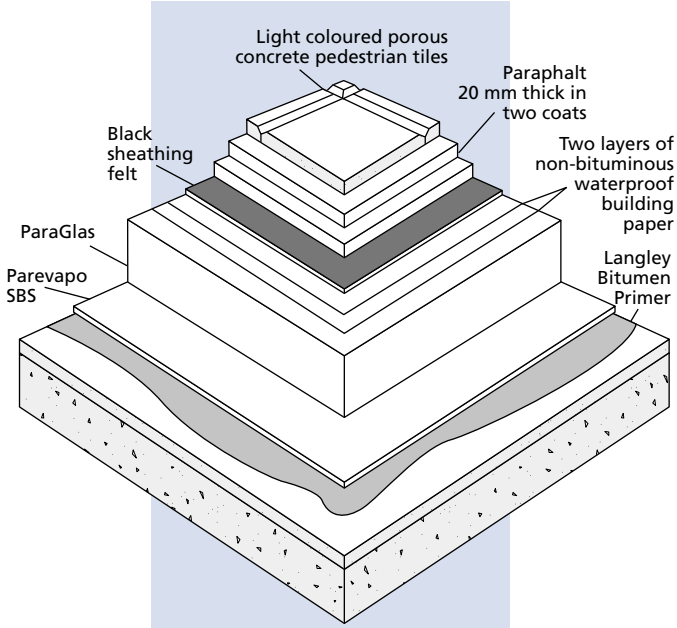
Black sheathing felt.
Paraphalt polymer-modified mastic asphalt roofing 20 mm thick in two coats.
Porous concrete pedestrian tiles bonded in hot bitumen.

Notes:
1. Roof decks other than concrete may be suitable depending on load bearing strength, deflection etc.
2. Roof voids must be ventilated.



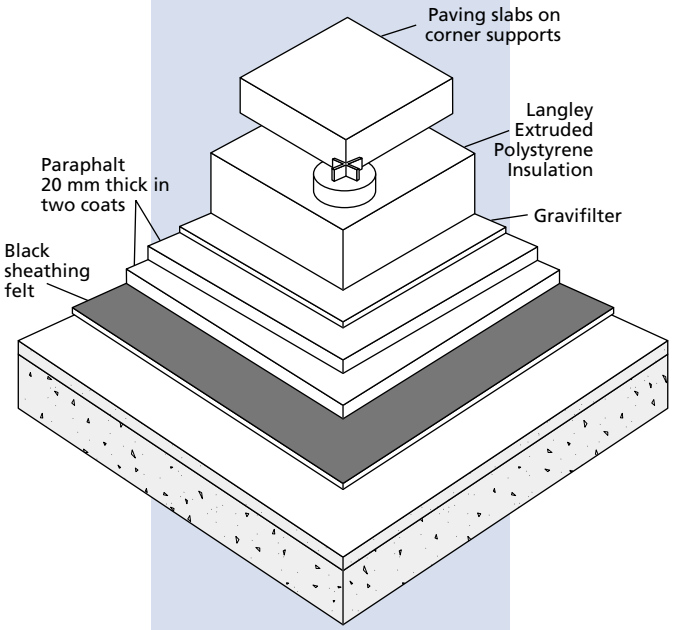
5.07 Concrete Access Decks and Private Balconies (Warm Roof) Falls ≥ 1:80

Langley Bitumen Primer (deck only).
Parevapo SBS vapour barrier fully bonded by torching.
ParaGlas cellular glass insulation boards fully bonded with hot bitumen.
Two layers of non-bituminous waterproof building paper.
Black sheathing felt.
Paraphalt polymer-modified mastic asphalt roofing 20 mm thick in two coats.
Light-coloured porous concrete pedestrian tiles bonded in hot bitumen.



5.08 Concrete Access Decks and Private Balconies (Inverted Roof) Falls ≥ 1:80

Black sheathing felt.
Paraphalt polymer-modified mastic asphalt roofing 20 mm thick in two coats.
Gravifilter isolating layer.
Langley Extruded Polystyrene Insulation boards.
Paving slabs on plastic corner supports.

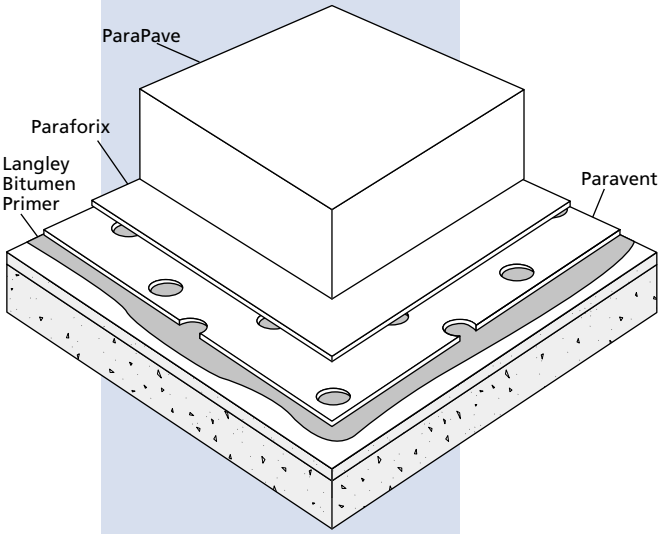


6. Rooftop Car Parks (Concrete Decks) ...

6.01 Mastic Asphalt Paving with Membrane Waterproofing
Falls ≥ 1:80

Langley Bitumen Primer.
Paravent perforated underlay laid loose.
Paraforix fully bonded by torching.
ParaPave polymer-modified mastic asphalt paving in one coat 30-40 mm thick (thickness according to use).
Sand-rubbed surface finish.

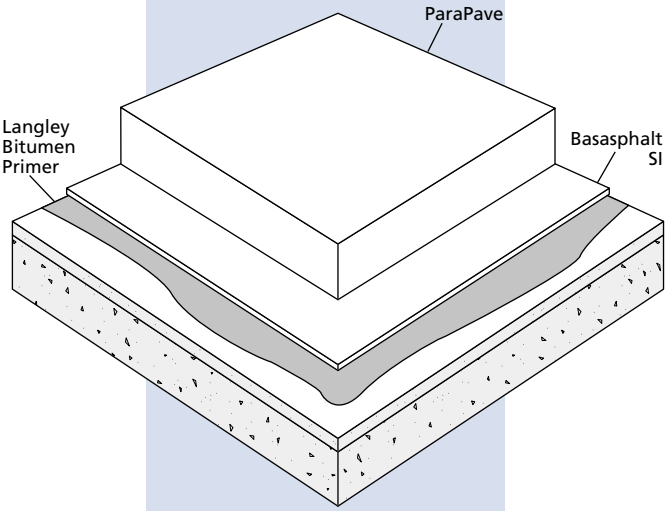
Details are formed in **Parafor Solo GS** on **Paraforix** (torch-applied).



6.02 Mastic Asphalt Paving with Membrane Waterproofing
Falls ≥ 1:80

Langley Bitumen Primer.
Basasphalt SI self-adhesive membrane with laps bonded by torching.
ParaPave polymer-modified mastic asphalt paving in one coat 30-40 mm thick (thickness according to use).
Sand-rubbed surface finish.

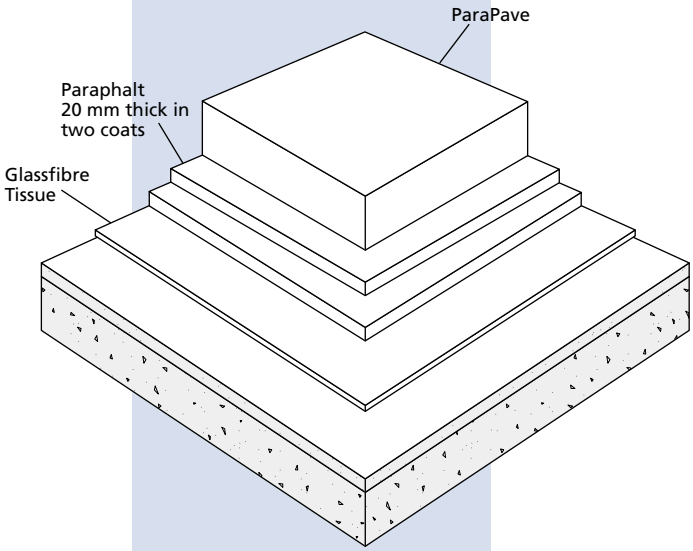
Details are formed in **Parafor Solo GS** on **Paradiene S R4** (torch-applied).



6.03 Mastic Asphalt Waterproofing and Paving **Falls ≥ 1:80**

Glass fibre separating membrane.
Paraphalt polymer-modified mastic asphalt roofing 20 mm thick in two coats.
ParaPave polymer-modified mastic asphalt paving in one coat 30-40 mm thick (thickness according to use).
Sand-rubbed surface finish.

Details are formed in **Paraphalt**.

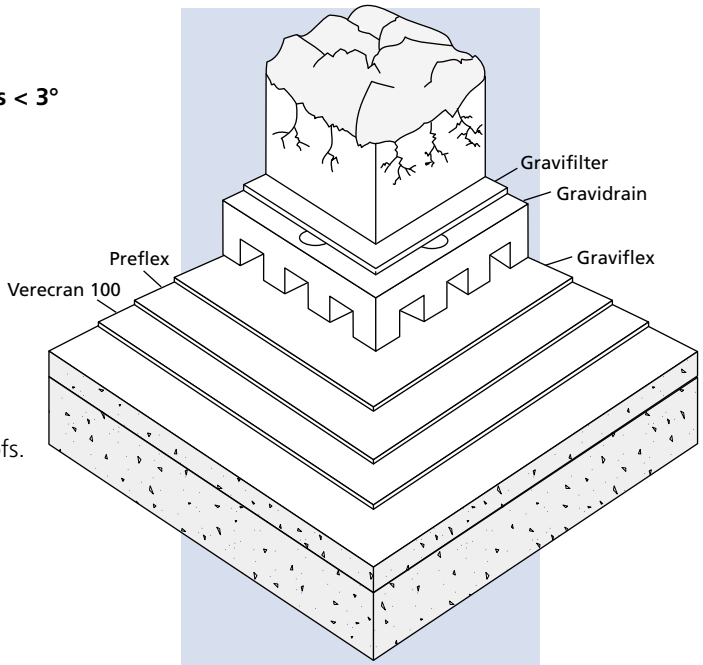


7. Roof Gardens ...

7.01 All Roof Decks Except Profiled Metal (Cold Roof) Slopes < 3°

Verecran 100 separating layer.
Preflex underlay laid loose.
Graviflex cap sheet.
Gravidrain drainage layer.
Gravifilter filtration layer.
Soil 300 mm to 1 m deep (for sedum, 60 mm **Graviflor** may be used).

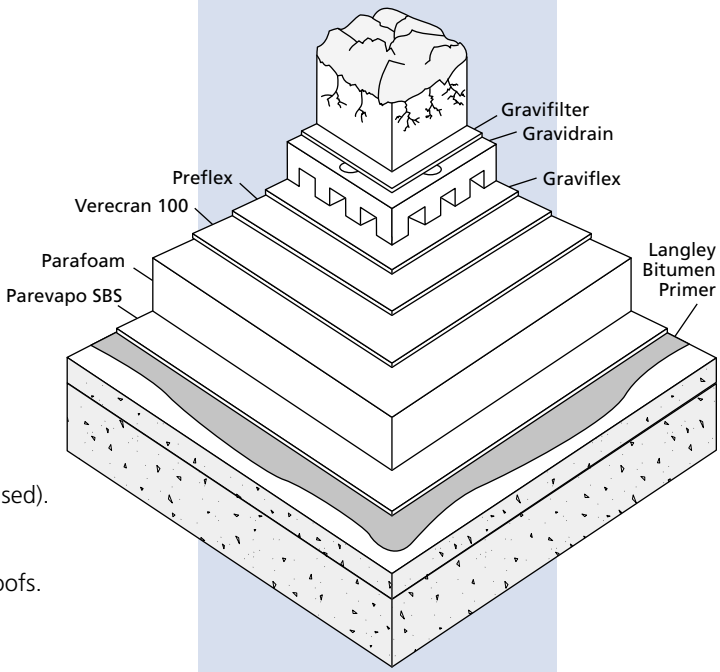
Notes:
1. For profiled metal roof decks, use 7.02.
2. Generally, only concrete roof decks are suitable for intensive roofs.



7.02 All Roof Decks (Warm Roof) Slopes < 3°

Langley Bitumen Primer (excluding timber boarded roof decks) Taped joints (plywood and pre-screeded or pre-felted woodwool roof decks).
Paradiene R4 first layer fixed by nailing (timber boarded roof decks only).
Parevapo SBS vapour barrier fully bonded by torching (bonded to crowns of metal roof decks).
Parafoam Standard PMA rigid urethane or **Parafoam Plus** cork-faced urethane insulation boards fully bonded with hot bitumen.
Verecran 100 separating layer.
Preflex under layer laid loose.
Graviflex cap sheet.
Gravidrain drainage layer.
Gravifilter filtration layer.
Soil 300 mm to 1 m deep (for sedum, 60 mm **Graviflor** may be used).

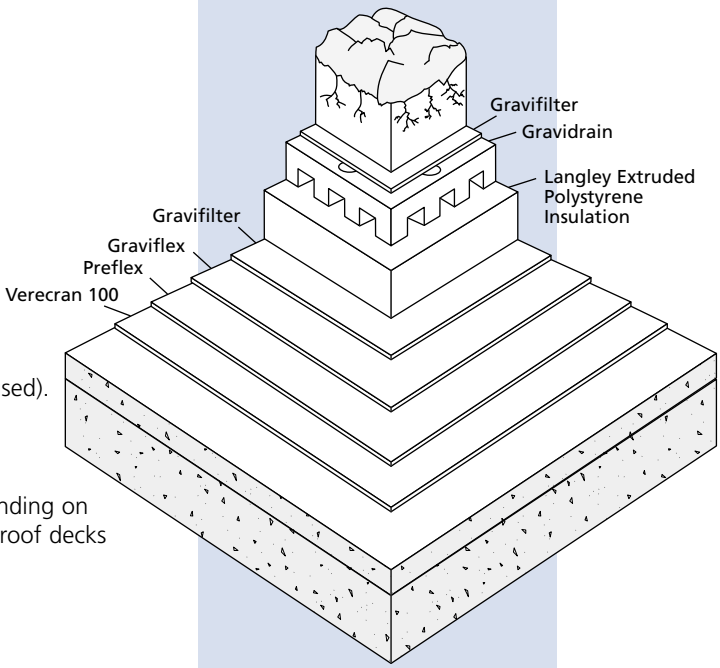
Notes:
1. Generally, only concrete roof decks are suitable for intensive roofs.



7.03 Concrete Roof Decks (Inverted Roof) Slopes < 3°

Verecran 100 separating layer.
Preflex under layer laid loose.
Graviflex mineral-surfaced cap sheet.
Gravifilter isolating layer.
Langley Extruded Polystyrene Insulation boards.
Gravidrain drainage layer.
Gravifilter filtration layer.
Soil 300 mm to 1 m deep (for sedum, 60 mm **Graviflor** may be used).

Notes.
1. Other roof decks (except profiled metal) may be suitable depending on load bearing strength, deflection etc. Generally, only concrete roof decks are suitable for intensive roofs.



8. Overlaying Existing Roofing Systems ...

It may often be possible to overlay an existing roofing system with the following benefits:

1. Exposure of the roof to the elements is minimised.
2. There is minimum disturbance to the occupants.
3. The existing insulation, if dry and not deteriorated, can be re-used.
4. Cost and time savings.

It is, of course, important that the existing roofing system and construction are fully assessed and a suitable overlay system chosen.

Where the existing surface finish is stone chippings, it is likely that a preparation layer, such as insulation boards, will need to be fixed to provide a sound surface to receive the new fully or partially bonded waterproofing system. Where the existing waterproofing is mastic asphalt roofing without an applied surface treatment, a torch-applied overlay system may be applied directly.

Of the systems described in the previous pages, the following are ideal for refurbishment in specific situations.

1 **Adesolo G** for direct, self-adhesive application to old mineral-surfaced felt on sloping roofs.
2 **Adesolo G** plus **Adepar JS** for direct application to old mineral-surfaced felt.
3 **Thermosolo GS** for direct torch application to old mineral-surfaced felt on sloping roofs.
4 **Parafor Solo GS** for direct torch application to old mastic asphalt roofing without an applied surface finish.
5 **Paradiene S R4** plus **Parafor Solo GS** for direct torch application to old mastic asphalt roofing without an applied surface finish.
6 **Parafor Solo GFM** for application with mechanical fixings to old built-up roofing systems on profiled metal decking.
7 **Paradiene FM** plus **Parafor Solo GS** for application with mechanical fixings to old built-up roofing systems on profiled metal decking.

Additionally: **SCR Alliance** plus **Parafor Solo GS** for application with mechanical fixings to old built-up roofing systems on sloping roofs.

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