

POLYMAT® Roof UV-R (UV resistant, for exposed roofs)
POLYMAT® Roof -R (UV stabilized, for inverted roofs)

POLYMAT Roofing



Installation Guide



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POLYMAT® UV-R (UV resistant, for exposed roofs)

POLYMAT® Roof -R (UV stabilized, for inverted roofs)

Roofing sheets for loose-laying with ballast, bonding and mechanical fastening on var. substrates- for exposed roofs, inverted roofs and roof gardens

Installation instruction Installation Guide

- POLYMAT Roof UV-R (UV resistant + reinforced) and
- POLYMAT Roof -R (UV stabilized + reinforced)
- POLYMAT Roof UV-HM (UV-resistant, homogenous w/o reinforcement)
- POLYMAT Roof HM (UV-stabilized, homogenous w/o reinforcement)

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1.	General information	
1.1.	POLYMAT Roof UV-R and POLYMAT Roof -R: Material standards: Roofing sheet in accordance with EN-DIN 13956 and ASTM D 4434, with intermediate polyester scrim or glass fiber fleece reinforcement.	
1.2.	Color POLYMAT Roof -R grey white (sim. RAL 9002) + UV-R: traffic white (sim. RAL 9016) (other RAL colors on customer request: please consult the BITUMAT technical department)	
1.3.	Area of application POLYMAT Roof roofing sheets type -R and UV-R are loose laid for use as ballasted flat roof membranes (i.e. inverted roofs with BituTHERM XPS thermal insulation boards, gravel, concrete slabs, tilings etc.) or for roof gardens.	
1.4.	Resistance/compatibility POLYMAT Roof sheets type -R and UV-R are not resistant to/compatible with: <ul style="list-style-type: none"> – Oil or materials which contain solvents, (see: separation layers 3.1) – Tar components (see: separation layers 3.1) – Bitumen and materials which contain bitumen (see: separation layers 3.1) – Insulating materials made of rigid polystyrene BituTHERM XPS, rigid polyurethane foam (see: separation layers 3.1) – Plastics belonging to other material groups (see: separation layers 3.1) Salt-based agents/preservatives must therefore be used for impregnating timber boards. A suitable separating layer must be used for incompatible materials.	
1.5.	Guidelines/standards The current editions of the following documents form the basis for the application of POLYMAT Roof sheet type -R and UV-R: <ul style="list-style-type: none"> – Regulations for roofs with waterproofing membranes (European and US Roofing Associations), – Local national guidelines, specifications and standards. 	
1.6.	Drawings The illustrations shown below are not to scale	

2. Basic installation principles

- **POLYMAT Roof** sheets type **-R** are always loose-laid or bonded under ballast or roof gardens.
- The ballast or roof garden is installed directly on top of the **POLYMAT Roof** sheet type **-R** with optional inclusion of protective layers.
- The roofing sheet substrate must be even and smooth and free of any sharp protrusions or burrs.
- According to the regulations for roofs with roofing membranes (EN), **POLYMAT Roof** sheet type **-R** and **UV-R** with a thickness of at least 1.50 mm must be used for utility roof surfaces.
- Junctions and borders must be secured against wind and planning must be carried out to prevent wind uplift with the use of point by point fixings-fixings and clamping bar or continuous fixing with **POLYMAT Roof** metal profiles **POLYMAT Bars**.
- **POLYMAT Roof** roofing sheets type **UV-R** are fully UV-resistant acc. to a.m. standards and norms, and are applied at exposed sectors of the covered roof designs.

3. Protective and separating layers

3.1. Protective layers

3.1.1. Protective layers under the roofing sheet

Before installing the roofing sheet, protective layers are required if

- the roofing sheet is to be installed directly on top of the structural substrate
- the roofing sheet is to be installed over sharp edges, corners etc.

The following are examples of protective layers which are suitable for use under the roofing sheet:

- Geo-textile protective fleece (Polyester or polypropylene fleece 140 - 300 g/m²)
- Thermal insulating sheets, e.g. made of mineral fibers, rigid polystyrene foam (**BituTHERM XPS** or EPS), with an additional separating layer made of glass fiber fleece 120 g/m², or PUR/PIR boards or spray-on applied PUR.

3.1.2. Protective layers on top of the roofing sheet

Protective layers on top of the roofing sheet are always required for utility roof surfaces and roof gardens.

Depending on the delivery program for the country in question, the following are suitable for use as protective layers on top of the roofing sheet:

- (Geo-textile) protective fleece type PP (Polyester or Polypropylene fleece 140 or 300 g/m²).

If a pneumatic conveyor system is used to apply the gravel, a protective layer is required

3.2. Separating layers

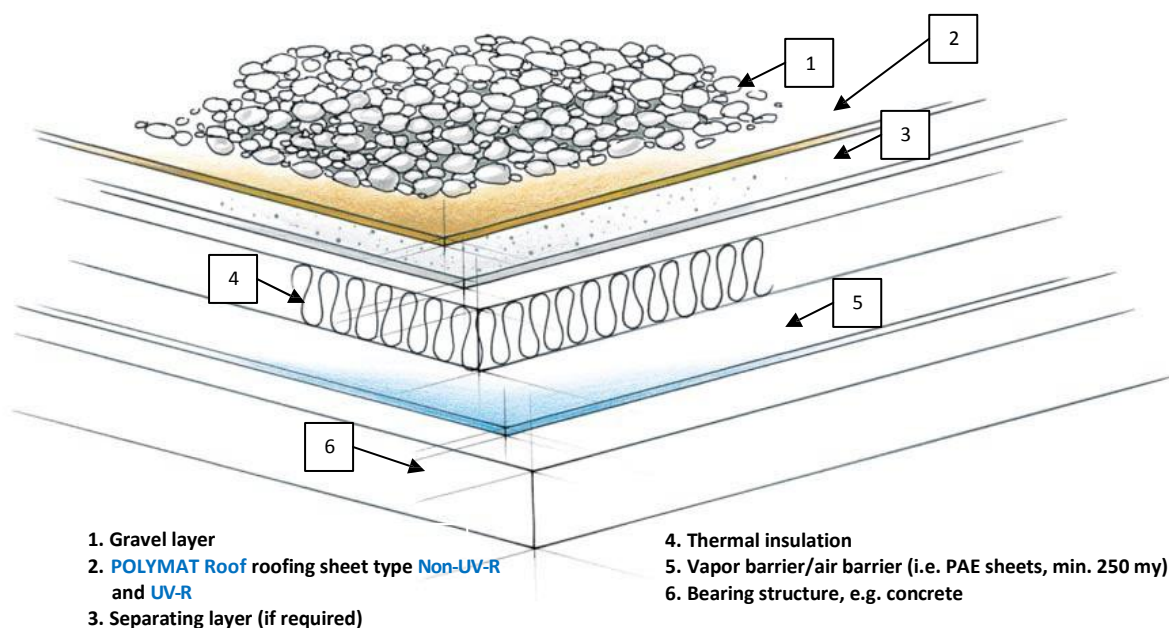
Separating layers are required in order to prevent direct contact between the **POLYMAT Roof** roofing sheets type **-R** and **UV-R** and incompatible materials such as bitumen, unfazed polystyrene or regenerated rubber mats. For a possible exception, please refer to 4.4 reverse roofs.

The following materials are compatible with materials which contain bitumen and layers in which the tar content has reduced, in addition to timber treated with an oil-based impregnating agent:

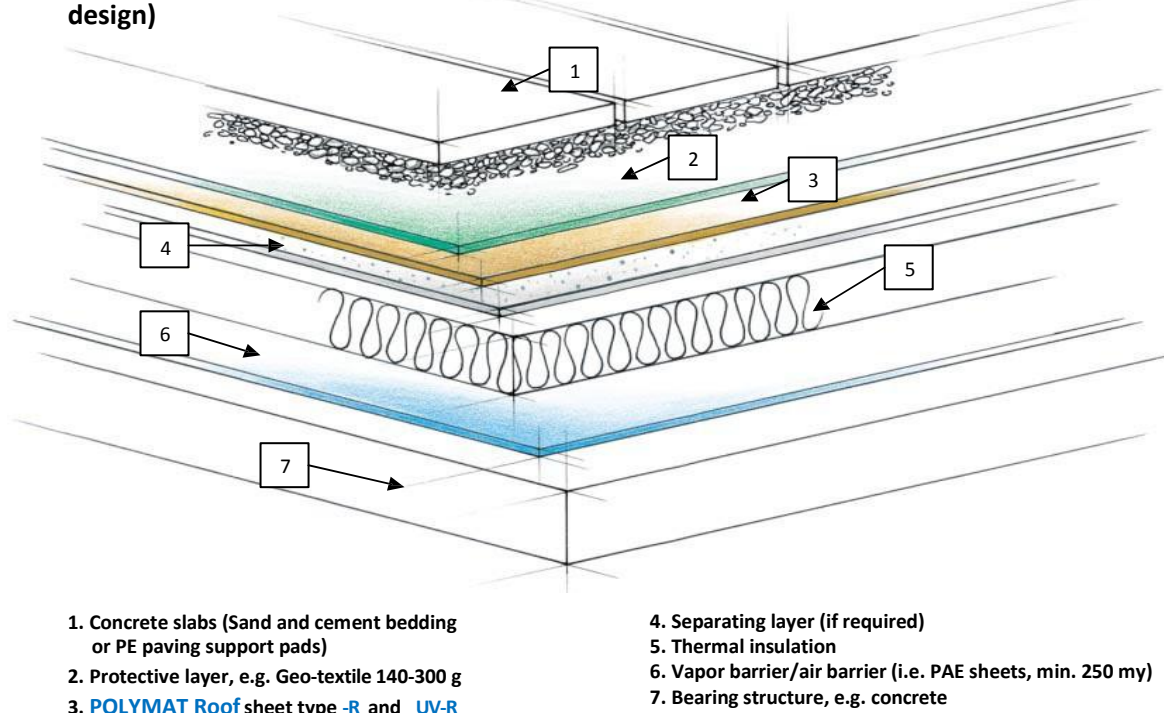
- Protective Geo-textile (Polyester or Polypropylene fleece 140 - 300 g/m²)
- Thermal insulating layers made of mineral fibers
- Thermal insulating sheets, e.g. made of rigid polyurethane foam with an additional separating layer of glass fiber fleece 120 g/m² or Geo-textile.

4. Standard roof build-ups (Warm roof designs)

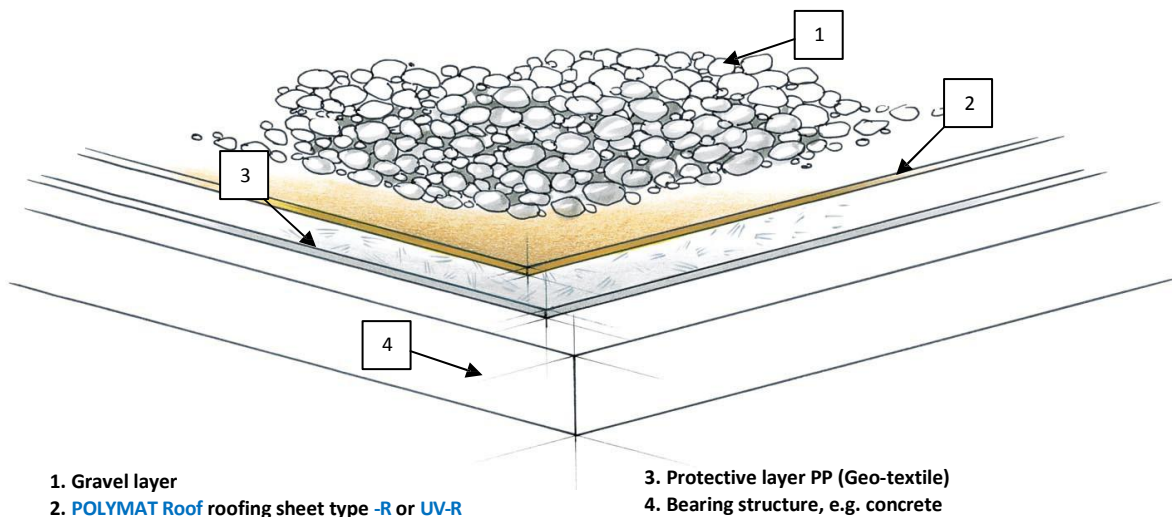
4.1. With thermal insulation, ballast consisting on gravel, unventilated roof (non-utilized roofs)



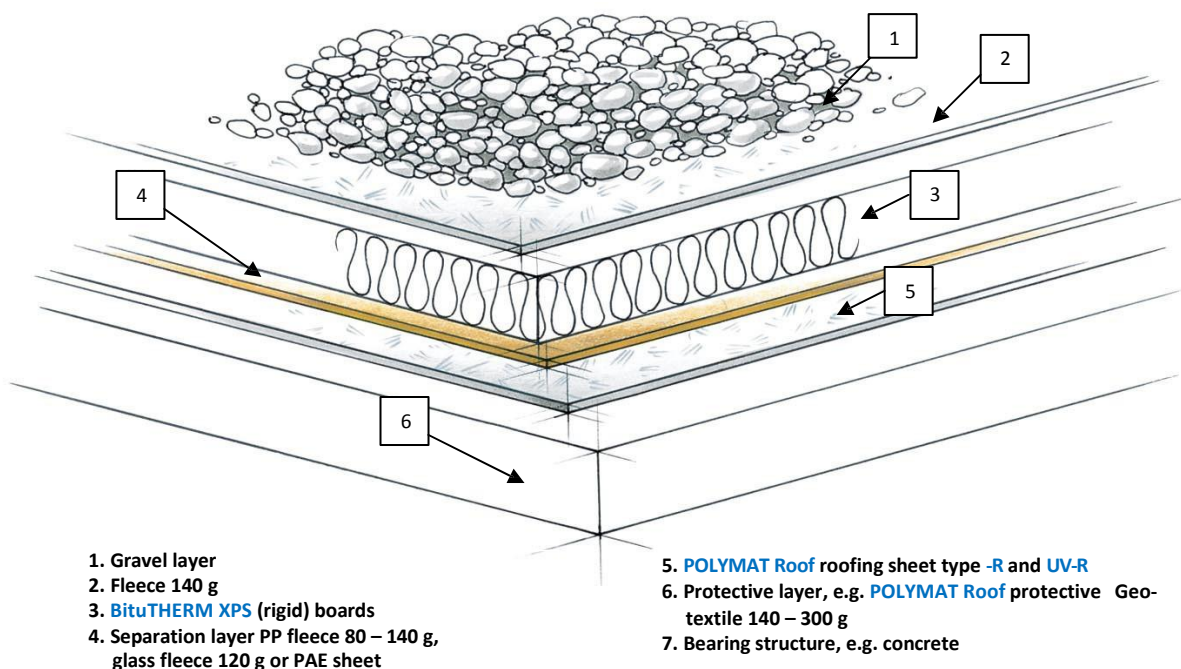
4.2. With thermal insulation, ballast consisting of concrete slabs, unventilated roof (utilized roof design)



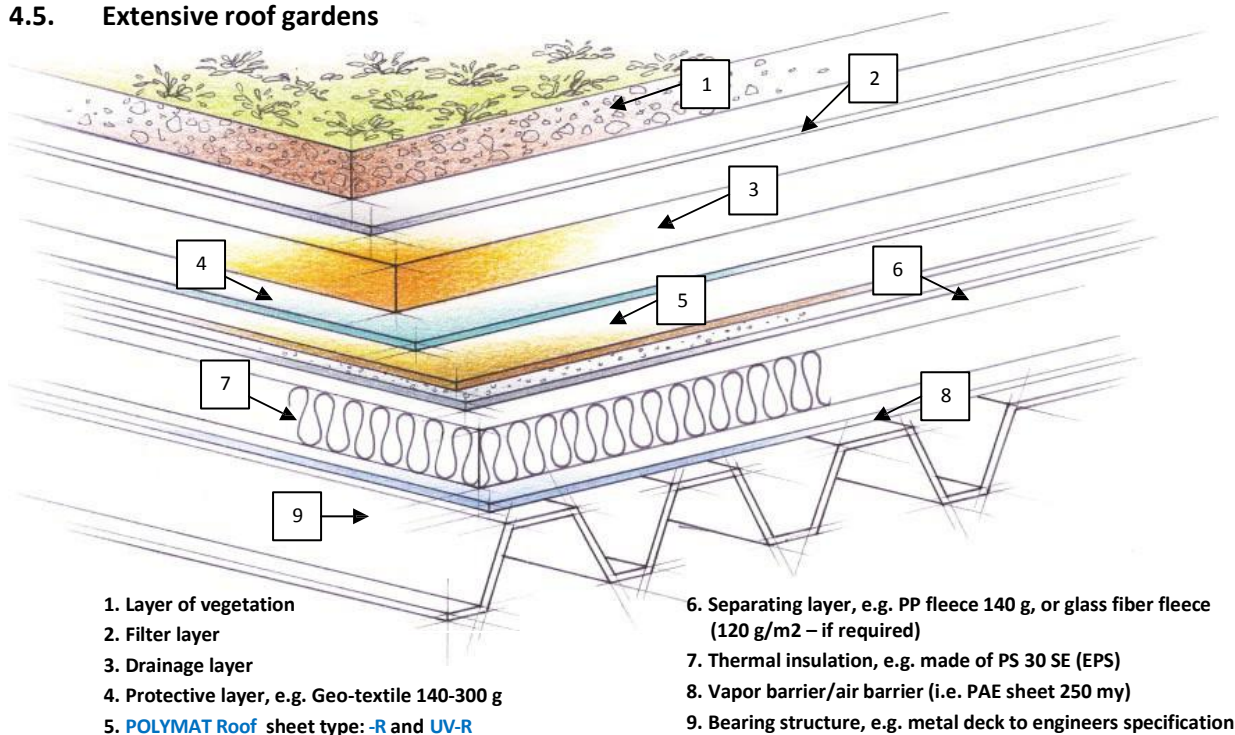
4.3. No thermal insulation, ballast consisting of gravel layer installed directly over the bearing structure (non-trafficked roofs)



4.4. Inverted roof



4.5. Extensive roof gardens



5. Mechanical fixings

5.1. Basic principles

POLYMAT Roof sheets type **-R** and **UV-R** are generally laid loose under ballast/roof gardens. However, the weight of ballast may not be sufficient to secure the roof build-up against wind uplift. If this is the case (see also "Regulations for Roofs with Waterproofing Membranes"), it may be necessary to apply mechanical fixings to the loose-laid roofing sheet including the roof build up. When calculating the number of mechanical fixings, the weight of ballast may not be taken into account. In such cases, the membrane is always laid at right angles to the metal deck or the boards fixings should be tread fast to grip the fixing plate.

6. Perimeter fixings for absorption of horizontal forces

6.1. Basic principles

Perimeter fixings must be applied directly to the perimeter of the roofing sheet, e.g. to junctions and borders, all roof build-ups and roof penetrations. They are necessary in order to absorb horizontal forces acting on the roof at roofing sheet level. Structural components, gullies and vent pipes must be firmly connected to the substructure.

6.2. Linear fixings

Minimum number of individual fixings required per meter to absorb horizontal forces, depending on the substrate:

Reinforced concrete/sheet steel 3 fixings/ma = 33 cm
Aerated concrete/solid timber 4 fixings/ma = 25 cm

NOTE:

For sample details, see section 8. (Details), if it is not possible to apply fixings at roofing sheet level.

6.3. POLYMAT Roof laminated PVC coated metal sheets

6.3.1 Material/area of application

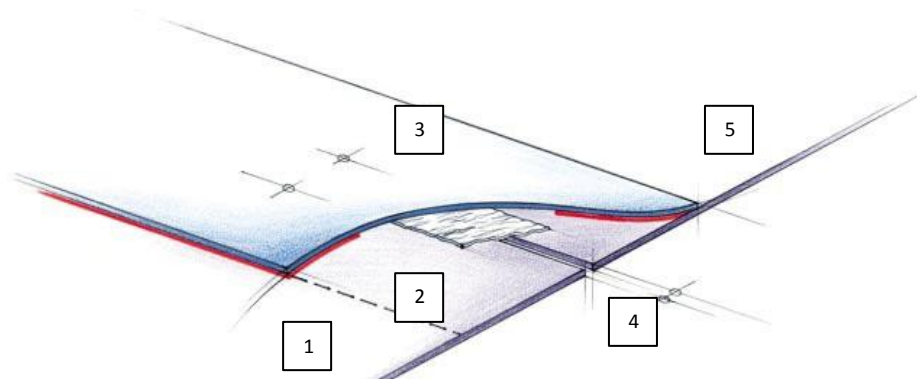
POLYMAT Roof laminated metal sheets consists of 0.6 mm thick galvanized sheet metal laminated on one side with 0.8 mm PVC roofing sheet cover or a PVC compound coating 0,6 mm. The lamination has the same special properties and compatibility as **POLYMAT Roof** roofing sheets type **-R** and **UV-R**. Therefore, **POLYMAT Roof** sheet type **-R** and **UV-R** can be permanently success fully homogeneously welded to the laminated surface. The reverse side of the laminated metal sheets is coated with a transport protection varnish.

6.3.2 Installation

POLYMAT Roof laminated metal sheets can be cut to size and formed with the usual tools used for sheet metal fabrication so that all the profiles required for junctions and borders can be fabricated. **POLYMAT Roof** sheets type **-R** and **UV-R** can be easily joined to the laminated metal sheet in accordance with section 7 (Seam joints). The joint area must be at least 5 cm wide. Laminated metal profiles must either be butt jointed with a 5 mm gap or overlapped by approx. 20 mm. The flexible butt joint can be made by holding the butt joint profile in place with 2 mm wide masking tape and covering it with a strip of homogeneous roofing sheet.

6.3.3. Trim joint

If the profiles need reinforcement, supports, which are formed to match the profile, are placed underneath. To counteract the wind loads they are likely to be subjected, extra supports are generally required for roof perimeter drip edge details and cladding profiles for eaves and walls. Cut edges of laminated metal sheet should have a drainage fold or be folded back so that they will not be exposed to the elements.



- | | |
|---|-----------------------|
| 1. POLYMAT Roof laminated metal sheet ± 20mm | 5. Weld area |
| 2. Weld area | 6. Continuous fixings |
| 3. Strips of homogenous roofing sheet | |
| 4. Masking tape ± 20 | |

6.3.4. Fastening of PVC laminated sheets and profiles

When used in conjunction with the usual details, laminated metal profiles which are fixed as described below can also create an effective continuous fixing system for absorbing horizontal forces. In order to prevent distortion of the laminated metal sheet (e.g. by the application of fixings) when installed directly over thermal insulation and to ensure reliable seam joint and an effective transfer of forces, the insulating material used under the laminated metal sheet must have a long-term compression strength of ≥ 0.15 N/mm² at a max. of 10 % compression (e.g. EPS 50, **BituTHERM XPS 50-75**). Otherwise an auxiliary system (e.g. timber battens) must be used.

Minimum fixing intervals required for laminate metal profile or a rigid metal profile in order to absorb horizontal forces, depending on the substrate:

Reinforced concrete solid/block masonry	Hammer rivet $\geq 4,5/25$ mm Nail dowel 6/5	a= 20 cm
Aerated concrete	Nail anchor 5mm \emptyset	a= 15 cm
Sheet metal	Galvanized screws 4.2 mm \emptyset	a= 20 cm
Solid timber	Galvanized wood screws 6mm \emptyset	a= 20 cm

NOTE:

For sample details see section 8. (Details)

If it proves impossible to apply fixings at roof level, the roofing sheet material must be brought up to the upright, parapet etc. and fixed vertically with a continuous fixing system consisting of a rigid metal profile or a laminated metal angle profile. The continuous fixings must be applied directly above the valley line. In the case of the above-mentioned substrates, the fixing intervals must be reduced in all cases to 15 cm or 12 cm for aerated concrete.

6.3.5. Perimeter board fixings

Shearing and pull-out forces

Type of fixing	Type of anchor	Fixing intervals for building heights		
		To 8 m	Over 8 m To 20 m	Over 20 m To 40 m
Timber on concrete \pm B25	Galvanized screws \emptyset 7 mm With dowels	1,0	0,66	0,50 m
Timber on aerated concrete	Galvanized screws \emptyset 7 mm With special dowels	0,90 m	0,50 m	0,33 m
Timber on sheet Metal	Galvanized self-tapping Screws 4.2 mm \emptyset	0,50 m	0,33	0,25 m
Timber on solid timber	Galvanized wood screws 6 mm \emptyset	0,80 m	0,50 m	0,33m

7. Seam joints

7.1. Basic principles

POLYMAT Roof sheets **-R** and **UV-R** are always bonded by hot air welding. The roofing sheet may be overlapped to prevent water seepage or brought up at vertical/sloped surfaces and then welded. The seam overlap must be at least 5 cm width. When hot air welding, the weld

width must be 4 cm. The welding area must be dry and clean. If the seam area is dirty, it must be washed with water without the addition of detergents. If this is insufficient, it should be cleaned again with **POLYMAT Roof** special cleaner. Double T-joints, folds and creases in the seam area should be avoided.

Hot air welding is distinguished by the following characteristics:

- The two areas to be joined are heated evenly to render them plasticized
- Pressure is applied to both seam joints simultaneously as soon as they reach the plastic state
- The welding speed varies depending on the ambient temperature, solar irradiation, the hot air temperature in addition to the substrate and material thickness.

Various automatic and manual welding machines are available on the market. The operating instructions of the appliance manufacturers should be observed.

Equipment required for hot air welding

- Hot air welding machine
- Manual hot air welder with pressure roller
- Seam testing - hot air

The seam must be checked subjected to a mechanical test, i.e. a metal probe described below.

Equipment for mechanical seam inspection

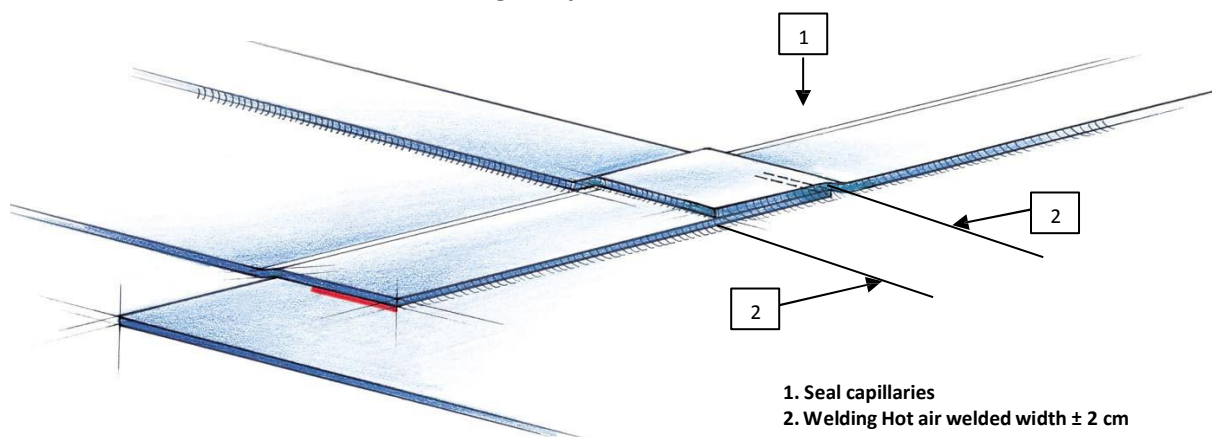
- Steel needle, steel mandrel or screwdriver no. 2

7.2. T-joint details

The seam edges of the center sheet must be chamfered in the overlap area (from 1.5 mm thickness) to avoid capillaries (edge plane/manual welder).

Seam joints in **POLYMAT Roof** roofing sheets type **-R** and **UV-R** must be checked to ensure that they have been properly welded. Any defect must be made good. A patch must be applied as reinforcement to any capillaries in T-joints which have cooled down.

7.2.1. Weld width and securing of T-joints



7.3. Welding with hot air welding machines

The nozzle is usually 4 cm wide but must be at least 3 cm wide. The welding machine air temperature should be approx. 400-500°C and the welding speed and hot air temperature must be adjustable. The most reliable results are obtained with hot air welding machines with electronic temperature and welding speed control.

The required pressure on the welding joint is generally achieved by applying an extra weight. The welding temperature and welding speed should be matched in such a way as to avoid defects or distortions in the material. Fluctuations in power should be avoided, e.g. by using power supply units. Each welding machine requires its own circuit. To ensure that the appliance is set and handled correctly, test welds should be made under matching external conditions.

7.4. Welding with manual hot air welders

The welding machine air temperature should be approx. 400-500°C. The seams are joined in two operating sequences. First the rear seam edge is sealed to prevent any hot air escaping under the overlapped roofing sheet in the second operation. The manual hot air welding nozzle is introduced between the overlap in such a way as to heat the two joint surfaces evenly. The seams are then bond homogeneously using a pressure roller.

7.5. Joints with other materials

It is not possible to provide any guarantees with regard to seam joints with other materials. Where such joints are unavoidable, BITUMAT technical department must be consulted.

8. Details

8.1. General information

POLYMAT Roof sheet type **-R** and **UV-R** is generally used for junctions. (If other than **POLYMAT Roof** sheet materials are used, BITUMAT technical department should be consulted). **POLYMAT Roof** laminated metal sheet and structural components made of PVC and compatible accessories produced by other manufacturers (see section 8.5) may also be used. **POLYMAT Roof** sheet type **-R** and **UV-R** may be used for junctions.

Where the substrate is resistant to under-currents and the roof perimeter is completely wind-proof, e.g. concrete deck with concrete parapet up stand, the loose-laid junction area may be approx. 50 cm (see also 2. Basic installation principles).

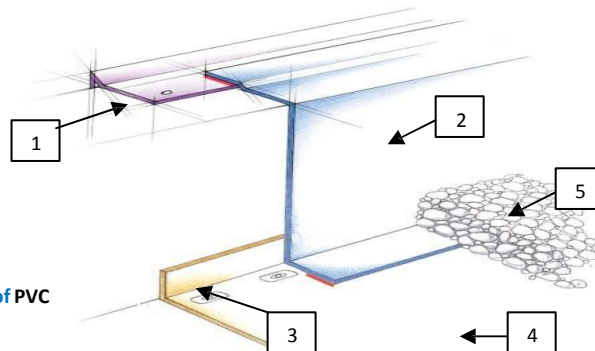
Where parapets/junctions are over 50 cm in height, it may be necessary to apply additional linear fixings/continuous fixings or continuous bonding using **POLYMAT Roof** contact adhesive to ensure that the sheet is properly anchored. If individual fixings are applied, the maximum interval is 33 cm. The load absorption must match that of the adjacent horizontal area.

Where **POLYMAT Roof** adhesive is used, steps must always be taken to prevent pounding and to protect junctions and borders against seepage of rain water or spray water, i.e. must be counter flashed or finished on to a **POLYMAT Roof** metal drip flashing. The following illustrations are sample system sketches and are not to scale.

8.2. Junctures and borders

POLYMAT Roof connecting sheets type **-R** and **UV-R** are carried from the junction area over the linear fixings in the roofed area and welded to the main area of roofing sheet.

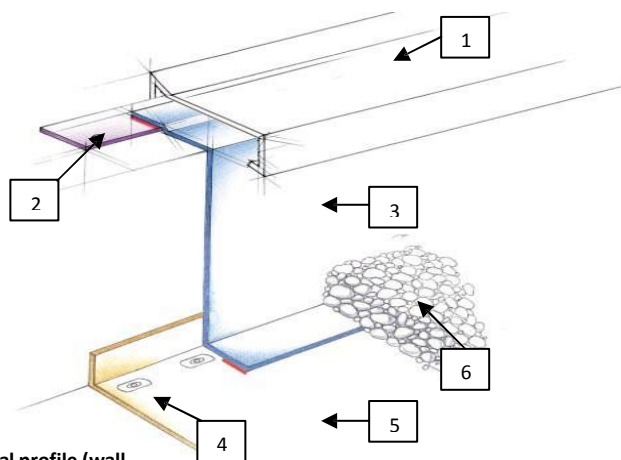
8.2.1. Parapet junction and border



1. Border profile made of **POLYMAT Roof** PVC laminated metal sheet
2. **POLYMAT Roof** sheet type **UV-R**
3. Fixing and clamping plates
4. **POLYMAT Roof** sheet type **-R**
5. Gravel ballast

8.2.2. Parapet junction and border with **POLYMAT Roof** sheet type **UV-R**

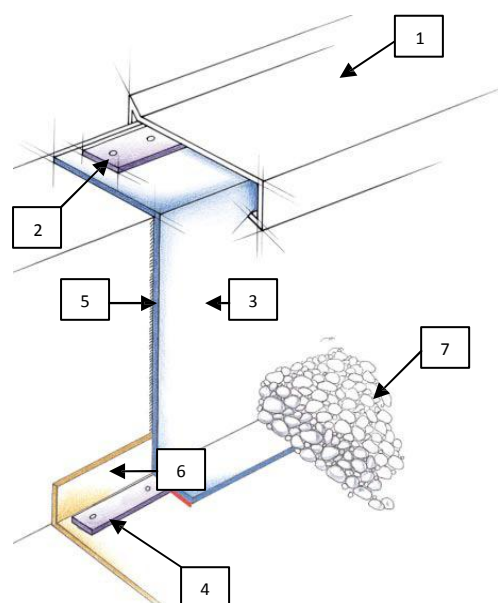
Parapet junction and border with **POLYMAT Roof** sheet type **UV-R**, with standard wall cladding, laminated metal sheet on the parapet and linear fixing in the valley



1. Border profile made of metal profile (wall cladding)
2. **POLYMAT Roof** laminated metal sheet
3. **POLYMAT Roof** **UV-R**
4. Fixing and clamping plates
5. **POLYMAT Roof** sheet type **-R**
6. Gravel ballast

8.2.3. Junctions and borders for a parapet

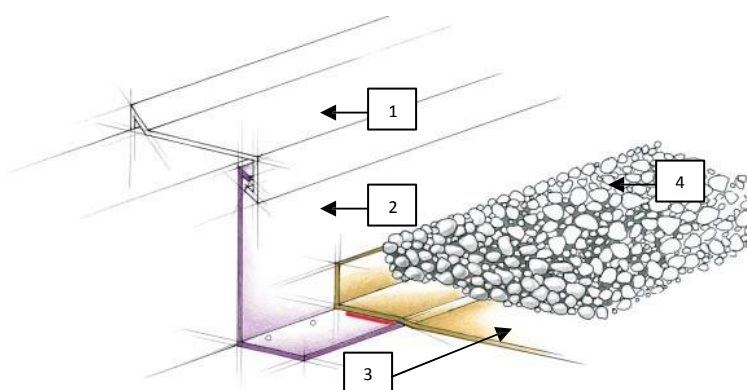
With **POLYMAT Roof** sheet type **UV-R**, with bonding of the junction, continuous fixings in the valley and on the parapet, and standard wall cladding



1. Standard wall cladding
2. Rigid metal profile/clamping bar
3. **POLYMAT Roof** sheet type **UV-R**
4. Continuous fixing/clamping bar and fixings
5. **POLYMAT Roof** contact adhesive
6. **POLYMAT Roof** roofing sheet type **-R**
7. Gravel ballast

8.2.4. Parapet junction and border

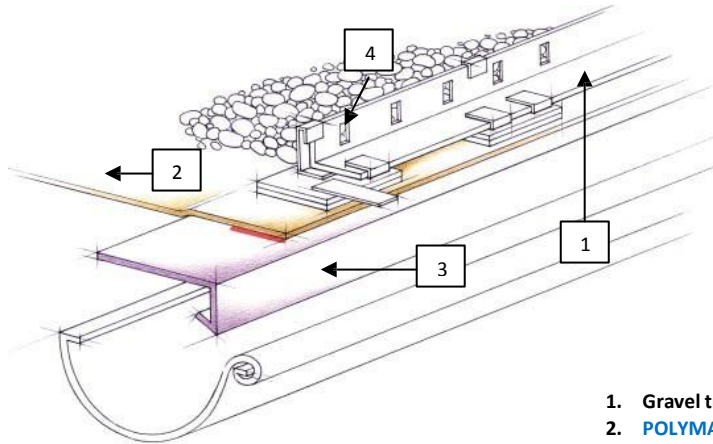
With laminated metal sheet junction as continuous fixing in the valley, and standard wall cladding



1. Standard wall cladding
2. Laminated metal angle profile made of **POLYMAT Roof** laminated metal sheet
3. **POLYMAT Roof** sheet type **-R**
4. Gravel ballast

8.2.5. Eaves border with perimeter border profile

Made of **POLYMAT Roof** laminated metal sheet as a continuous fixing system

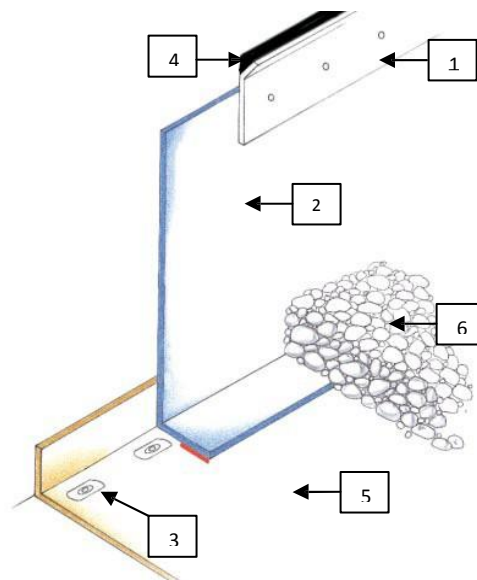


1. Gravel trap
2. **POLYMAT Roof** sheet type -R
3. Eaves profile made from **POLYMAT Roof** laminated metal sheet
4. Gravel ballast

8.2.6. Junction with **POLYMAT Roof** sheet type UV-R

with linear fixing in the valley, perimeter border with rigid metal profile

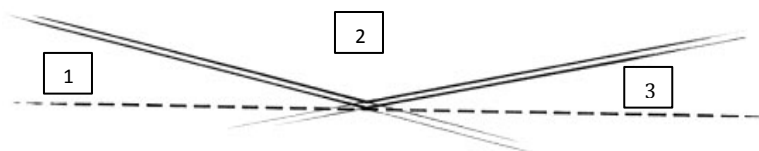
1. Rigid metal profile
2. **POLYMAT Roof** sheet type UV-R
3. Fixings
4. Permanently elastic sealing compound
5. **POLYMAT Roof** sheet type -R
6. Gravel ballast



8.3. Valley detail

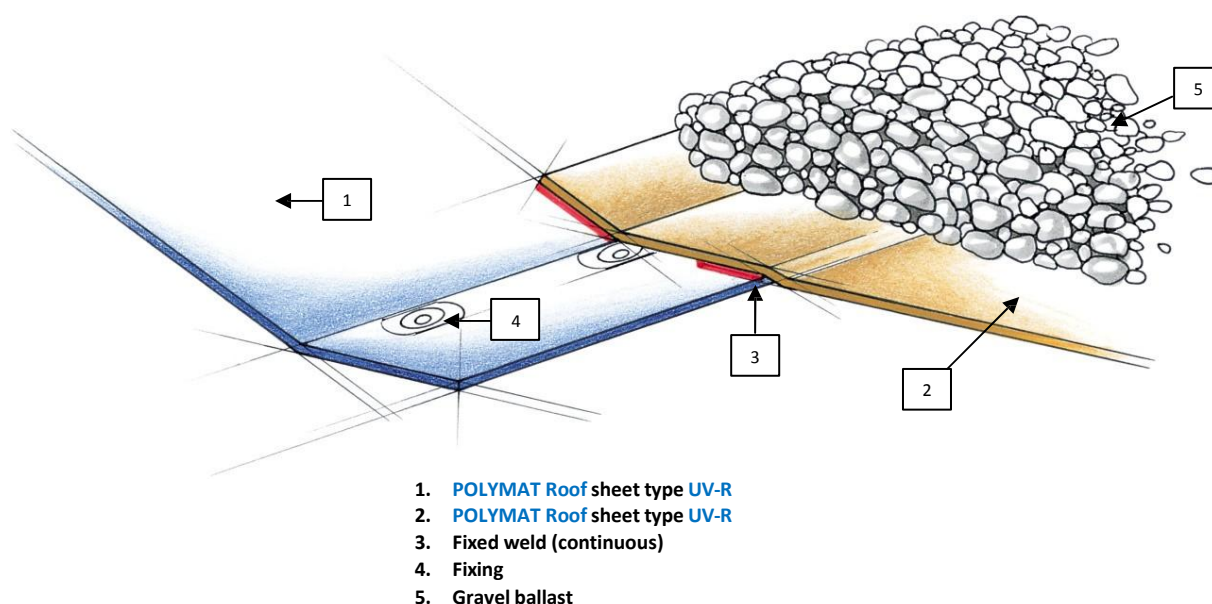
In the case of loose-laid **POLYMAT Roof** sheets type G, valley details are always required if an angle of between 0° and 174° occurs where the two roof zones meet. Where the valley angle is between 174°- 180°, no valley detail is required.

8.3.1. Relationship between the roof gradient and the valley angle



1. Roof gradient 3,0°
2. Valley gradient 174°
3. Roof gradient 3,0°

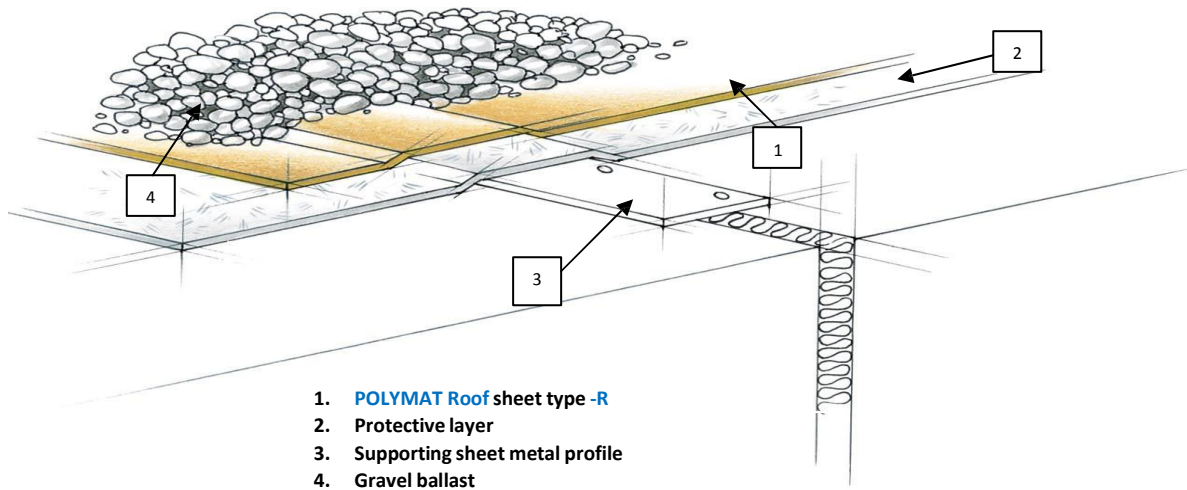
8.3.2. Valley detail as linear fixing



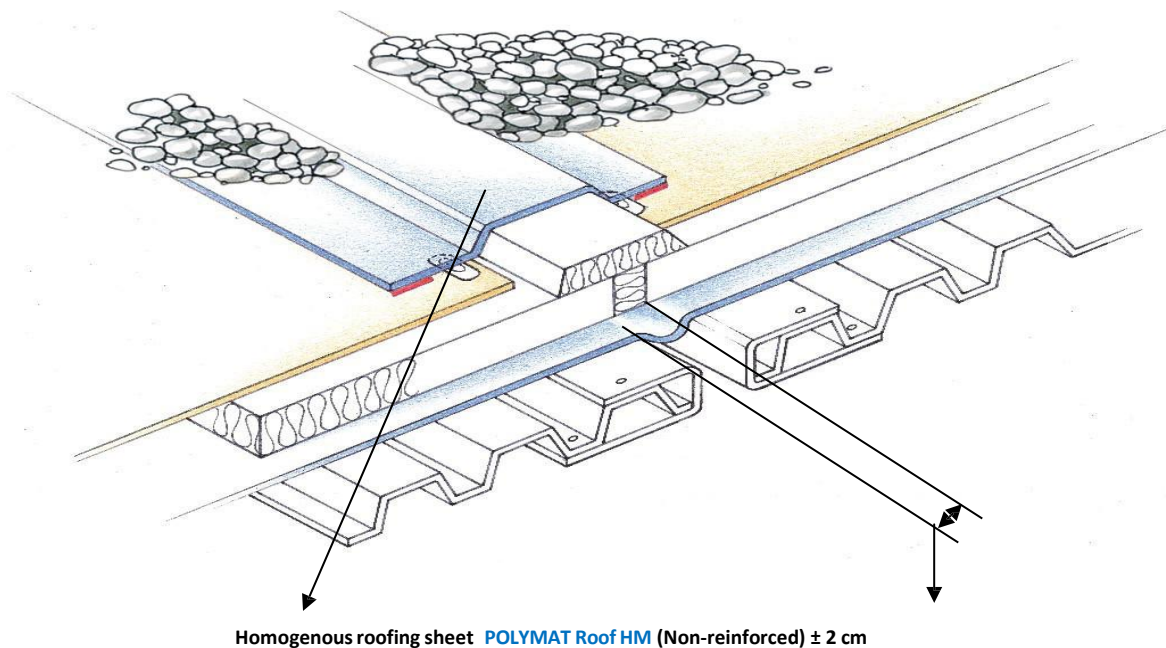
8.4 Expansion joints

When **POLYMAT Roof** sheet type **-R** and **UV-R** is used as a waterproofing membrane, minor movements (≤ 5 mm) within the loose-laid roofing sheet can be compensated for so that with a roof build-up with thermal insulation, no further measures are required in most cases. If thermal insulation is not used as a supporting layer in the roof build-up, the joints under the roofing sheet should be covered with supporting sheet metal profile which should be fixed along one side. Laminated metal profiles or other auxiliary components should not be laid over settlement joints. They should be separated in the area of the joint. In the case of serious settlement or expansion or shearing movements, e.g. in mine subsidence regions, the planner should plan for the expansion joints as a construction detail and they should be treated in the same way as junctions and borders.

8.4.1. Expansion joint with supporting sheet metal profile for minor movement ($\leq 5\text{mm}$)



8.4.2. Expansion joint with expansion compensation for more serious movement

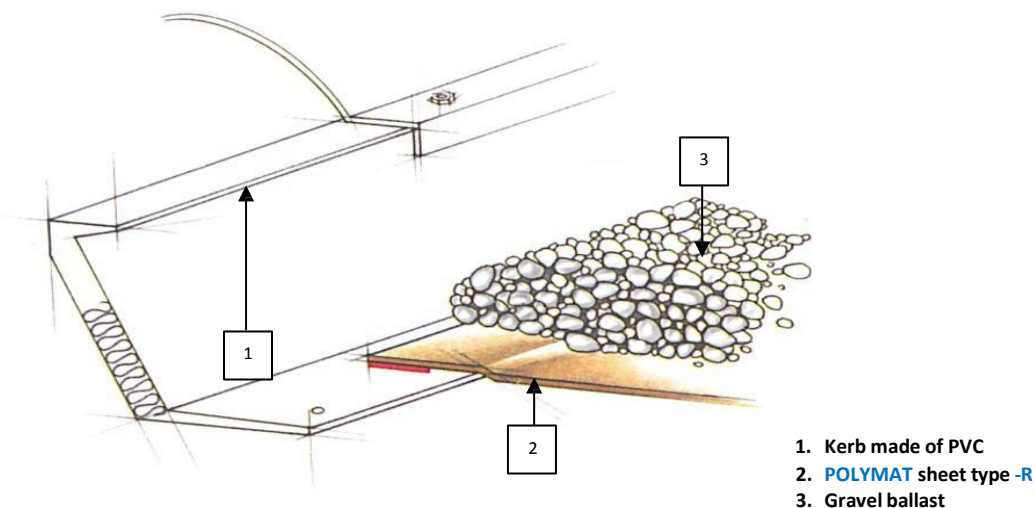


8.5. Roofing sheets/roof penetrations/ structural components

Preference should always be given to **POLYMAT Roof** components or other prefabricated accessories which permit a homogeneous joint with the roofing sheet as described in section 7. (Seam Joints). Where accessories produced by other manufacturers are used for details, the technical application specifications and details suggested by the relevant accessory manufacturer must be complied with. Such manufacturers are responsible for the information

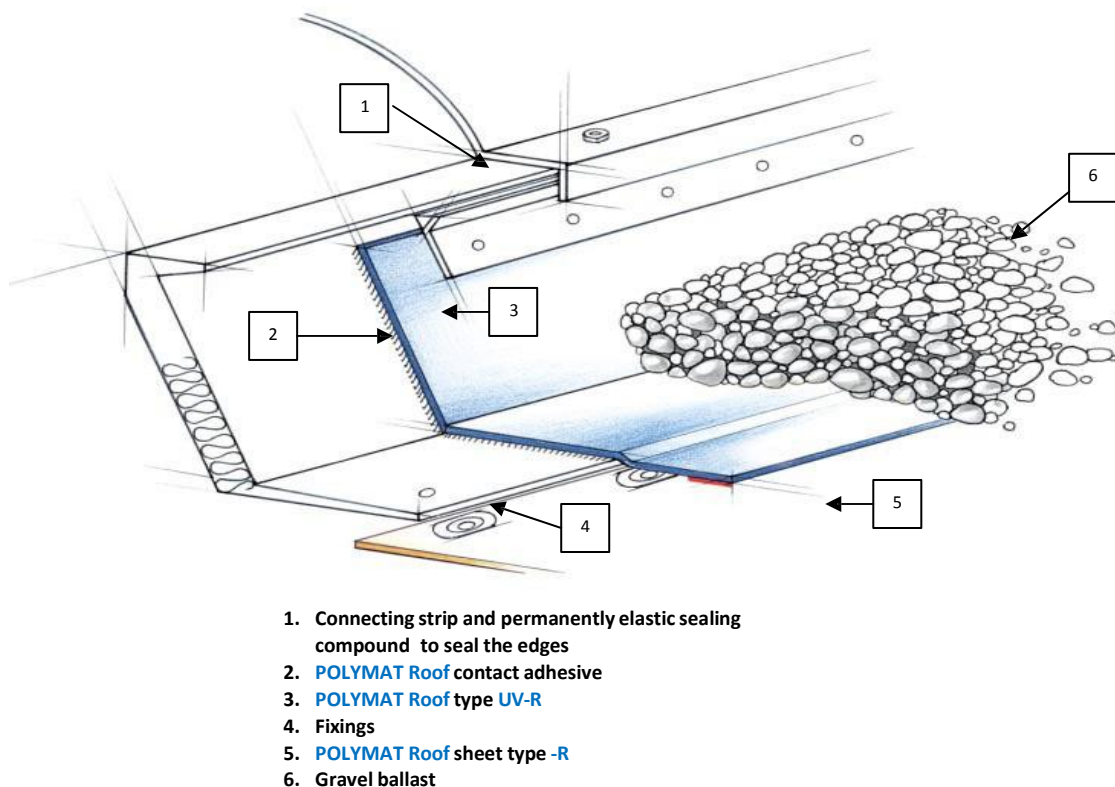
supplied and must guarantee functionality (e.g. absorption of horizontal forces/waterproof sealing). If clarification is required, we recommend that you contact the **BITUMAT** technical department.

8.5.1 Junction with kerb made of PVC or prefabricated junction option

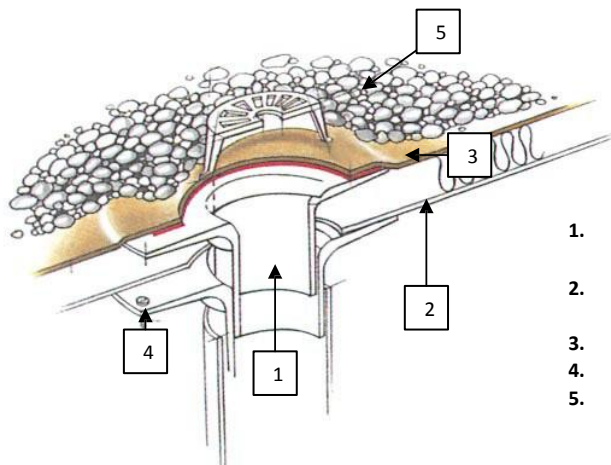


8.5.2. Junction with kerb following application of linear fixings

With **POLYMAT Roof** sheet type **UV-R** bonded, connecting strip and permanently elastic sealing compound to seal the edges



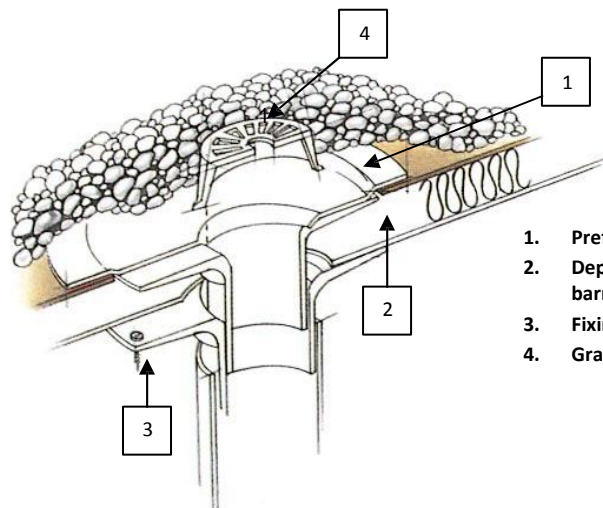
8.5.3. Roof gully junction with gully flange made of PVC



1. Gully unit, flange made of PVC or PVC junction option
2. Depending on the roofing material, junction with vapour barrier in accordance with the manufacturer's instructions
3. **POLYMAT Roof** sheet type -R
4. Fixings
5. Gravel ballast

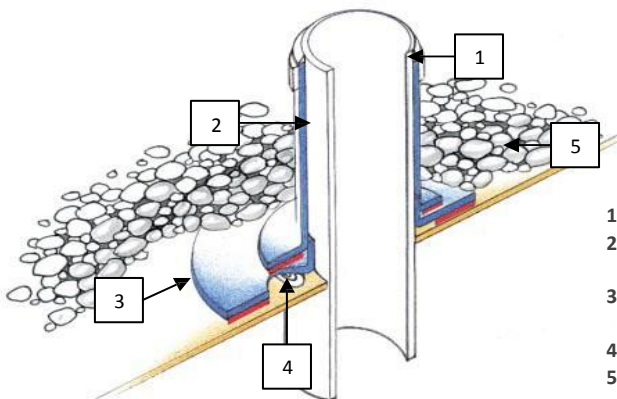
8.5.4. Roof gully junction

With prefabricated connecting sleeve for **POLYMAT Roof** PVC-roofing sheets



1. Prefabricated connecting sleeve for PVC roofing sheets
2. Depending on the roofing material, junction with vapour barrier in accordance with the manufacturer's instructions
3. Fixings
4. Gravel ballast

8.5.5. Roof penetration junction with pipe casing, sleeve with bonding of junction



1. Stainless steel clamping ring with seal
2. Sleeve made of **POLYMAT Roof** pipe casing with bonding (UV-R) of the junction, **POLYMAT Roof** contact adhesive
3. Flexible collar made of homogeneous roofing sheet **UV-HM**
4. Fixings
5. Gravel ballast

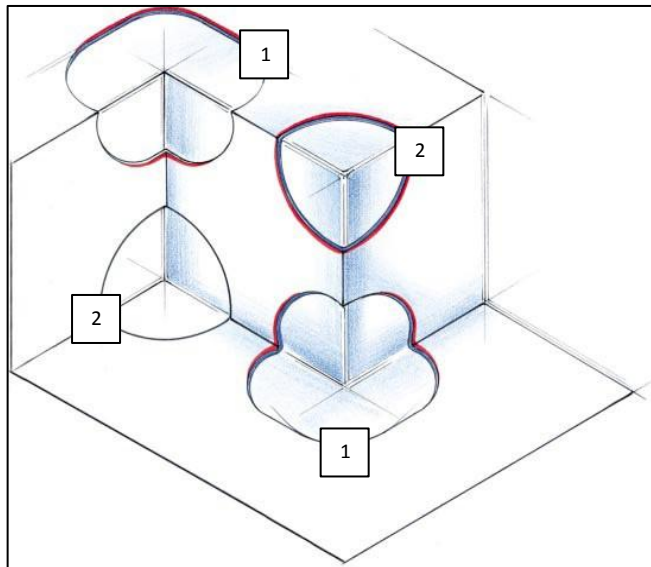
9. Accessories

For the complete delivery program, please refer to the actual product range. The following is a list of the major standard accessories:

(We recommend the use of molded parts as this can save time and ensure a high degree of reliability while simplifying the work involved)

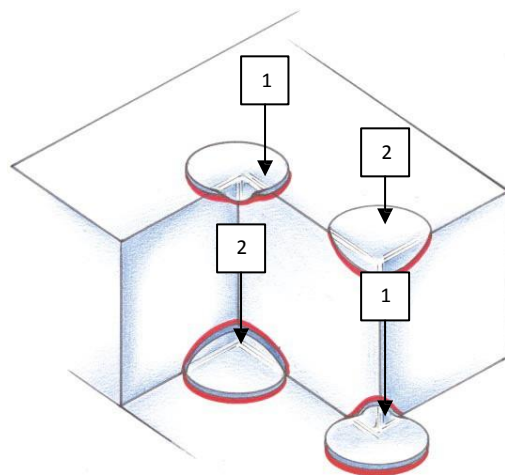
- Separating and protective layers
- Moulded parts and prefabricated corners
- Pipe casing
- Strips made from **POLYMAT Roof** type **HM** (homogeneous)
- **POLYMAT Roof** contact adhesive
- **POLYMAT Roof** Cleaner

9.1. POLYMAT Roof prefabricated corners (90° internal and external corners)



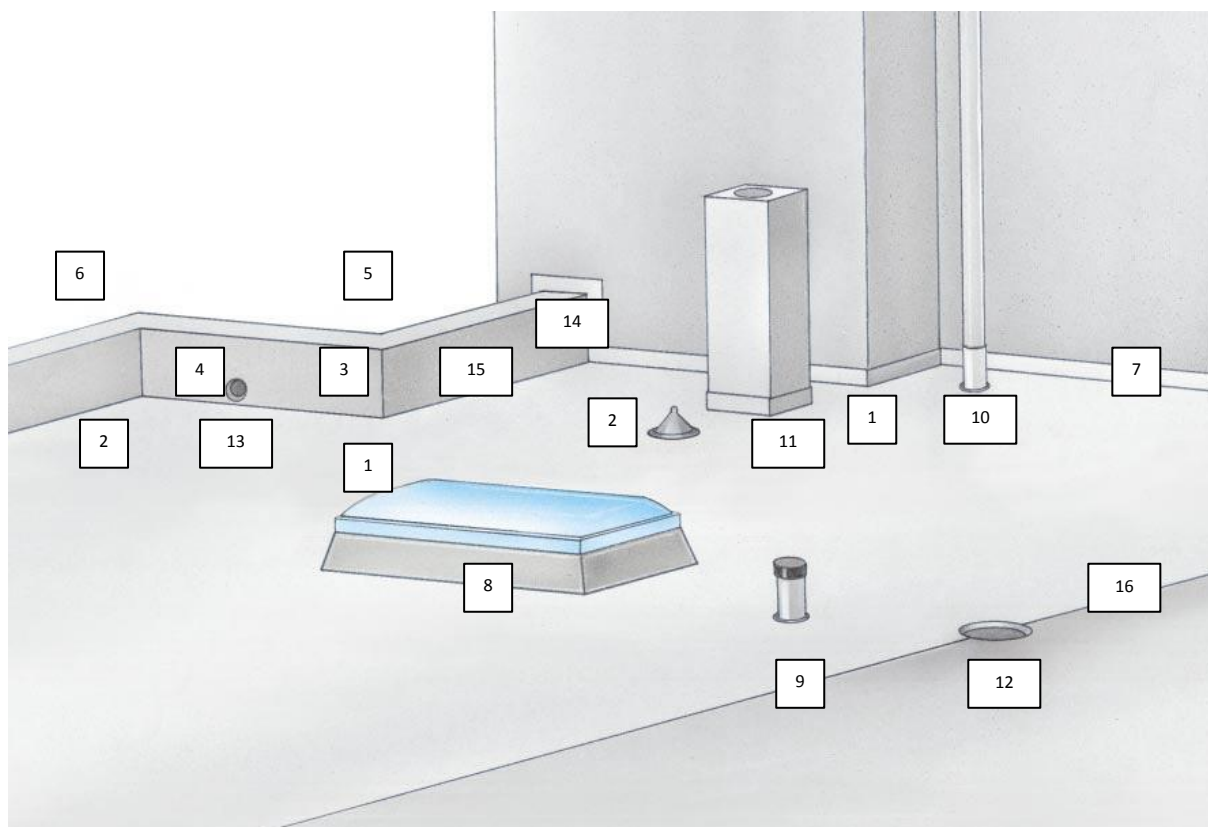
1. External corner
2. Internal corner

9.2. POLYMAT Roof prefabricated corners



1. Corner 1 (external corner)
2. Corner 2 (internal corner)

9.3. Definitions



1. External corner at roof level
2. Internal corner at roof level
3. External corner on top of a wall
4. Internal corner on top of a wall
5. Roof perimeter border: Corner - facade side
6. Roof perimeter border: Corner - facade side
7. Wall border with covering strip/counter flashing
8. Junction with roof light
9. Junction with vent pipe
10. Junction with post and pipe
11. Junction with roof penetration with small diameter
12. Roof water inlet
13. Emergency overflow
14. Parapet
15. Parapet valley
16. Valley in the roof surface

10. Anchoring

10.1. Basic anchoring principles

10.1.1 General information

In order to counteract wind loads, ballast is used to anchor loose laid roofing sheets. The weight of ballast is determined by the expected wind loads and will vary depending on the roof zone (corner/perimeter zone, field area). Ballast is primarily used for roofs with a pitch of up to 5° and should be laid as soon as the roofing sheet is installed.

The following are generally used as ballast

- Gravel, particle size approx. 16/32 mm, minimum thickness 5 cm
- Concrete slabs, laid on extruded polystyrene boards and separation layers, paving support pads/Pedestals
- Ceramic or concrete slabs or similar materials in a bed of mortar
- Soil/layers for roof garden
- Protective screed or similar material

10.1.2. Determining the required weight of ballast

The required weight of ballast is determined on the basis of the theoretical loads set out in the national technical standards requirements and can generally be calculated from the general regulations.

However, general regulations for determining the required weight of ballast can only be applied if they:

- Form an integral part of the national technical standards or
- They do not contravene the national requirements.

General regulations are based on many years of practical experience and specify the required weight of ballast for the various roof zones, depending on the height and exposure of the roof.

11. Repairs/renovation

11.1. Repairs

Where the roofing sheet has been damaged, e.g. mechanically, it can be repaired by installing a new piece of roofing sheet. The area around the seam where the new joint is to be created must be washed over a wide area with water without the addition of any cleaners.

The new piece of roofing sheet to be applied is either laid over or under the old roofing sheet and the seam area is welded with a manual hot air welder (double seam/2 cm nozzle or single seam 4 cm).

NOTE: Welding tests must always be carried out before commencing the repair work.

11.2. Renovation

When carrying out renovation work on waterproofing membranes, the points previously mentioned in these installation instructions (e.g. separating layers etc.) must be complied with.

Existing high-polymer roofing sheets need not necessarily be removed. It may be possible to find a project-specific solution in such cases. The **BITUMAT** technical department may be able to provide assistance.

NOTE: When replacing old PVC membranes with new ones, we are frequently asked whether environmentally friendly disposal facilities are available for the old material. Roofing sheet recycling (i.e. at **BITUMAT** plant) offers an ecological and economically efficient method of disposal.

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