

INSTALLATION GUIDE LINE

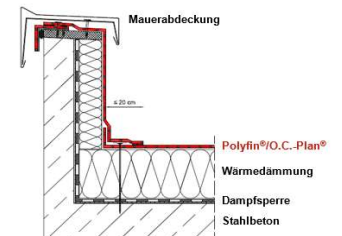
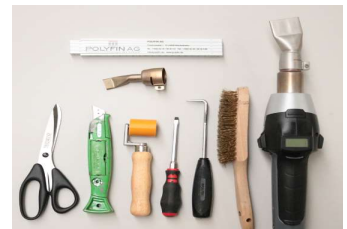
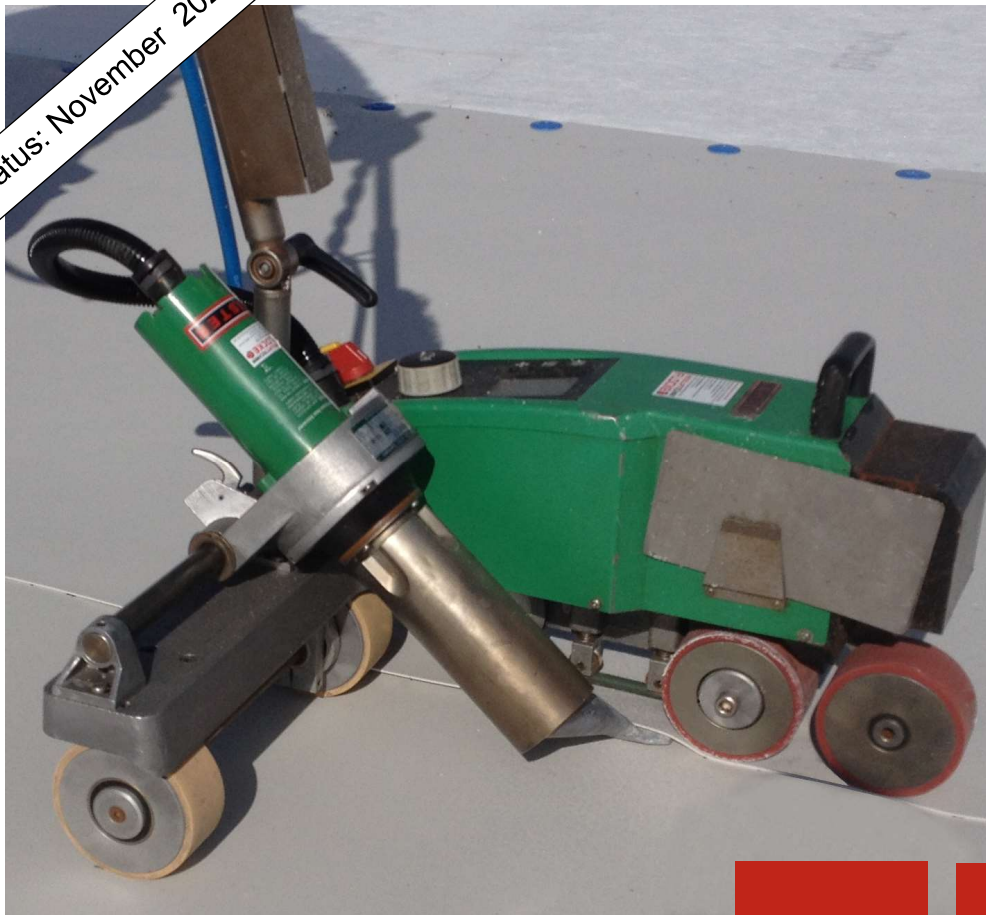
Polyfin® (FPO/TPO)

Polyfin Duo® (FPO/TPO)

O.C.-Plan® (ECB)

Single Ply Waterproofing Membranes

Status: November 2020



PRACTICAL

RELIABLE

SUSTAINABLE

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Foreword

The installation guidelines should lead to the intended use of the products marketed by POLYFIN AG. The focus of this directive is clearly on the use as a flat roof sealing. In addition to the detailed technical training, the different roofing membrane products require different construction and installation methods.

In addition to manual / constructional aspects, consideration must also be given to fire protection (with special attention to "hard roofing") and positional stability (resistance to lifting by wind suction). First and foremost, the designs are based on the requirements of the German market. Other countries may have different requirements for products and designs. The individual topics are described in the following text to the best of our knowledge, which is based on decades of experience. However, the installation guidelines do not replace the expertise of every single user and planner. The disclaimer is to be observed, changes to the installation guidelines are reserved.

1. Products

1.1 Polyfin® roofing- and sealing membrane (FPO/TPO)

Polyfin® membranes are single ply roofing and waterproofing membranes consisting of flexible polyolefins (FPO / TPO). This material is a thermoplastic. Polyfin® is easy to process and suitable for use in new buildings as well as for the refurbishment of objects. Since Polyfin® is available in different versions with glass fleece reinforcement, with or without fleece lamination on the underside, we enable you to cover all application areas.

You will receive our Polyfin® sheets in thicknesses of 1.5 to 2.5 mm.



Product Properties

- Proven suitability confirmed by independent testing institutes
- Free of PVC, plasticizers and halogens (e.g. Chlorine or Bromine)
- Quality assurance according to ISO 9001: 2015
- CE certification according to DIN EN 13956
- Resistance to flying sparks and radiant heat for tested roof structures within the framework of corresponding classification standards
- Highly resistant to UV radiation
- Highly resistant to hail
- Ozone resistant
- Bitumen and polystyrene compatible
- Easy installation and processing
- Hot air welding is possible over a wide range of temperatures, creating homogenous seams and eliminating the need for additional seam sealing.

Polyfin®-roofing and sealing membranes – possible installation methods

Products (FPO/TPO)	Polyfin® 3015 Glass fleece reinforcement	Polyfin® 3016 Glass fleece reinforcement	Polyfin® 3018 Glass fleece reinforcement	Polyfin® 3020 Glass fleece reinforcement	Polyfin® 3025 Glass fleece reinforcement
Application method					
Under ballast Incl. paving slabs	✓	✓	✓	✓	✓
Mechanically fixed	✓	✓	✓	✓	✓
Strip bonding	-	-	-	-	-
Full bonding	-	-	-	-	-
Colour ¹⁾	Standard colour: light grey				
Thickness [mm]	1,5	1,6	1,8	2,0	2,5
Width [mm]	2100/1500/ 1050/750/ 500/350/250	2100/1500/ 1050/750/ 500/350/250	2100/1500/ 1050/750/ 500/350/250	2100/1500/ 1050/750/ 500/350/250	2100/1500/ 1050/750/ 500/350/250
Length [m] ²⁾	See delivery program				

1) Other colours on request (e.g. white: SRI 90, SRI 100, oder black) 2) Special length material on request

Polyfin®-roofing and sealing membranes

- Fleece backed Polyfin membranes, fleece free welding edge on both sides -

Products (FPO/TPO)	Polyfin® 4230	Polyfin® 4015 v	Polyfin® 4018 v	Polyfin® 4020 v
Application method	Glass fleece reinforced, polyester fleece backed, fleece free welding edge on both sides	Glass fleece reinforced, polyester fleece backed, fleece free welding edge on both sides	Glass fleece reinforced, polyester fleece backed, fleece free welding edge on both sides	Glass fleece reinforced, polyester fleece backed, fleece free welding edge on both sides
Under ballast including paving slabs	✓	✓	✓	✓
Mechanically fixed	✓	✓	✓	✓
Strip bonding (partially)	✓	✓	✓	✓
Full bonding	✓	✓	✓	✓
Colour ²⁾	Standard colour: light grey			
Thickness[mm] ¹⁾	2,0	1,5	1,8	2,0
Width [mm]	1500			
Length [m] ³⁾	Siehe Lieferprogramm			

1) Effective thickness of the sealing layer
SRI 90, SRI 100; or black) 3) Special length material on request

2) Other colours on request (e.g. white:

Polyfin®-membrane for detailings

Product (FPO/TPO)	Application / Purpose	Thickness [mm]	Width [mm]	Length [m]
Polyfin® 1020 Homogenous material	For roof outlet- and pipe penetration collars, also for roof light corner patches	2,0	500	15

1.2 Polyfin Duo® roofing and sealing membranes (FPO/TPO)

Membranes of the Polyfin Duo® product line are FPO roofing and waterproofing membranes. The membranes have a white top and a black bottom.

The products are available in different variants:

- Polyfin Duo® 30 .. - membrane with central glass fleece reinforcement
- Polyfin Duo® 30 .. GS membrane with a central combination reinforcement consisting of polyester scrim and glass fleece.

Polyfin Duo® membranes can be easily processed

and are suitable for use in new buildings as well as for the renovation of objects. Since Polyfin Duo® is available in different variants, we enable you to cover all application areas. Polyfin Duo® membranes are available in thicknesses of 1.5 to 2.0 mm.



Product properties

- Proven suitability confirmed by independent testing institutes
- PVC- and plasticizer-free, halogen-free
- Quality assurance according to ISO 9001: 2015
- CE certification according to DIN EN 13956
- Resistance to flying sparks and radiant heat for tested roof structures within the framework of corresponding classification standards
- Highly resistant to UV radiation
- Highly resistant to hail
- Ozone resistant
- Bitumen and polystyrene compatible
- Easy installation and processing
- Hot air welding is possible over a wide range of temperatures, creating homogenous seams and eliminating the need for additional seam sealing.

- Standard color white (top surface), SRI > 90
- Optimized flame retardant equipment opens up even more possibilities with regard to possible roof structures and roof pitches

Polyfin Duo®-roofing and sealing membranes– possible application methods

Products (FPO/TPO)	Polyfin Duo® 3015 With glass fleece reinforcement	Polyfin Duo® 3018 / 3018 rd With glass fleece reinforcement	Polyfin Duo® 3020 / 3020rd With glass fleece reinforcement
Application			
Under ballast including paving slabs	✓	✓	✓
Mechanically fixed	✓	✓	✓
Strip bonding	-	-	-
Full bonding	-	-	-
Colour	Standard colour: top side white, bottom side black		
Thickness [mm]	1,5	1,8	2,0
Width [mm]	750 / 1500	750 / 1500	750 / 1500
Length [m]	20		

Polyfin Duo® GS - roofing and sealing membranes– possible application methods

Products (FPO/TPO)	Polyfin Duo® 3015 GS Reinforcement combination consisting of glass fleece + polyester scrim	Polyfin Duo® 3018 GS Reinforcement combination consisting of glass fleece + polyester scrim	Polyfin Duo® 3020 GS Reinforcement combination consisting of glass fleece + polyester scrim
Application			
Under ballast incl. paving slabs	✓	✓	✓
Mechanically fixed	✓	✓	✓
Strip bonding	-	-	-
Full bonding	-	-	-
Colour	Standard colour: top side white, bottom side black		

1.2 O.C.-Plan® roofing and sealing membranes (ECB)

O.C.-Plan® is a single ply roofing and waterproofing membrane made of ECB (ethylene copolymer bitumen). This material is a thermoplastic. O.C.-Plan® is available with glass fleece reinforcement, with or without underside fleece lamination and fleece-free edge on both sides. Depending on your choice, you can cover all areas of application, from strip to full-surface bonding, whether loosely laid with ballast and under paving slabs or mechanically fastened - with O.C.-Plan® you always have the right membrane for your project!



Product properties

- Quality assurance according to ISO 9001: 2015 (TÜV certification)
- Proven reliability by laying over 70 million square meters in over 45 years
- CE certification according to DIN EN 13956 and DIN EN 13967
- Resilience to radiant fire and radiant heat for certified roof structures in accordance with applicable classifications
- Certified fire protection
- Highly resistant to hail
- PVC-free, free of plasticizers, free of halogens
- Highly resistant to UV radiation
- Ozone resistant
- Bitumen and polystyrene compatible
- Root and rhizome resistant according to the FLL method
- Easy installation and processing
- Homogeneous seam connections and requires no additional seam sealing.

O.C.-Plan® has a standard thickness of 2.0 mm. Independent investigations confirm that O.C. Plan® membranes have an expected service life of at least 30 years.

Products

O.C.-Plan®-roofing and sealing membranes – possible application methods

Products (ECB)	O.C.-Plan® 3020 With glass fleece reinforcement	O.C.-Plan® 4230 With glass fleece reinforcement, polyester fleece backing and fleece free edge on both sides
Application		
Under ballast Including paving slabs	✓	✓
Mechanically fixed	✓	✓
Strip bonding	-	✓
Full bonding	-	✓
Colour	black	
Thickness ¹⁾ [mm]	2,0	2,0 ¹⁾
Width [mm]	2100/1500/1050/ 750/500/350/250	1500
Length [m]	See delivery program	

1) effective thickness without fleece backing

O.C.-Plan®-membrane for detailings

Produkte (ECB)	Application / purpose	Thickness [mm]	Width [mm]	Length [m]
O.C.-Plan® 1020 Homogenous material (unreinforced)	For roof outlet- and pipe penetration collars, also for roof light corner patches	2,0	500	siehe Lieferprogramm

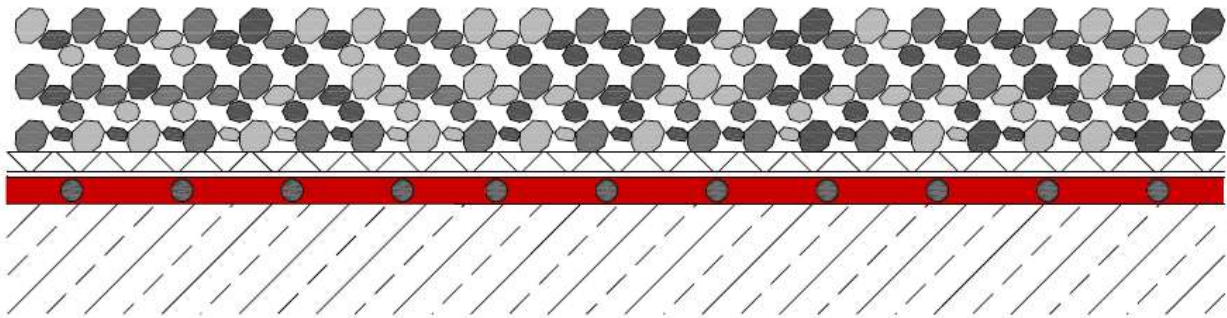
1.3 Installation Methods – Exemplary Build Up's

a) *Loose laid with ballast, such as gravel, concrete slabs, roof garden system build ups*

Polyfin® 3015 - 3025 / 4230 / 4015 v – 4020 v

Polyfin Duo® 3015 – 3020 / Polyfin Duo® 3015 GS – 3020 GS

O.C.-Plan® 3020 / 4230

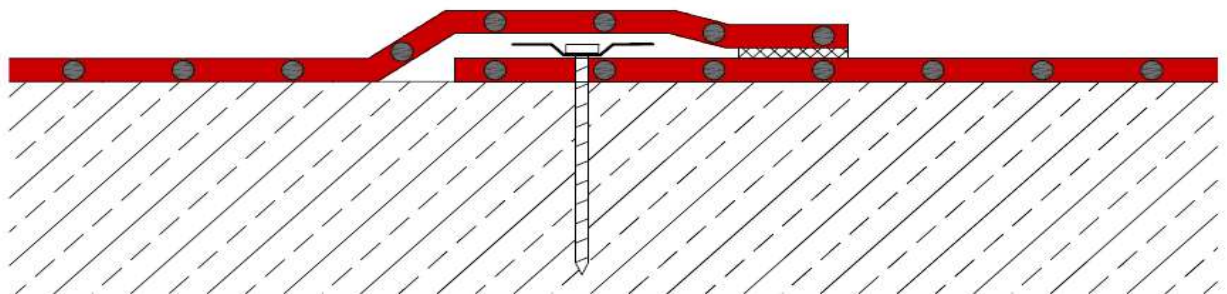


b) *Mechanically fixed*

Polyfin® 3015 - 3025 / 4230 / 4015 v – 4020 v

Polyfin Duo® 3015 – 3020 / Polyfin Duo® 3015 GS – 3020 GS

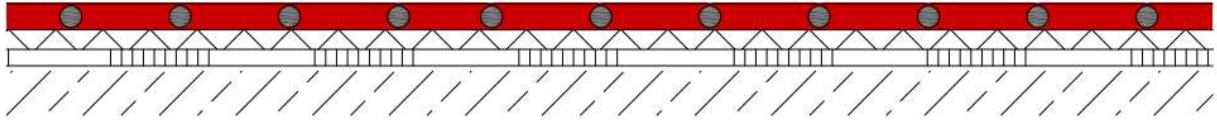
O.C.-Plan® 3020 / 4230



c) *Strip bonding (or full bonding)*

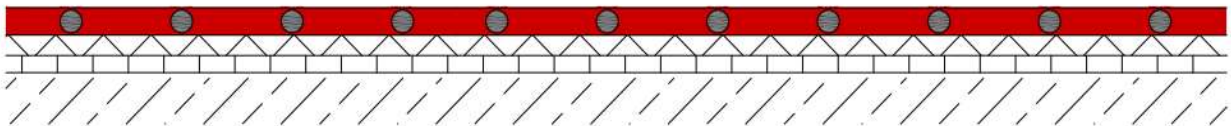
Polyfin® 4015 v - 4020 v, strip (partially) bonded on polystyrene insulation (EPS) mit with PU-roofing membrane adhesive

Polyfin® 4225 - 4230 / O.C.-Plan® 4230, glued in strips with PUR glue



Polyfin® 4015 v – 4020 v, fully bonded on polystyrene insulation (EPS) with PU roofing membrane adhesive

Polyfin® 4230 / O.C.-Plan® 4230, fully bonded with PU roofing membrane adhesive



Equipment & Tools

2. Equipment & Tools

2.1 Hot Air Hand Gun



- Hot Air Hand Gun
- VDE-tested, 230 Volt, with variable temperature control
- Up to + 620 °C with a **flat nozzle, width = 40 mm**
- Heat capacity \geq 1400 Watt

2.2 Automatic welding machine



- 200 V/4200 Watt, 230 V/4600 Watt und 400 V/5700 Watt
- VDE-testet, with variable temperature control up to + 620 °, and variable movement velocity
- Width of the nozzle and the pressure roller must be 45 mm
- „Prep-“, and „Grip nozzles“ are not suitable

At cable length of \geq 50 m at 230 V and \geq 100 m at 400 V, the use of mobile power aggregates is recommended to avoid power loss.

2.3 Checking the Welding Temperature

- The welding temperature should be approx. + 500 °C to + 620 °C at the nozzle exit of the hand welding gun
- A suitable measuring tool must be available at all times to control the welding temperature



2.4 Devices for grinding the weathered roofing membranes

With a burnishing machine, a one-hand flex plus wire brush attachment, the surface of weathered Polyfin® / O.C. Plan® roofing and waterproofing membranes must be pre treated in the



welding area (see chapter 5.4).

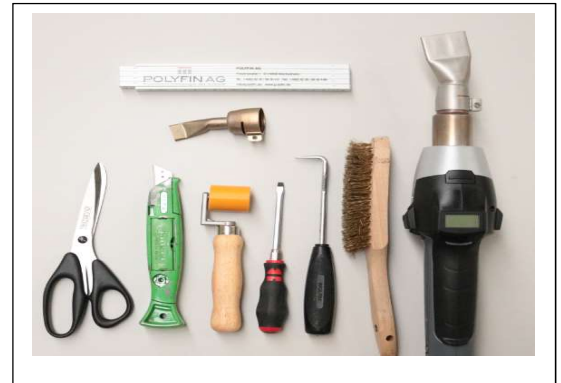
A burnishing machine can be ordered at the POLYFIN AG.

Seam Joint Connection

2.5 Tools - Overview

For a proper application of Polyfin® / Polyfin Duo® and O.C.-Plan®, these tools are required:

- Hot air hand gun resp. welding machine
- Silicone pressure roller, width 40 mm
- Knife with hook shaped or trapezoidal blade
- Pair of scissors
- Wire brush
- Folding rule
- Temperature measuring device (Range up to +750°C)
- Seam checker or, screw driver, 5 mm, with rounded corners



3. Seam Joint Connection

Welding parameters:

The welding parameters described here are basic or straightening settings.

Under site conditions, the individual settings must always be determined by means of trial welds.

Influencing factors (by way of example):

- weather conditions (outside temperature, solar radiation, precipitation)
- Material thickness of the membranes to be joined
- wind
- Shaded areas, areas with direct sunlight
- Stability / compressive strength of the substrate

The influencing variables mentioned by way of example, individually or in combination, exert an influence on the welding result and welding parameters.

A parameter set that can be reliably used universally under all construction site conditions can therefore not be determined.

For the above reasons, trial welds, continuous monitoring of the welding process, as well as repetitive seams are essential.

Our roofing and waterproofing membranes are thermally welded together. With hot air, the membranes are evenly plasticized in the overlap and joined together under pressure. Temperature, contact pressure and speed must be matched during the welding process as a function of the ambient temperature. With changing environmental conditions, a multiple adaptation of the welding parameters may become necessary. The seam welding of the roofing and waterproofing membranes with glass fleece reinforcement is possible depending on the nozzle width within a temperature range of + 500 ° C to + 620 ° C (hand welder or welding machine). In the case of homogeneous molded parts (eg inside and outside corners) or homogeneous material (Polyfin 1020 / Polyfin Duo 1020 / OC-

Plan 1020), the welding of the seam joint within a temperature range, depending on the nozzle width, has been found to be from + 350 ° C up to + 500 ° C possible. By a professional hot air welding a homogeneous seam connection is achieved.

In order to check the quality of the weld seam and the front edge of the seam, test welds

seam preparation

- For new membranes in the delivery condition, no preparation of the joint seam areas is required.

- After a certain period of weather exposition (in summer, under certain circumstances, after only a few days, the surface must be mechanically pre treated (see chapter 3.4)

Seam areas must be clean.

- Impurities of the surface of the roofing membranes can affect the welding result.

In the case of mineral wool as an insulating material, it may e.g. It may be necessary to clean the seam areas with mineral wool dust before welding with a dry, non-pilling cloth.

A preparation of seam areas with solvent is not part of the system.

must be carried out before starting work. At created peel samples the break must lie outside the welded seam. An optical indicator is the "welding thread" (slight melt outlet) at the seam leading edge.

To check the seam strength, the seams must be completely cold. The overlaps must be at least 5 cm in the case of machine and hand welding and must be kept clean and dry. All roofing membranes with fleece lamination on the underside or adhesive

coating have a fleece-free or adhesive-free edge of approx. 4 cm. Head joints are to be covered and sealed with Polyfin® 3015-3025 / Polyfin Duo 3015 - 3020 / O.C.-Plan® 3020 strip material (≥ 12 cm wide).

The seam overlap of the roofing membranes may also be carried out against the watercourse - z. As in arrivals and sales and fixtures this is unavoidable.

Cross joints are to be avoided, for. B. by offset arranged roofing membranes.

POLYFIN AG offers practical training and seminars.

Seam Joint Connection

3.1 Hot Wir Welding

3.1.1 Manual Welding

Set hot air hand gun to the recommended welding temperature of approx. + 500 ° C to + 620 ° C depending on the nozzle width.

Basic setting of practical parameters – Hot air hand gun:

Polyfin®: approx. 400 ° C to approx. 650 ° C with a 40 mm nozzle

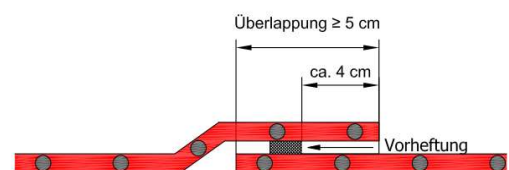
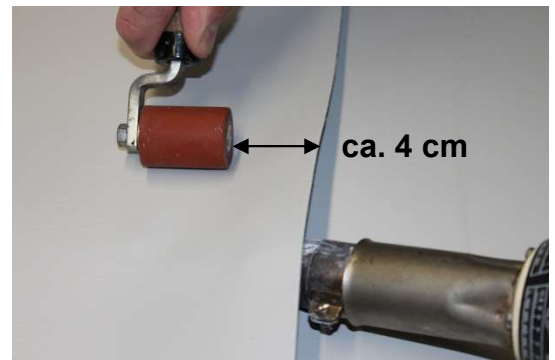
Polyfin Duo®: approx. 350 ° C to 550 ° C with a 40 mm nozzle

Approximately 340 ° C to 420 ° C with a 20 mm nozzle (recommended for detailed training)

O.C.-Plan®: Approx. 350 ° C to about 650 ° C with a 40 mm nozzle

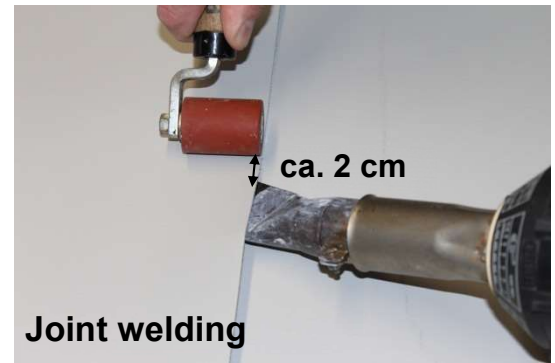
The welding is to be carried carried out in two steps:

- I. The upper membrane is stapled in the overlap, ≥ 5 cm from the edge, to the lower membrane (see sketch: pre-tacking). By edge pressure of the silicone hand roller a line-shaped pre-tacking is achieved. This operation ensures that the necessary temperature in the welding area is maintained during the subsequent welding. In addition, this ensures a perfect position of the waterproofing membranes.

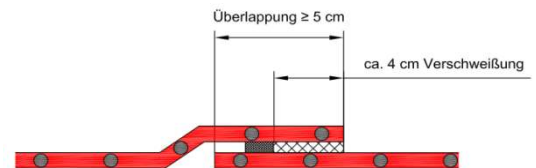


Seam Joint Connection

- II. A welding then takes place on the remaining width of 4 cm. The welding device and silicone and roller are guided parallel to the edge of the membrane and continuously in the welding direction (see sketch seam welding). After completion of the welding work, the hot air hand gun must first be switched off.



In case of polystyrene thermal insulation, the overlap should be increased accordingly to prevent damage to the insulation material caused by the hot air.



Seam overlaps and width of the welded seam

- For mechanical fastening, the minimum overlap is determined by the arrangement and geometry of the fasteners.
- For glued and loosely laid structures, the seam overlap is determined by the required partitioning at the seam seam and the required minimum width of the joint seam. The width of the overlap should be chosen so that pre-stitching can take place during manual welding, and in the case of automatic welding, both layers are compressed by the revolving round belt.
- The minimum width of the joint seam is 20 mm for FPO and ECB roofing membranes

Practical tip welding with the hot air hand gun:

- Weld straight sections - as with transitions from automatic seam to hand seam, as well as at seams of connection strips - with a 4 cm nozzle. Usually, this relates to the minimum 2 cm seam width in one operation. Using a 2 cm wide nozzle usually requires at least 2 passes plus pre-tacking.
- Weld corner moldings with a 2 cm wide nozzle.

Seam Joint Connection

3.1.2 Automatic Welding

Set the welding temperature from approx. + 500 ° C to + 620 ° C at an outside temperature of approx. 20 ° C.

When extending and retracting the welding machine, it is recommended to place a metal strip underneath the welding nozzle. The machine welding takes place in one operation. An effective air seal on the machine (round belt) does not require pre-stitching. The welding speed is adjustable and is determined by the respective weather conditions.



Basic setting of practical parameters - automatic welding machine (reference machine: Leister Varimat V2):

Polyfin®: approx. 620 °, 2.7 m / min depending on membrane thickness

Polyfin Duo®: approx. 580 ° C, 2.7 m / min depending on membrane thickness

O.C.-Plan®: approx. 620 ° C, 2.6 m / min

Weight: Leister Varimat V and Varimat V2, use two additional weights

In principle, it is possible to produce the seam connections with various welding machines designed for this purpose. However, the parameters then can differ from the recommendations for the "reference machine". Experience also shows that larger and heavier machines lead to a higher degree of process safety on the construction site.

3.1.3 T-Joints

Beveling of the middle edge of the membrane in the T-joint area of a seam is not absolutely necessary with Polyfin® / OC-Plan® membranes up to 2.0 mm thickness, since there is generally enough plasticized melt to reliably fill the geometrically induced capillary. Depending on the compressive strength of the substrate and welding speed (in particular when using very fast moving machines), however, a beveling of the middle edge of the membrane can ensure an increased degree of safety in the process of craftsmanship. For membranes with an effective nominal thickness of > 2.0 mm, however, beveling the middle web edge is a mandatory manufacturer's specification!

3.2 Control of the welded joints

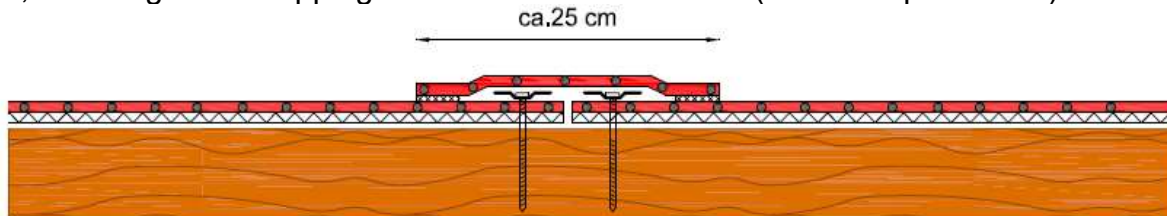
Before starting work, test welds must be performed to determine the optimum welding parameters and to ensure the quality of the welds. With changing environmental conditions, a multiple adjustment of the welding temperature as well as the performance of further seam samples may become necessary.

The testing of the joint seam can be carried out by means of a cranked test pin (blunt) or a 5 mm wide, rounded off at the corners of the flat screwdriver and by a peel test. Seam control and peel tests can only be performed after sufficient cooling (24 hours) of the weld. In order to accelerate the process of cooling in the test welds, the peel samples can be cooled in a bucket filled with cold water to the temperature to be tested (about 20 ° C).

Seam Joint Connection

3.3 Butt joints

The butt joint formation of fleece-backed Polyfin® / O.C.-Plan® roofing membranes should be mechanically fastened or bonded in the area of the joints on both sides or in the overlapping area (recommendation). Subsequently, a Polyfin® 3015-3025- / O.C.-Plan® 3020 strip, approx. 25 cm wide, is arranged overlapping and welded on both sides (see example sketch).



3.4 Connection of new and already weathered membranes

New railways can be connected to already weathered railways. For this it may be necessary that the already weathered sheets must be mechanically pretreated. (The necessity for this is to be determined by trial welding and subsequent testing of the joint according to chapter 3.2 and by a peeling test).

With a satin grinder or other grinding equipment (see chapter 2.4), the surface of the weathered sheets must be sanded on the surface.

By this measure, patina and impurities are eliminated. The new Polyfin® / O.C. Plan® roofing and waterproofing membranes can then be welded to the weathered roofing membranes.

3.5 Connection with other materials

A consultation with the POLYFIN AG is absolutely necessary.

4. Substrate

4.1 General substrate constitution

The substrate and especially its surface must be checked by the publisher for their suitability. Recognizable shortcomings in advance crafts, provided that they can affect their own performance, acc. the DIN 1961, VOB / B complain about.

The load-bearing structure must meet all technical requirements, in particular with regard to loading capacity, deflection, anchoring, drainage, etc. Structurally available expansion joints must also be formed in the roofing layer package (see Chapter 6).

Roofs should have according to flat-roof directive a continuous gradient to the water outlet. A minimum pitch of 2% is recommended. Floating roof surfaces are possible as special construction. Drainage elements are to be arranged at the lowest points. Roofs should have according to flat-roof directive a continuous gradient to the water outlet.

4.2 Profiled Steel Deckings as Substrate

Only steel trapezoidal profiles with factory-applied corrosion protection according to DIN 18807-1 are to be used. The top straps of the steel trapezoidal profiles must be according to flat message line in a plane. The deflection of the steel trapezoidal profiles shall not exceed 1/300 under full load in the application category K1 and at most 1/500 of the span (between the binders and purlins) in the application category K2. Thrust fields are statically effective disks on which the overall stability of a structure depends. On these, no subsequent changes may be made without static proof. Likewise, additionally attached loads must be detected on the steel trapezoidal underside. Roof penetrations such as fans, gullies etc. are to be stabilized by reinforcement plates. In the case of skylights, chimneys, fan systems, etc., replacement must be statically verified.

4.3 Concrete Slabs

Concrete ceilings including slope layers must be sufficiently hardened and surface-dry according to the flat-roof directive. The surface should be abraded, continuous, free of gravel nests, cracks and ridges.

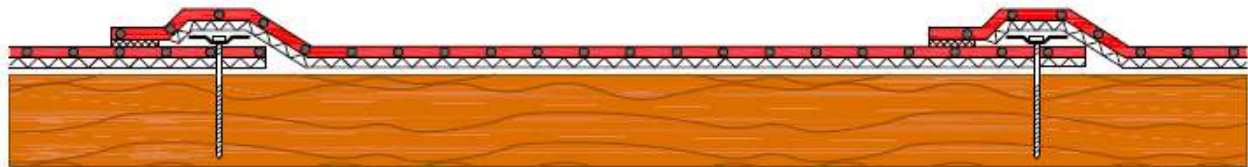
4.4 Prefabricated Concrete Slabs

The installed precast concrete elements must form a continuous surface. Joints between the plates should be closed. On the bearing joints (head ends), drag strips of at least 0.2 m width are to be arranged under the seal. For large panels, this applies to all joints (TT slabs), unless other measures are taken.

4.5 Timber Decking

The roof decking must be protected from moisture. Joints are to be formed taking into account the expected length and width changes due to swelling. These are generally to be considered for 2 mm / m flat press plates and 1 mm / m for veneered plywood. If solid wood formwork is used, then grooved boards (tongue and groove) with at least grade S 10 according to DIN 4074-1 must be used.

The formwork thickness must be adapted to the expected loads and the support distance and must be at least 24 mm for wood and at least 22 mm for wood materials. In the case of wood and wood-based materials, a protective layer (eg plastic fleece 300 g / m²) should be arranged between the roofing membrane and the formwork. When laying the Polyfin 4230 and 4015 v - 4020 v and O.C. Plan 4230 (see example sketch), it is possible to dispense with the separating layer between the roofing membrane and the wooden formwork, since the roofing membrane has a fleece lamination on the underside. The Polyfin 4230 and 4015 v - 4020 v can be laid loosely (under load) or mechanically fastened (weather exposed).



Polyfin 4230 sowie 4015 v – 4020 v und O.C.-Plan 4230 auf Holzschalung,
mechanisch befestigt

For timber decking, the rounded boards should not be wider than 16 cm. OSB panels must be provided with tongue and groove and are always laid in a composite. The maximum edge length should not exceed 2.50 m.

For wood preservation the wood preservatives are to be used on a salt basis. When using the wood preservative, DIN 68800 must be observed.

4.6 Old roof - Refurbishment

Prior to any renovation, the functionality of the existing roof structure must be checked by repeatedly opening it up to the supporting structure (function of the vapor barrier, thickness of the thermal insulation, moisture content of the thermal insulation, possibility of dehydration of the roof structure, etc.).

Bituminous Substrate

Waves, bubbles and other bumps are to be cut and leveled. Optionally, a protective layer may be required.

Condensation Protection

In the course of a planned refurbishment measure, the existing roof structure has to be examined physically for its functional capability.

Refurbishment in case of old plastic single ply roof sealings

An individual consultation by the POLYFIN application technology is recommended.

4.7 Vapour barriers / vapour retarders

Because of unforeseeable changes in use, we also recommend using thermal –insulated Roof structures of unheated buildings installing a vapor barrier. Depending on the water vapour load and use, vapour barriers made of aluminum composite films, PE films or bitumen (bituminous membranes) can be used.

For example, a low-thermal load vapour barrier from POLYFIN AG with a S_d value ≥ 1500 m is recommended. The vapour barrier complies with the requirements of DIN 18234 "Structural fire protection of large-area roofs", and is typically used on trapezoidal sheet substrates.

Vapour barriers must be led up to the edges and edges as well as upstands up to the upper edge of the insulating layer / insulating wedge and connected professionally. These must also be connected professionally to all penetrations.

PE films should be loosely laid out, overlapped by approx. 10 cm and sealed tightly with a suitable double-sided adhesive tape in the overlap. PE connections with double-sided butyl adhesive tapes must be tightly connected to all flashings. Above air-conditioned rooms, both the connections and the seam overlaps must be sealed with butyl adhesive tapes. The processing instructions of the respective manufacturer are to be observed.

On trapezoidal sheet substrates and in the area above air-conditioned rooms, we recommend the use of a self-adhesive vapour barrier from POLYFIN AG. This must be tightly connected to covers, flashings and penetrations.

4.8 Thermal Insulation Materials

There are only those thermal insulation materials to use that are resistant to temperature, dimensional and dimensional stability and as a base of the roof waterproofing. Rigid foam boards should be formed with stepped rabbets or laid offset in two layers. Insulation boards made of PUR / PIR must be additionally fastened according to the manufacturer's instructions. According to the flat-roof directive, the necessary bridging of the span width between the upper corrugations must be taken into account for steel trapezoidal profiles.

The minimum thickness of the thermal insulation is not least used to the heat protection.

Max. width of the span from corrugation to corrugation [mm]	Recommended min. thickness of the thermal insulation boards [mm]		
	EPS	PUR / PIR	Mineral wool
70	40	40	50
100	50	50	80
130	60	60	100
150	70	60	120
160	80	70	120
170	90	80	140
180	100	80	140

Recommended minimum thickness on steel deckings

5. Installation

5.1 General Information

Polyfin® / O.C.-Plan® are roofing and waterproofing membranes that can be plastified by heat supply and homogeneously welded. Polyfin® / O.C.-Plan® sheets can be laid free weather exposed.

The surface sealing is in the roof level, at flashings, at the edge of the roof and in roof valleys according to DIN 18531 frictionally connected with the supporting deck as follows: Mechanical attachment before the flashing and completion, at the edge of the roof and in valleys can be carried out by single roofing membranes fasteners, metal straps, rails or laminated metal sheet angles (line attachment), and should be connected to the substructure with at least 4 fasteners per meter, regardless of the calculated number of fasteners.

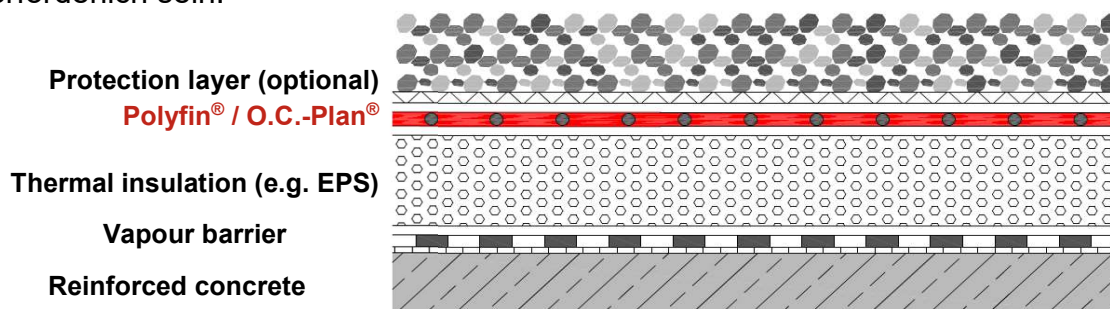
Polyfin® / O.C.-Plan® sheets are compatible with bitumen and polystyrene and are optimally suited for the renovation of bituminous sealed roofs. Slightly stagnant water on the seal has no influence on the technical values or on the expected service life of the Polyfin® / O.C.-Plan® roofing and waterproofing membranes.

5.2 Losely laid with ballast

5.2.1 New construction

An edge fixation on penetrations, connections and terminations is mandatory even when laying under load. See also 4.1. The connection strip is windproof to connect to the wall crown. The Polyfin® / O.C.-Plan® roofing membrane is rolled out, aligned and the following roofing membrane is laid out with a coverage of ≥ 5 cm and welded. If there is loose laying on polystyrene insulation, the coverage should be increased (recommended ≥ 8 cm) so that the insulation material is not damaged when welding with hot air. The use of a protective layer between the roofing membrane and the ballast is carried out in accordance with the flat-roof directive (see chapter 7.2 "Protection layers"). The surcharge is based on the requirements of the flat roof directive or DIN 1991-1-4: 2005 / NA: 2010-12 (wind loads)

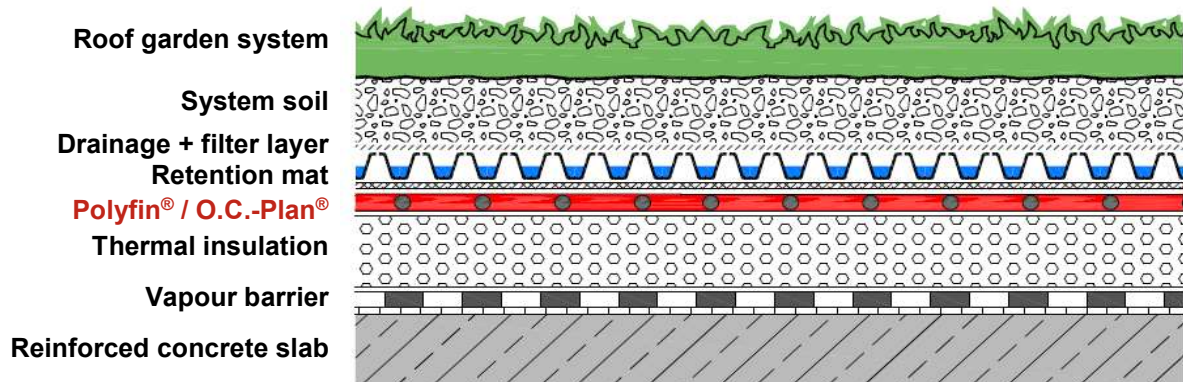
In Rand- und Eckbereichen kann die Kiesauflast eventuell durch Windkräfte verfrachtet werden. Ggf. können daher zusätzliche, geeignete Maßnahmen zur Herstellung der Verwehsicherheit erforderlich sein.



Suitable loads for wind suction protection are to be applied immediately after installation!

5.2.2 New construction – Roof garden

The laying of the root-resistant Polyfin® / O.C.-Plan® roofing membranes is carried out as described under point 4.1. After completion of the sealing work, any necessary sliding or protective layers must be installed.



Immediately after installation, appropriate loads must be applied for wind suction protection!

The use of a protective layer between the roofing membranes and the ballast is carried out in accordance with the flat-roof directive (see chapter 7.2 "Protective layers"). The surcharge is based on the requirements of the flat roof directive or DIN 1991-1-4: 2005 / NA: 2010-12 (wind loads).

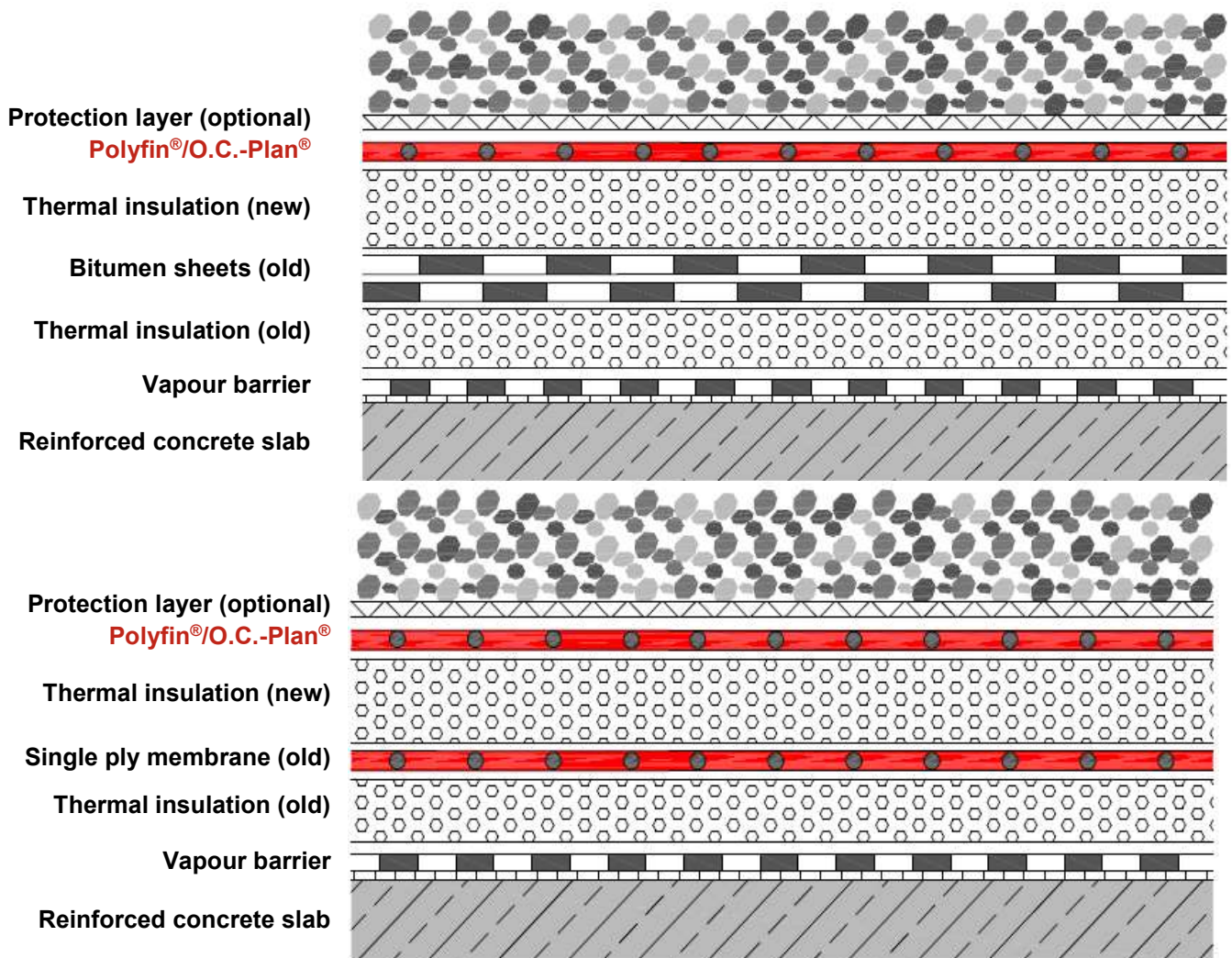
It is advisable to subdivide the area to be sealed into sections by the installation of foreclosures and to record these in a laying plan, photos, etc..

5.2.3 Inverted Roof

The installation of Polyfin® - / O.C.-Plan® sheets takes place as described in chapter 4.1. On the sealing thermal insulation panels made of extruded polystyrene (XPS) are applied. The plates are designed with circumferential rabbet and must be laid tightly pushed. Between the thermal insulation and the ballast a trickle protection track is arranged. The trickle protection track to be used must generally meet the following requirements: Building material class B2 according to DIN 4102 or class E according to DIN EN 13501-1, tear-resistant, open to diffusion, sufficient UV stability. The information must be confirmed by the fleece manufacturer. The surcharge is based on the requirements of the flat roof directive or DIN 1991-1-4: 2005 / NA: 2010-12 (wind loads). It is advisable to subdivide the area to be sealed into sections by the installation of foreclosures and to record these in a laying plan, photos, etc..

5.2.4 Refurbishment – bitumen roof – single ply roof

Since Polyfin® / O.C. Plan® roofing membranes are bitumen-compatible, it is possible to dispense with intermediate layers on bituminous old waterproofing membranes. For overburden repairs, Polyfin® / O.C.-Plan® roofing membranes are laid as described in chapter 4.1. Prior to this, it must be checked whether additional thermal insulation pursuant to the German Energy Saving Ordinance or a protective layer (plastic fleece, at least 300 g / m²) is required in accordance with the flat-roof directive. When laying new Polyfin® / O.C.-Plan® roof waterproofing under load, a fire protection layer between insulation and roofing membranes can be dispensed with, provided that the ballast is suitable for producing the "resistance to flying sparks and radiant heat"



Immediately after installation, appropriate loads must be applied for wind suction protection! The use of a protective layer between the roofing membranes and the ballast is carried out in accordance with the flat-roof directive (see chapter 7.2 "Protective layers"). The surcharge is based on the requirements of the flat roof directive or DIN 1991-1-4: 2005 / NA: 2010-12 (wind loads).

5.3 Mechanically fastened

5.3.1 Installation with mechanical fastening

Only fastening systems (self-drilling screws, wood screws or dowel systems with the corresponding load distribution plates) with European Technical Approval (ETA) must be used. The systems must be corrosion-protected, possibly corrosion-resistant, made of non-ferrous metals or of age, shape and temperature-resistant plastic.

- Mechanical fixing in the roof level: The number of fasteners should be at least 2 pcs./m² regardless of the calculated number. During the execution it must be ensured that the distance of at least 10 mm (see picture) between the load distribution plate and the edge of the sheet is maintained.
- Mechanical fastening before flashings, at the edge of the roof as well as in throat areas can be carried out with single roof fasteners, metal straps, rails or composite sheet brackets and should be connected to the substructure with at least 4 fasteners per meter, regardless of the calculated number of fasteners.

Only those screws in question, which can not unscrew due to proper movements or vibrations. The pull-out strength of the fasteners from the support structure must be at least 0.4 KN per fastener element. When renovating heat-insulated roof structures, use only corrosion-resistant stainless steel fasteners in accordance with the flat roof directive.

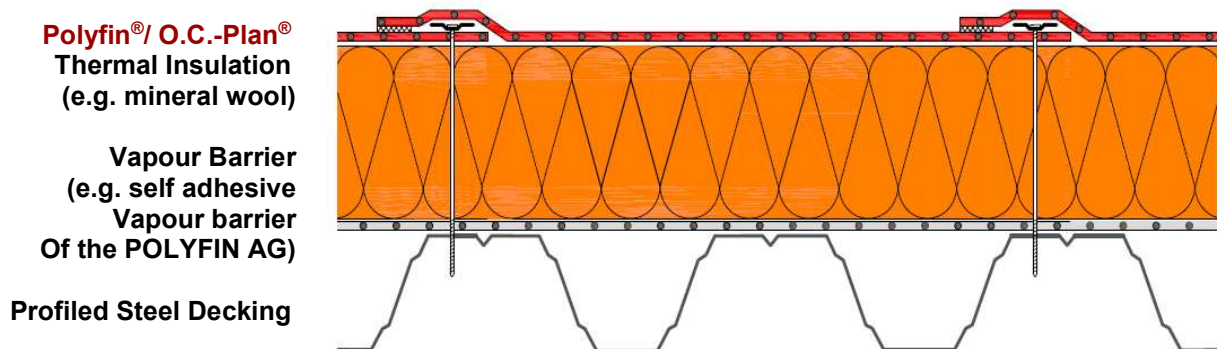
5.3.2 Installation, general

In the case of steel trapezoidal profiles and timber boarding, the roofing membranes are usually laid transversely to the upper corrugations or board joints. In order to accommodate the calculated number of fasteners in the corner and edge area, there is the possibility to work with narrower web widths or to set additional fasteners in the middle of the web and to over-weld them with a strip. The web cover consists of: fastener width, width of the weld and 1 cm safety clearance on both sides of the fastener (see example sketch in chapter 4.3.5).

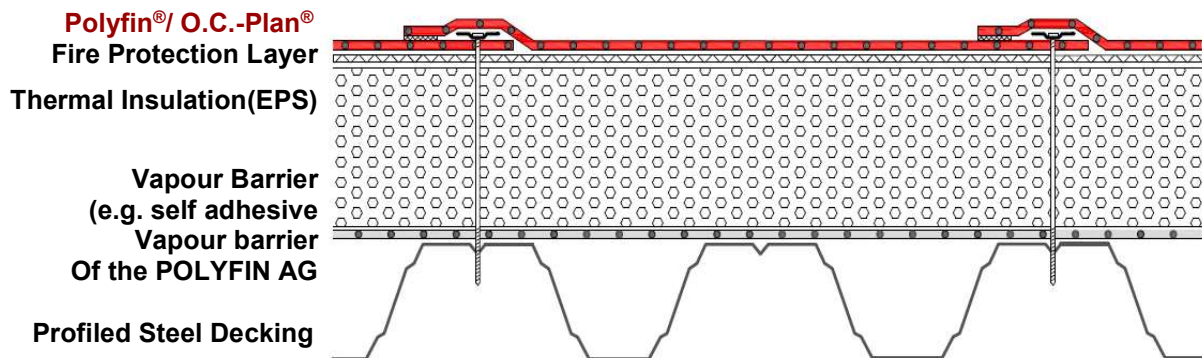
We recommend to use narrower membrane widths in corner and edge areas, as the variant with additional fasteners in the middle of the membrane is associated with increased effort (possibly cleaning work, additional strip material, additional welding seam)

5.3.3 (Industrial) Light Roof

In the laying method with mechanical fastening, all layers of the roof structure are anchored in the supporting structure in a force-fitting manner. The insulation boards must be mechanically fastened according to the manufacturer's instructions. For steel trapezoidal profiles, the insulation boards are to be arranged transversely to the upper belts, as well as the roofing membranes. The minimum thickness of the insulation boards is to be measured according to the flat roof directive so that no penetration into the deep bead occurs. The compressive strength of the thermal insulation must be sufficient and permanently ensured for the mechanical fastening system.



For the type of laying with mechanical fastening of the Polyfin® / O.C.-Plan® roofing membranes to EPS insulation, a fire protection layer (glass fleece 120 g / m² A2) must be arranged between the roofing membranes and the insulation.



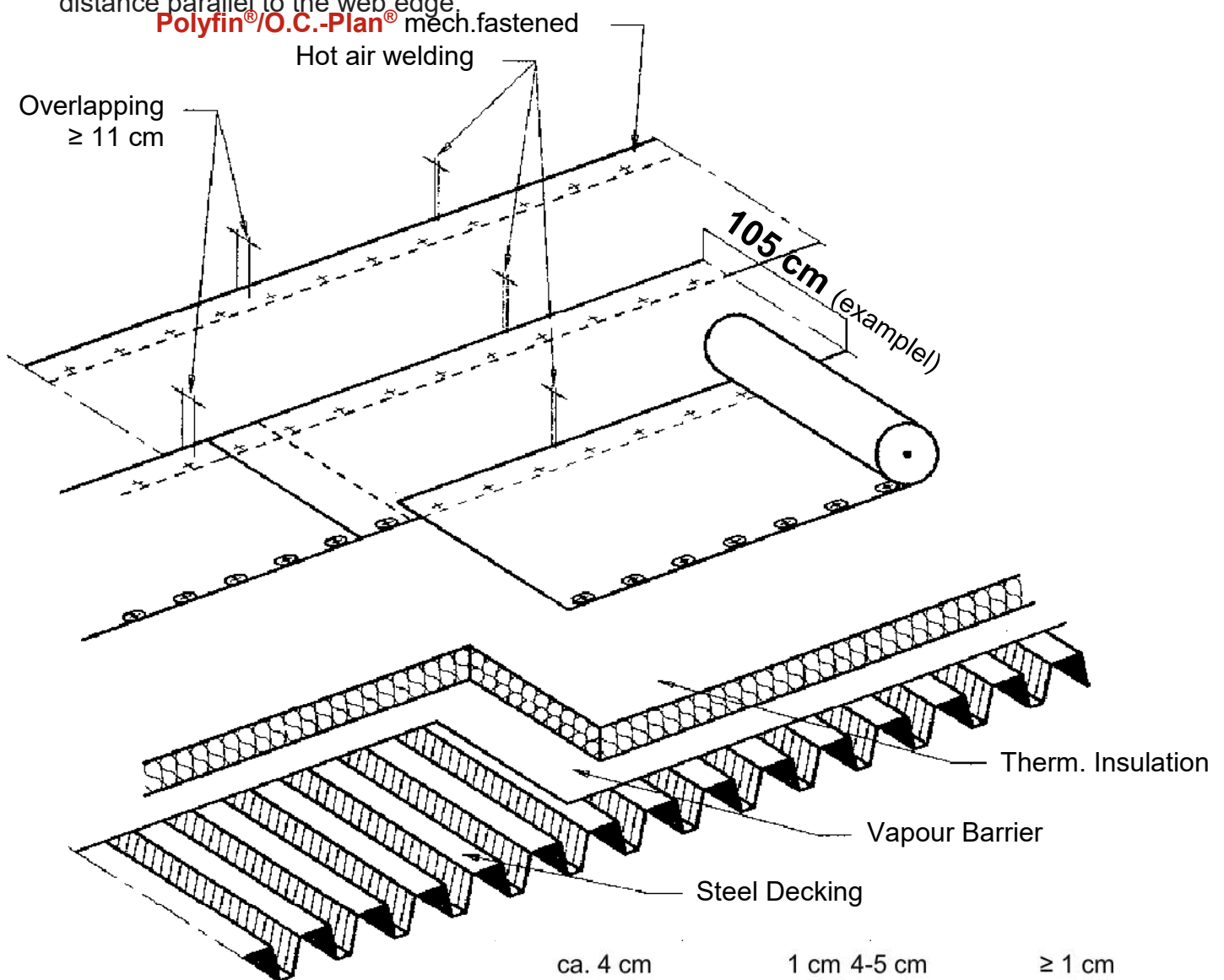
The distances and the number of mechanical fasteners are based on the specifications of the flat roof directive or DIN 1991-1-4: 2005 / NA: 2010-12 (Wind loads). In the case of small-sized insulation boards, attention must be paid to a positional safety according to the flat-roof directive.

The "hard roofing" (Broof (t1)) has been proven for tested roof structures. If you have any questions, please contact the application engineering department of POLYFIN AG.

Installation

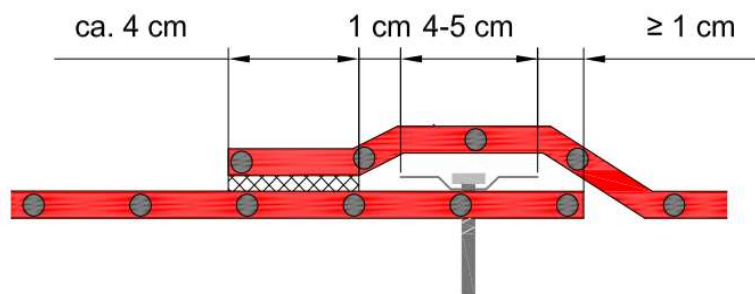
5.3.4 Asymmetric Fastening System

The fastenings are made at the edge of the membrane. The fasteners are to be set at the same distance parallel to the web edge.



The seam coverage is composed of:

≥ 1 cm edge distance, 4-5 * cm width of the fastener, ≥ 1 cm safety distance and approx. 4 cm seam welding.

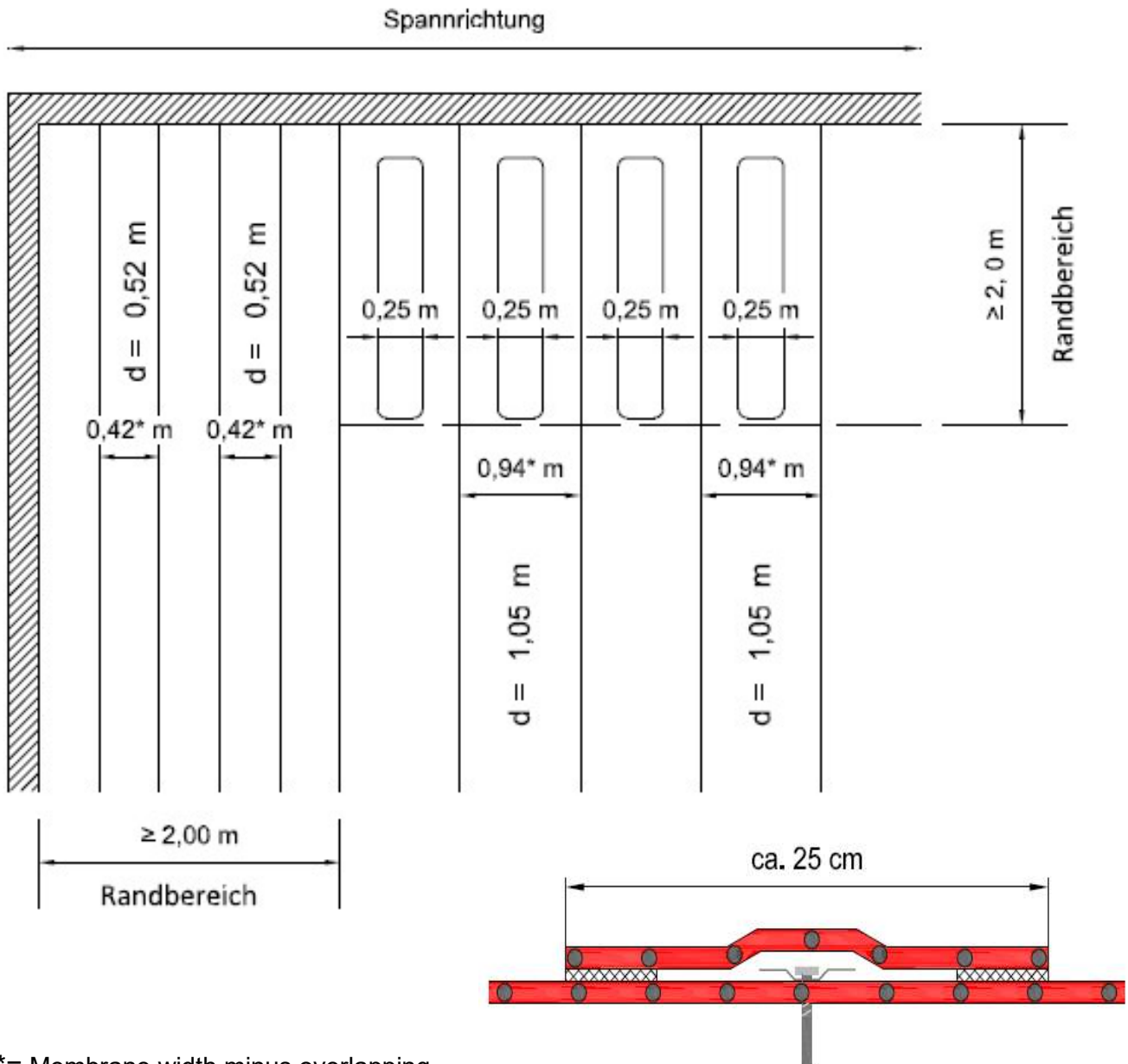


* For 5 cm wide plastic plates we recommend to increase the overlap to 12 cm -13 cm.

Installation

5.3.5 Symmetric Fastening System

This system is also used in lightweight roof constructions, especially in the formation of the perimeter and corner areas. In this case, the fasteners are arranged as specified in the middle of the membrane and overlaid with Polyfin® 3015-3025- / O.C.-Plan® 3020 strip material (≥ 25 cm wide) (see example below).



*= Membrane width minus overlapping

5.4 Bonded installation

5.4.1 Bonding general

Bonded laying can then take place if loose laying with ballast or laying with mechanical fastening is not economically or technically possible. When gluing, all layers in the roof layer structure are usually glued together. Hot bitumen and polyurethane adhesives can be used as adhesives for roofing and waterproofing membranes. The processing instructions of the adhesive manufacturer are to be observed.

The amount of adhesive must be calculated according to the specifications of POLYFIN AG. For bonding to the prepared substrate, Polyfin® / O.C. Plan® sheets with fleece backing on the underside must be used. The fleece lamination must be dry.

The lanes must be overlapped by at least 5 cm. Since the webs are welded by means of hot air, the area in which the seam takes place must be free of bitumen.

For refurbishments, bonding is only permissible if the old roof structure is glued securely in place. With regard to the permissible processing temperatures of the adhesives, the processing instructions of the manufacturers must be observed.

5.4.2 Strip-wise bonding with PU-adhesive

Polyurethane adhesives must be low in solvents and suitable for roof waterproofing. The adhesive is applied in strips to the substrate or the insulation boards. The specifications of the adhesive manufacturer apply (adhesive quantities according to POLYFIN AG, see table below). Chapter 3 should be observed with regard to the substrate. **In the case of strips of adhesive, the adhesive must only be applied in strips parallel and not in serpentine lines.**

Roof areas	Number of parallel stripes	Adhesive quantity per stripe	Total adhesive quantity
Internal (I)	4 stripes/m	40 g/m	Wind load calculation of the Polyfin AG
Int. perimeter (H)	5 stripes/m ²	40 g/m	Wind load calculation of the Polyfin AG
Ext. perimeter (G)	6 stripes/m ²	40 g/m	Wind load calculation of the Polyfin AG
Corner (F)	8 stripes/m ²	40 g/m	Wind load calculation of the Polyfin AG

Fleece-backed Polyfin® / O.C.-Plan® roofing membranes are rolled into the viscous adhesive and pressed on. The technical information provided by the adhesive manufacturer must be observed. Only the surface should be prepared for gluing, which is also within the

Installation

the reaction period can be sealed. Depending on the weather and adhesive, a position correction is only possible within 10-20 minutes.

Bonding with sprayable PU roofing membrane adhesives

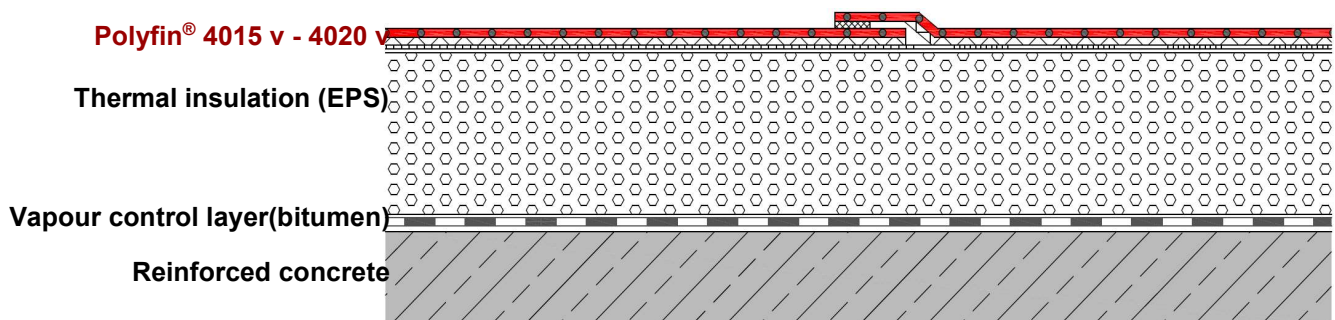
Fleece-backed Polyfin roofing membranes can also be glued to the entire surface with suitable, sprayable roofing membrane adhesives. For example with the Soudatherm Roof 360 M adhesive from Soudal or comparable.

Benefits:

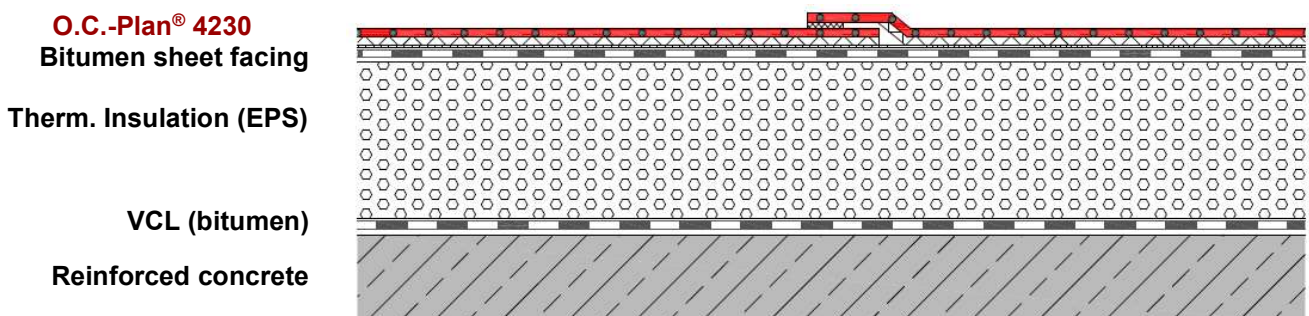
- Even, practically full-surface adhesive distribution possible without adhesive accumulation
- Low consumption
- Very fast curing compared to liquid PU adhesives
- Compared to partial gluing, there is no division of the roof area

The roofing membrane needs to be mechanically fastened in the load-bearing substructure at the edge of the roof as well as at connections and connections. In order to prevent the adhesive cords from being marked (in the case of adhesive applied in strips), the bonded sheets must be unrolled with a closed roller or a suitable weight. When glued with PUR adhesive, colored FPO sheets can cause slight discolouration on the surface. However, these have no influence on the function or the expected service life of the waterproofing membrane.

The fleece-backed FPO roofing membranes of the v-series (Polyfin 4015 v - 4020 v) can be glued directly onto unclad polystyrene insulation (EPS insulation) with PUR adhesive.



The fleece-backed ECB roofing membranes are glued on bitumen sheet-faced EPS insulation and on other tested structures with PUR glue.



Installation

Remark:

Since PUR adhesives have a low initial adhesion, the bonded roofing membranes must first be secured against wind suction by means of a load. Slight increases in the area of the adhesive strips are possible.

The "external fire performance" has been proven for tested roof structures. If you have any questions, please contact the Technical Department of the POLYFIN AG.



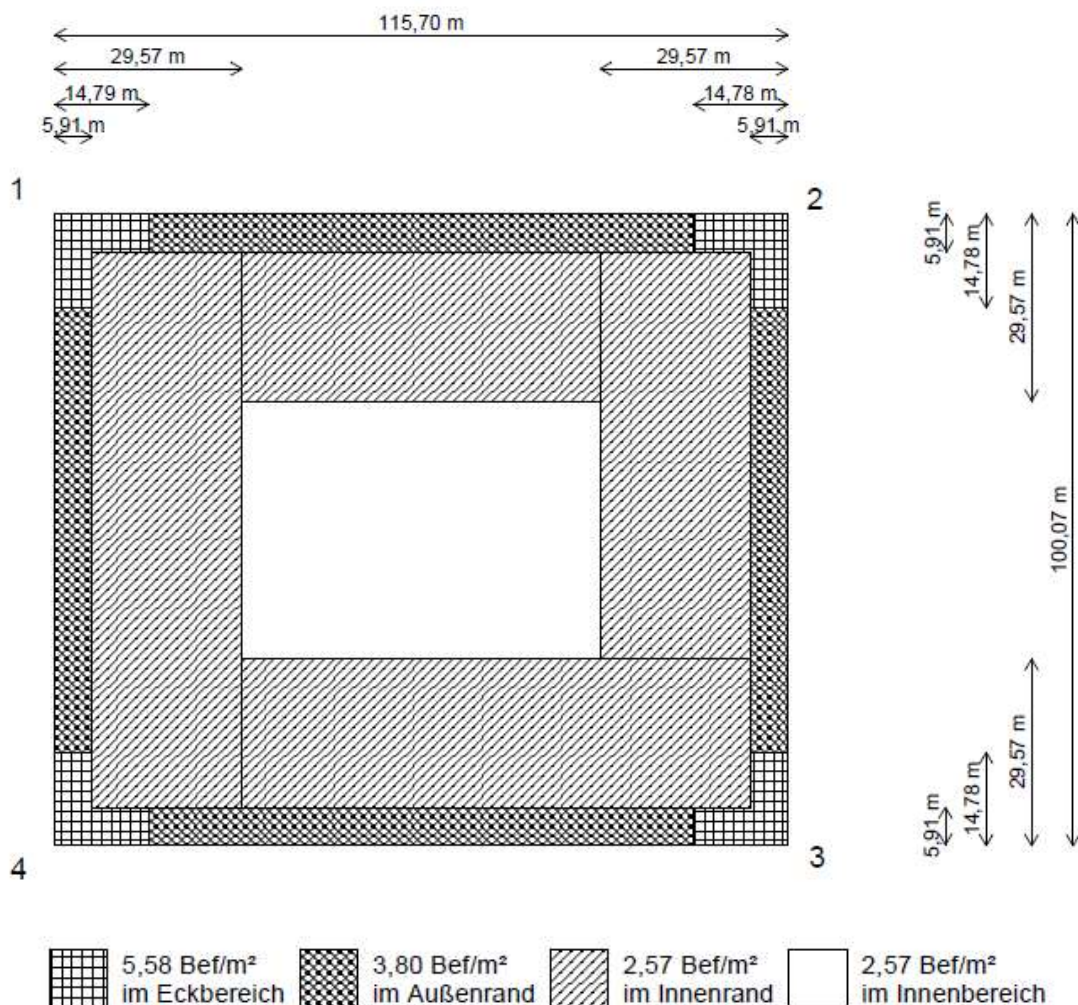
Application example: Full-surface adhesive application of a sprayable PU roofing membrane adhesive.

Installation

5.5 Calculation of the wind loads

The wind suction loads are determined using the latest edition of DIN EN 1991-1-4: 2005. When calculating the number of fasteners, a distinction is made between the inner, inner edge, outer edge and corner area. POLYFIN AG offers the service to determine the number of fastenings individually for each object as individual verification according to DIN 1991-1-4: 2005 / NA: 2010-12. This can result in cost advantages. In the case of renovation, extract values are to be determined as the basis for a calculation.

Sample calculation for a rectangular building



Remark:

Installation instructions included. Be sure to note!

6. Flashings in General

Connections to surface membrane are made with sheets or strips of Polyfin® 3015-3025 / Polyfin Duo® 3015 - 3020 / O.C.-Plan® 3020. Suitable measures for absorbing horizontal forces must be taken in particular at connections and end connections as well as roof penetrations in accordance with DIN 18531. For this purpose, the surface sealing must be non-positively attached to the substrate with individual brackets (at least 4 pieces / running meter), rails or laminated sheet metal angles (mechanically fastened every 25 cm). In the case of fillets on rising components and changes of direction over 3 ° from the horizontal, the roofing membranes must be mechanically fastened every 25 cm (4 pieces / meter).

In the case of statically separated components, a rigid connection with the surface seal must be avoided in any case. Overloading in the connection area due to tensile, shear or shear forces must be prevented by constructive measures. Connections and terminations are to be made windproof.

Connections and terminations must be designed so that no water can run behind. When making connections, seams directed against the direction of the water flow cannot be avoided. This is not a disadvantage for hot air welding.

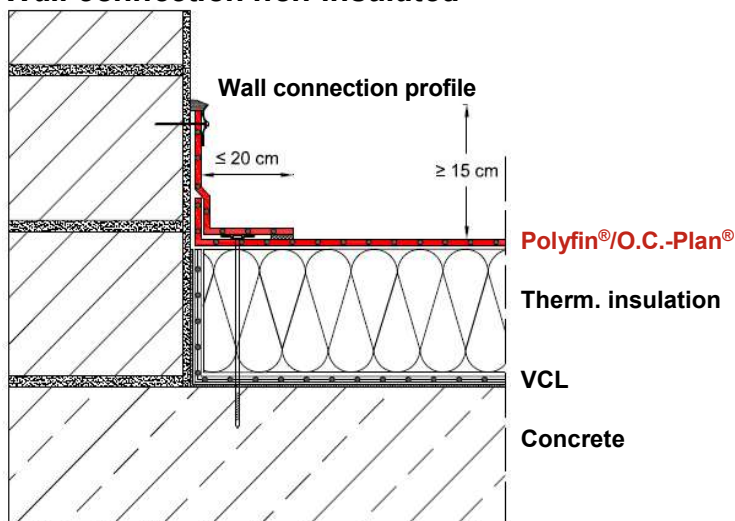
The connection strips are to be welded onto the surface sealing a maximum of 20 cm from the throat. The connection strips can be laid loosely or glued over the entire surface with the POLYFIN contact adhesive W.

Wall connection profiles / clamping profiles are dimensioned and fastened depending on their function. The fastening distance should not be more than 20 cm. Their individual length should not exceed 2.50 m. If the upper edge of the clamping profile is not protected against weathering by an overhang strip or the wall cladding, it must be designed by folding so that a sealant chamfer of at least 10 mm width and 6 mm thickness can be introduced, or an additional seal can be provided by pre-compressed tapes becomes. Sealant chamfers must be serviced regularly.

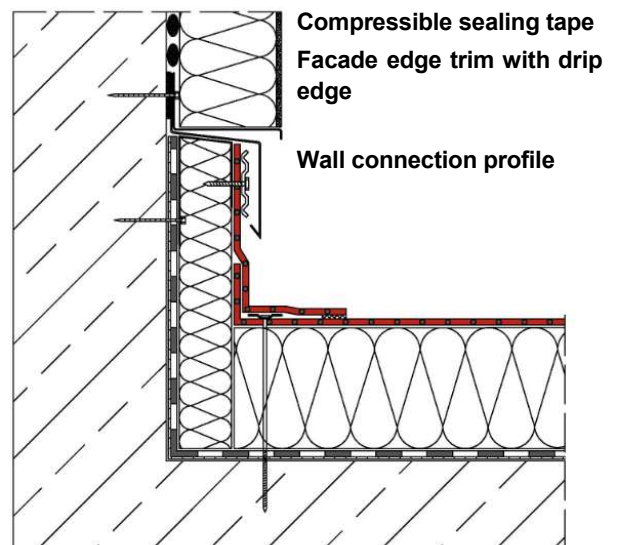
6.1 Wall connection (without movement joint)

The Polyfin® 3015-3020- / O.C.-Plan® 3020 sealing must be mechanically attached to the roof edge in the valleys. The Polyfin® 3015-3025- / O.C.-Plan® 3020 connection strip is loosely raised on the rising component and mechanically fastened using a wall connection rail. According to the flat roof guideline, the connection height should be at least 15 cm above the surface of the waterproofing or ballast (e.g. gravel fill). The connecting strip is then guided onto the roof surface and the existing fillet fastening (fastening element, rail or composite sheet metal bracket) is professionally covered. The connecting strip is welded onto the surface sealing a maximum of 20 cm from the valley.

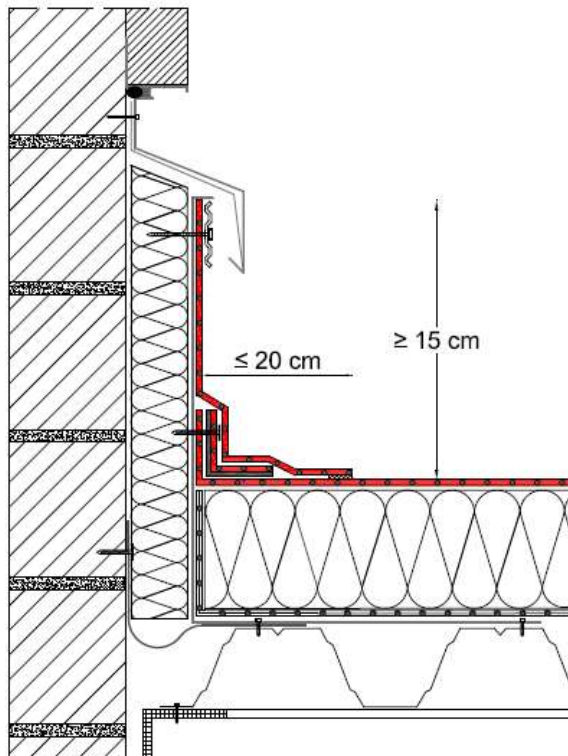
Wall connection non-insulated



Wall connection, thermally insulated



6.2 Wall connection with movement joint



In contrast to the rigid connection, the Polyfin® 3015-3025 / Polyfin Duo® 3015 - 3020 / OC-Plan® 3020 connection strip is not mechanically attached to the rising component, but to an auxiliary structure, a galvanized angle plate or the like. The connecting strip is welded onto the surface sealing a maximum of 20 cm from the valley.

Polyfin®/O.C.-Plan®

Therm. insulation

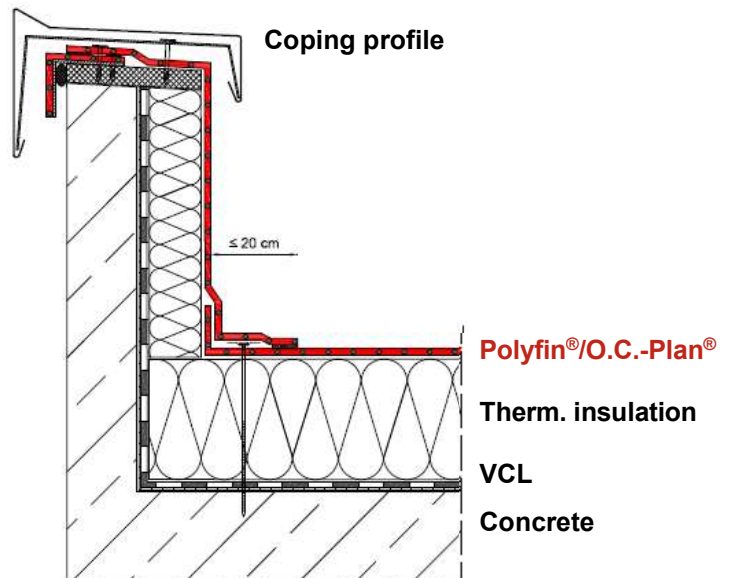
VCL (e.g. BLD SK)

Steel decking

6.3 Parapet flashing

The installation is carried out in the same way as for the wall connection. However, here the Polyfin® 3015-3025- / Polyfin Duo® 3015 - 3020 / O.C.-Plan® 3020 strip material is mechanically attached to the top of the parapet and loosely guided onto the roof surface in accordance with the profile.

A wall coping profile must then be properly installed on the top of the parapet. The connecting strip is to be connected windtight on the wall crown (e.g. with a laminated sheet metal bracket and pre-compressed sealing tape) (see sketch 1).



Sketch 1

Polyfin®/O.C.-Plan®

Therm. insulation

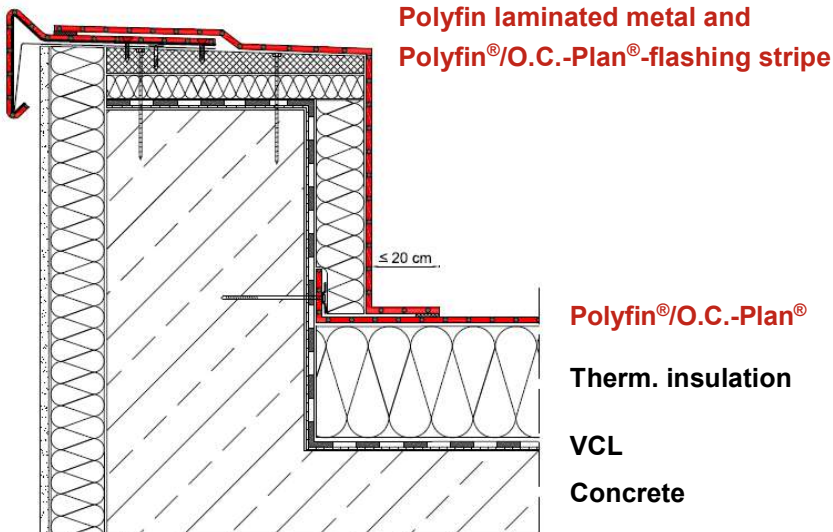
VCL

Concrete

Flashings

The parapet can also be flashed with a multi-folded laminated metal sheet with an outer panel and drip edge (see sketch 2).

The parapet cover must have a slope of at least 2% inwards

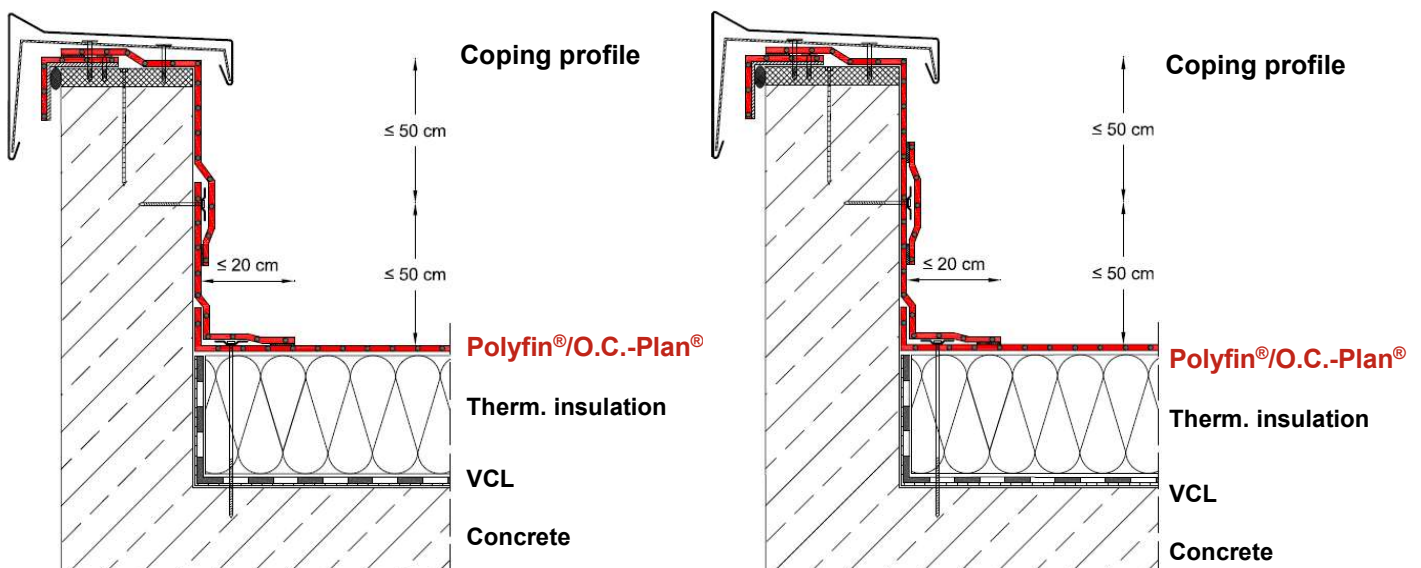


Sketch 2

6.4 High parapet flashing

In case of parapet heights over 50 cm, the vertical waterproofing membrane must be glued over the entire surface and mechanically secured against slipping in the upper area *or* mechanically inter-attached. The intermediate attachment can be executed e.g. with a wall connection rail as a two-part concealed connection (see sketch on the left), with a concealed laminated sheet metal strip to which the roofing membrane is welded, or individual roof membrane fasteners (4 pieces / linear meter). The one-piece version with a Polyfin® / O.C.-Plan® strip is also permissible (see sketch on the right).

The connection strip is to be connected windtight on the wall crown (e.g. with a composite sheet bracket and pre-compressed sealing tape).



6.5 Parapet flashing with movement joint

The installation is the same as for the movable wall connection. A wall covering profile must be properly installed on the attic crown. The connecting strip is welded onto the surface sealing a maximum of 20 cm from the valley.

6.6 Parapet flashing with movement joint behind façade cladding

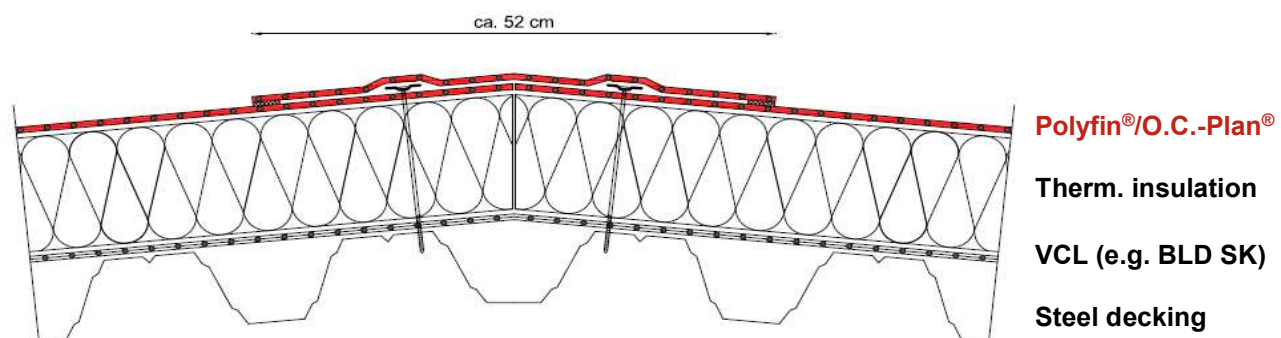
In the case of higher parapets, the wall cladding or a bent Z-profile covers the movable connection. The wall cladding must be designed in such a way that rainwater does not run behind. The connecting strip is welded onto the surface sealing a maximum of 20 cm from the valley.

6.7 Verge and roof edge flashing

A professional edge seal is required at the verge / roof edge. Multi-part, commercially available profiles and folded profiles made of POLYFIN laminated metal sheet are suitable for this, to which the roofing and waterproofing membrane can be professionally connected. For this purpose, the surface seal must be led to the outer edge of the roof and mechanically fastened properly. The additional connection strip is fastened in the roof edge profile, led onto the roof surface and professionally welded onto the surface sealing. In the case of folded roof edge profiles made of laminated sheet metal, the fastening distance of the screws should not be more than 20 cm. The screws are to be arranged offset to each other..

6.8 Ridge

In the ridge area, we recommend bringing the sealing membranes on both sides and fastening it mechanically in line in the supporting structure every 25 cm. Then a Polyfin® 3015-3025- / O.C.-Plan® 3020 strip, approx. 52 cm wide, is arranged to cover the rows of fasteners and welded on both sides (see sketch). In the case of surfaces with a slope of more than 3 °, the Polyfin® / O.C.-Plan® roof membrane must be pulled over the ridge and mechanically fastened to the head side.



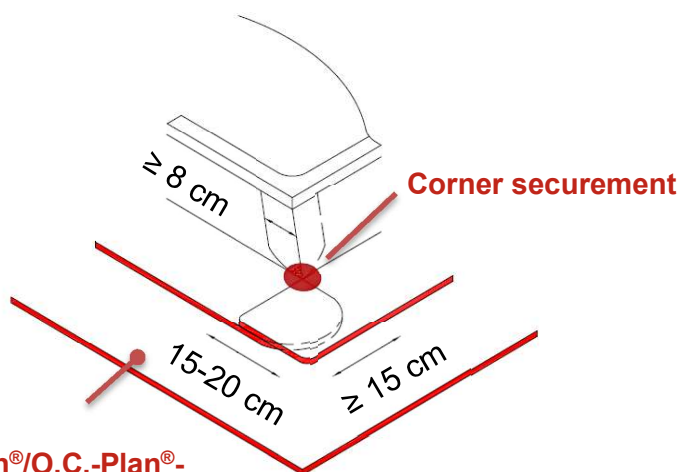
6.9 Flashings to dome lights and linear roof lights

The Polyfin®- / O.C.-Plan® roofing membranes are brought up to the curb and professionally fastened in the throat.

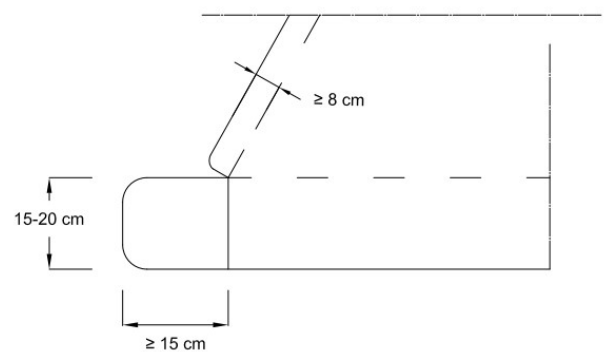
The Polyfin® 3015-3025- / O.C.-Plan® 3020 connection strip is mechanically attached to the curb with wall connection rails. The connecting strip is laid loosely, molded onto the upstand and led onto the horizontal roof surface. He must professionally cover the existing edge fastening. The connection strip is fixed at the corners for installation.

The connection strip can also be glued to the substrate with the POLYFIN contact adhesive W. The connection path is welded at a distance of max. 20 cm from the vertical upstand of the curb. The intersection at the corner between the roof surface and the upstand is to be secured with corner molded parts or corner fuses (homogeneous material Polyfin® 1020 / O.C.-Plan® 1020) from our system accessories program (see sketch on the right, page 37).

The size of the corner protection depends on the local conditions. The attachment around the dome light should take place directly in the valley. Special fastening screws may have to be used.

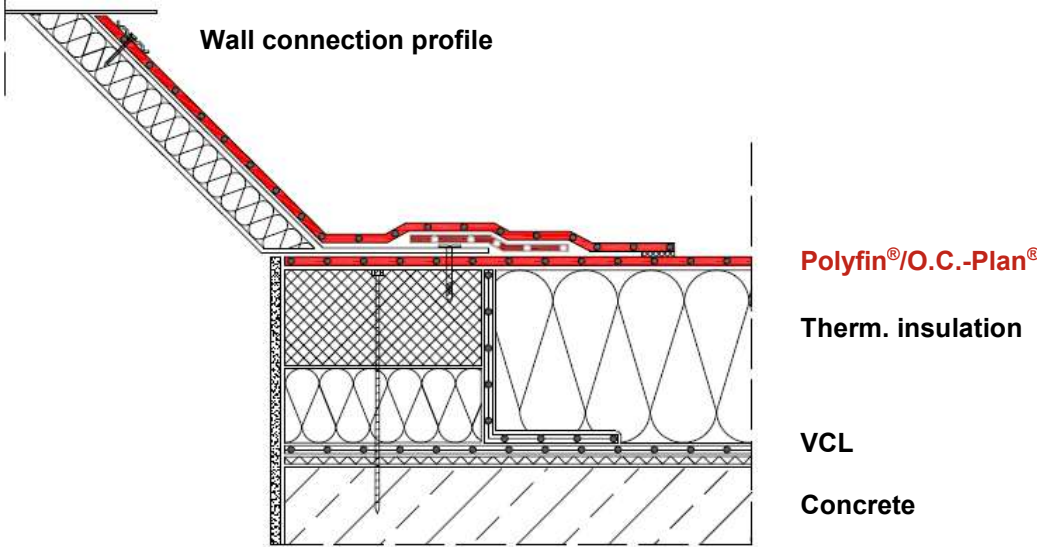


**Polyfin®/O.C.-Plan®-
sealing**

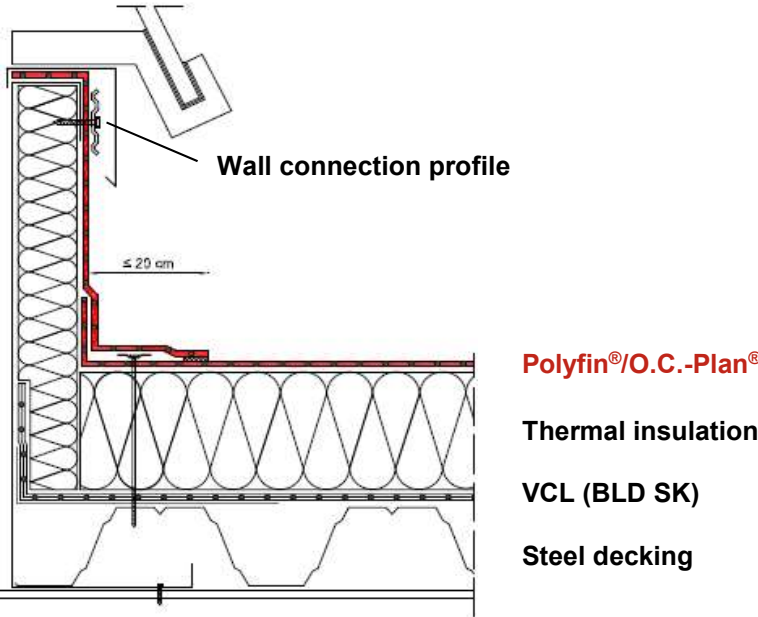


Flashings

Dome light flashing



Linear roof light flashing



Flashings

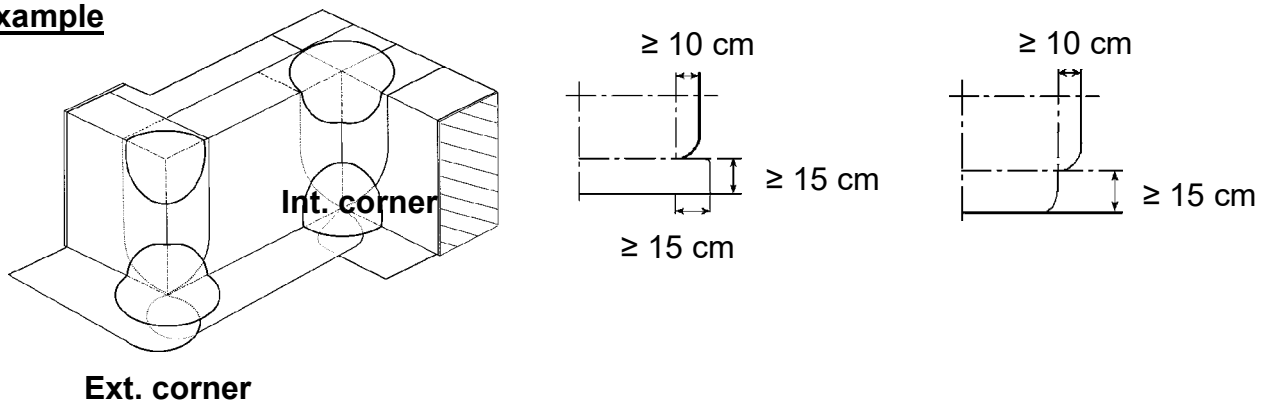
6.10 Internal and external corners

In corner areas, Polyfin® 3015-3025 / O.C.-Plan® 3020 is led around the corner and welded. The protection can be done with molded parts or with round corner securement patches made of homogeneous material Polyfin® 1020 / O.C.-Plan® 1020. The size of the corner securement depends on the detailed training.

Formation of the inside corners using the "pinch fold method" is not permitted.

Outside corners can also be used for square or rectangular roof penetrations.

Example



6.11 Flashing to drainage systems

a) Internal drainage

For safe connection to internal drainage systems, gullies with a factory-made connection flange made of Polyfin® / O.C.-Plan® 4230 (fleece-lined on the underside) should preferably be used (see sketch 1).

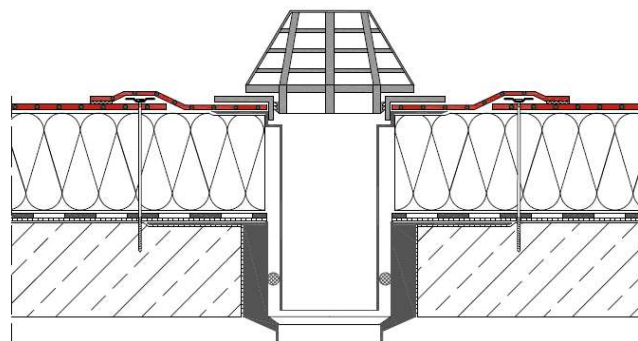
The Polyfin® - / O.C.-Plan® connection flange must be mechanically fixed with at least 4 individual fasteners.)

Polyfin®/O.C.-Plan®

Therm. insulation

VCL

Concrete

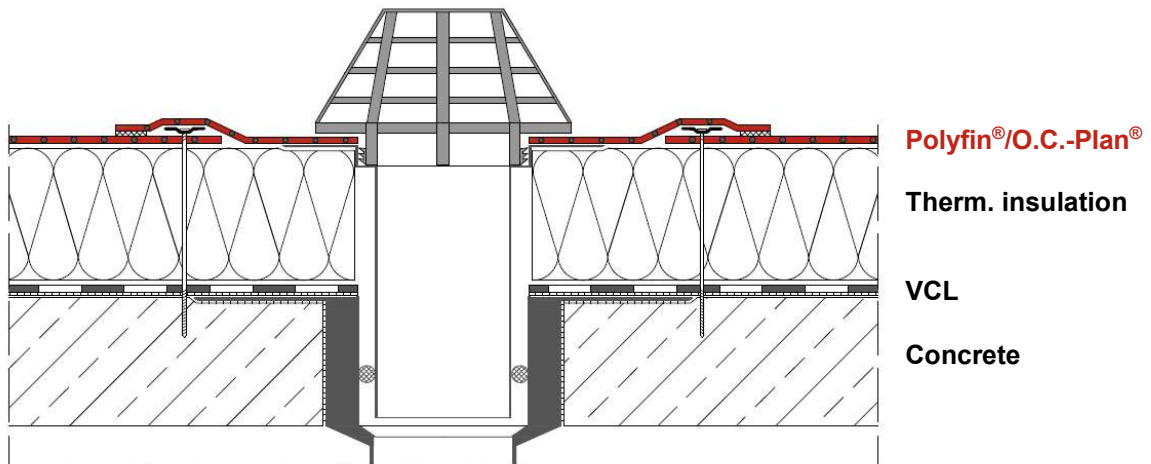


Sketch 1

Flashings

The polyfin® 3015-3025- / O.C.-Plan® 3020 connection flanges can be flanged directly into clamping flange gullies with sealing gaskets. Allowances are to be used according to the manufacturer's specifications of the gully manufacturer.

The Polyfin®- / O.C.-Plan® roof waterproofing membrane is to be mechanically fixed with at least 4 single fasteners:

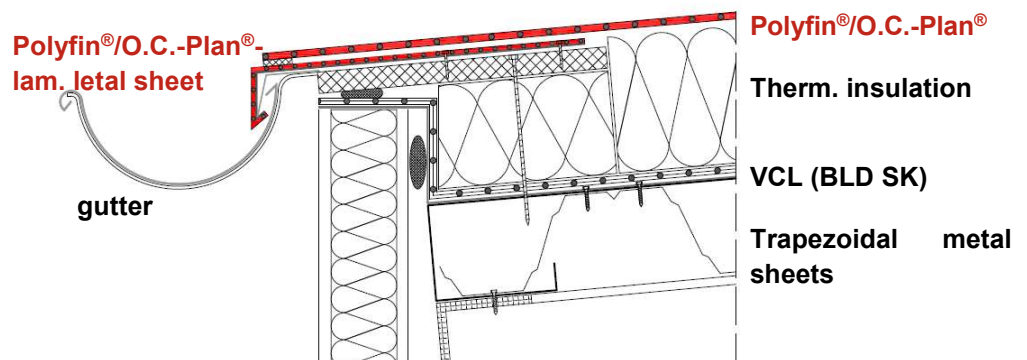


Sketch 2

The gully pot or the extension unit must be mechanically fastened in the substructure. Gullies are to be arranged in accordance with the relevant guidelines with a minimum distance of 30 cm (from the outer edge of the flange) of rising components. Components separated by a joint must be drained independently of one another. In the case of thermally insulated roof structures, the roof gullies must be embedded in the thermal insulation to ensure unimpeded water drainage. Appropriate molded parts are available in our system accessories program for renovation purposes.

b) External drainage

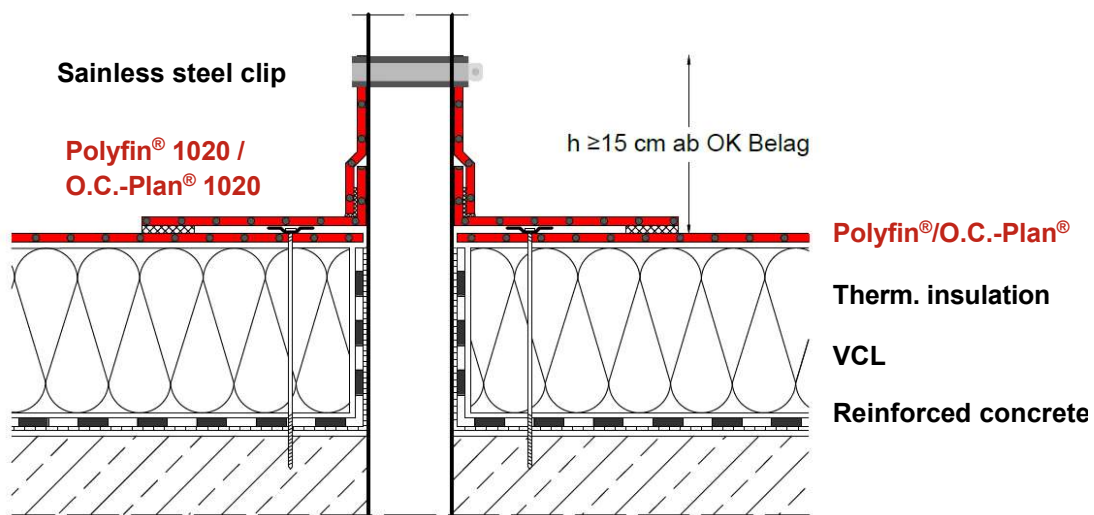
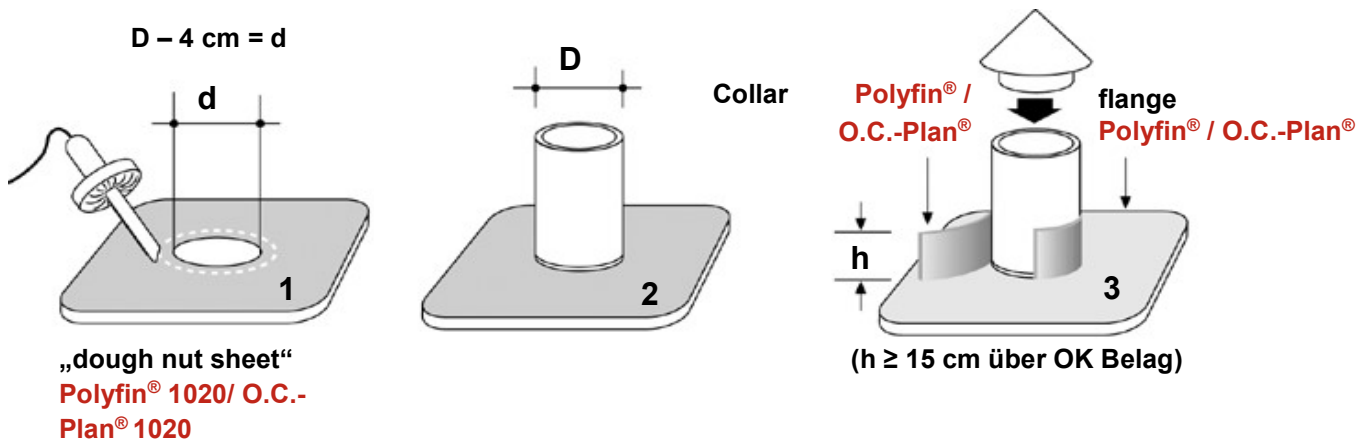
The drip edge metal sheet (Polyfin®- / O.C.-Plan® laminated metal sheet) must be mechanically fastened with screws to the eaves plank (every 15 cm offset). Depending on the processing, stiffening plates may be required. The individual laminated metal sheets are to be fastened in joint areas with a distance of approx. 5 mm. The joint areas are to be covered with stretch strips (approx. 15 cm wide) made of Polyfin® 1020 / O.C.-Plan® 1020. The surface sealing can be welded directly onto the Polyfin® / O.C.-Plan® metal sheet.



6.12 Flashings to penetrations

Pipe penetrations can be sealed with molded parts from our system accessories program or a flange approx. 50 x 50 cm and a sleeve made of Polyfin® 1020 / O.C.-Plan® 1020.

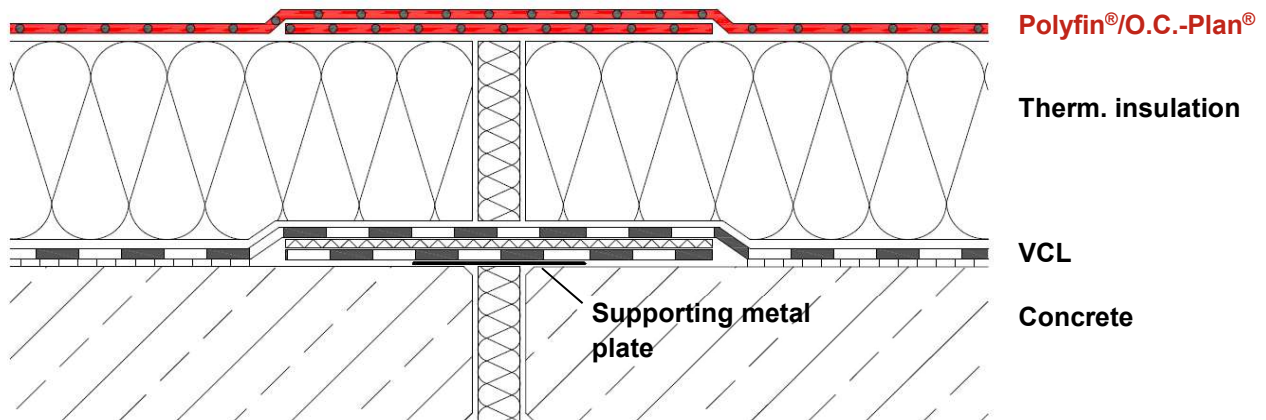
A hole is cut out in the middle of the flange. The diameter of the cut-out results from the pipe diameter minus approx. 4 cm. With the hand welder, the area around the cutout is heated so that the heating on the top and bottom is the same [1]. The cutout is expanded to the required size and pulled over the pipe. If this is not possible on the pipe itself, it can be prefabricated on a pipe of the same diameter. By choosing the smaller diameter for the cutout, a collar is obtained around the tube [2]. The sleeve is now molded onto the pipe and welded to the collar in a material-homogeneous manner [3]. The flange is aligned on the surface seal and welded on properly. Above the water level, the cuff is e.g. pressed onto the pipe with a stainless steel strap (see sketch below). Rectangular roof penetrations such as chimneys, roof hatches, fans, etc. are carried out in the same way as wall connections.



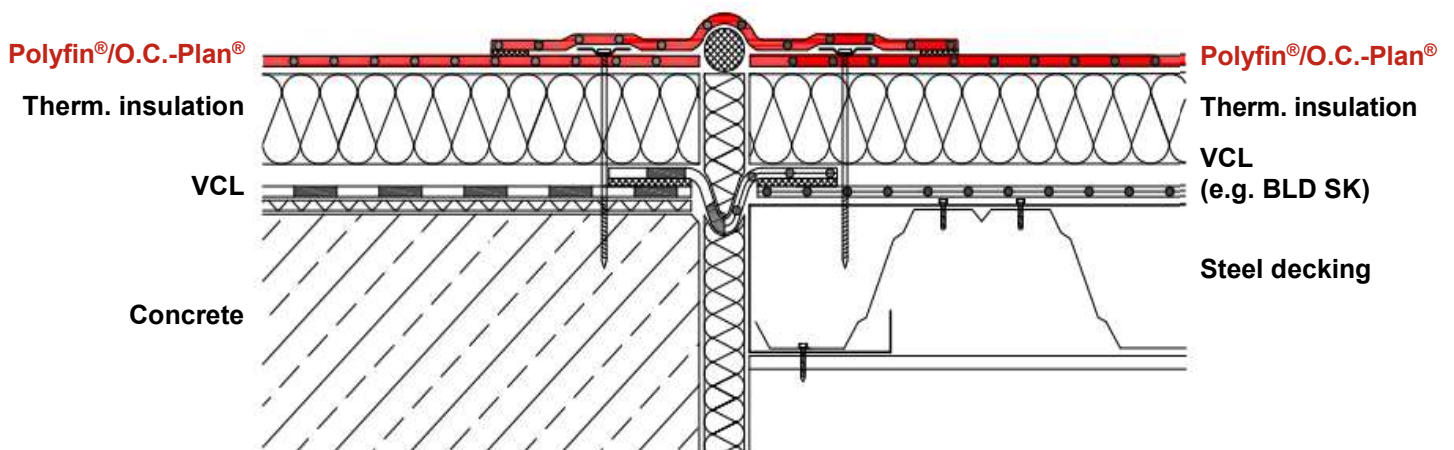
The Polyfin®- / O.C.-Plan® roof waterproofing membrane must be mechanically fastened in front of every roof penetration.

6.13 Building joints and expansion joints

Joints in the construction of the building must also be formed as joints in the layered structure above. The type of training depends on the movements to be expected. Structural and expansion joints type 2 can be designed as high points according to the flat roof guideline. They must not lead through roof openings and must not pass such points closer than 50 cm.



Example joint type 1 (acc. to DIN 18531)



Example joint type 2 (acc. to DIN 18531)

Depending on the component movement, it may be necessary to work with upstands and auxiliary structures.

7. Separation layers – protective layers – fire protection layers

Separation layers

Our roofing and waterproofing membranes are free of plasticizers and require contact with other materials such as B. Bitumen and polystyrene basically no separating layers. However, if, for example, "old roofs" are renovated, e.g. a separating layer may be useful in order to reliably prevent chemical reactions with an old waterproofing that is being renovated. Depending on the requirements of the general building inspection test certificate ("Fire-ABP") to be applied, the separating layer may also be required as a fire protection layer at the same time. When refurbishing old bitumen roofs, the separating layer (to prevent material discolouration of the new waterproofing) can also act as a protective layer.

Fire protection layers

Fire protection layers may be required to prove the "hard roofing" the fire protection layers (the requirements of the applicable general building inspection test certificates must be taken into account). For example, in certain structures it may be necessary to arrange a 120 g / m² A2 glass fleece between the insulation material and the waterproofing.

Wood preservatives must not have a detrimental effect on the roof structure. As separating layers are z. B. raw glass fleece, plastic fleece, PE film etc.

Protective layers

Possibly it may be necessary to arrange a protective layer above and / or below the roof waterproofing.

A protective layer is typically arranged below a seal if the substrate is relatively rough or if roughness can be expected. Typically this is e.g. this is the case for concrete or wooden formwork substrates. Suitable protective layers are e.g. Plastic fiber fleece with a basis weight of 300 g / m². If fleece-backed Polyfin or O.C. sheet is laid, the nonwoven fleece on the underside takes on the function of the protective layer.

Protective layers above the waterproofing may be necessary if the roof area e.g. is being used. Even if e.g. If chillers are placed on the sealing, protective layers must be arranged. This can also be 300 g / m² plastic fiber fleece.

Make sure that the separating layers are drill-proof.

7.1 Heat protection

Bei Verlegung von Polyfin®/O.C.-Plan® als Bautenabdichtung unter Heißasphalt (z. B. bei Straßen- und Brückenabdichtung) ist mit der Anwendungstechnik der POLYFIN AG Rücksprache zu halten.

7.2 Protective layers

In the case of rough, sharp-edged substrates, a protective layer must be laid to protect the roof waterproofing. A protective layer may also be required when renovating bituminous surfaces (possibly not with Polyfin® 4015 v - 4020 v /O.C.-Plan® 4230). For this, z. B. polyester fleece. For single-layer seals, the placement of a protective layer is recommended. For punctiform loads or loads that could damage the roofing and waterproofing membrane, e.g. B. in the pneumatic application of gravel and used roofs, the arrangement of a protective layer is required. For this, z. B. plastic fleeces (according to the flat roof guideline 300 g / m²) can be used.

7.3 Sheet of drift

When applying concrete directly to the waterproofing, acc. German guidelines and standards 2 layers of PE film (2 x 0.25 mm) to be used. Before using other separating layers, please consult the application technology of POLYFIN AG.

7.4 Corrosion protection in case of O.C.-plan roofing membranes

Due to intensive UV radiation and weather-related moisture z. For example, metals or dew, organic substances deposited on the surface in conjunction with bituminous building materials can lower the pH value of the water and accelerate the corrosion of metal materials (such as zinc, aluminum, lead, iron and copper) in unfavorable conditions. We therefore recommend using gutters and downpipes made of plastic or stainless steel or plastic-coated gutters and downpipes in conjunction with O.C. plan roofing and waterproofing membranes (ethylene-copolymer bitumen ECB roofing membranes). Otherwise, suitable protective coats should be applied professionally to all metal parts, as prescribed in the flat roof guideline and the technical rules for metalwork in the roofing trade. Protective coats are care coats and may require frequent maintenance and refurbishments.

7.5 Safety and health

The general accident prevention regulations of the professional associations in the currently valid version must be observed. Sufficient ventilation must be provided in closed rooms when welding the sheets.

7.6 Hazard class

Polyfin®- / O.C.-Plan® roofing membranes are not hazardous substances and therefore free of labeling. The roofing membranes are environmentally compatible and can be classified as a non-water-endangering substance (no endangering of the ground water or animal life). Welding and burning do not produce dioxins, furans or corrosive gases.

Properties in relation to fire exposure

7.7 Material classification in relation to fire exposure

In most common roof structures, Polyfin® / OC-Plan® are in accordance with the requirements for “hard roofing” (resistance to flying sparks and radiant heat) in accordance with DIN 4102, Part 7 or in accordance with the European standard DIN V ENV 1187 in conjunction with DIN EN 13501, part 5 tested. As a building material, Polyfin® / O.C.-Plan® roofing membranes are classified in class E according to DIN EN 13501, part 1.

Test certificates can be requested from the application technology of POLYFIN AG!

7.8 Fire protection layers

The arrangement of a fire protection layer between the waterproofing membrane and the insulation or sub-construction may be necessary depending on the requirements of the applicable general building inspection test certificate. In weathered, mechanically fastened structures on polystyrene thermal insulation (EPS), a raw glass fleece 120 g / m², A2 (Polyfin 3016 - 3024, O.C. plan 3020) is suitable as a fire protection layer.

7.9 Storage

Polyfin®- / O.C.-Plan® roofing membranes must be stored dry on construction sites and outdoors, in their original packaging, on a flat, clean surface.

Polyfin® adhesives must be stored in accordance with the requirements of the respective safety data sheet.

7.10 Reflection radiation

Polyfin®, Polyfin Duo® and O.C.-Plan® are designed for the temperatures of + 80 ° C typically to be expected on flat roofs according to DIN 18531.

In front of glass facades or highly reflective built-in parts made of metal, in addition to direct sunlight, heat radiation partially reflecting on the sealing can cause temperatures of partially arise well above 100 ° C. Such temperature effects can damage the roofing membranes.

Appropriate measures must be taken to prevent this. In the area in front of glass facades this can e.g. B. be a heavy surface protection of the roof waterproofing. Strongly reflective metal surfaces (e.g. ventilation ducts) can e.g. B. can also be provided with matt, dark paints.

If building protection mats are laid in front of glass facades, which are not immediately covered with slabs or gravel, heat reflection can occur between the building protection mats and the sealing. This can be avoided if the ballast is immediately applied over the entire surface of the building protection mats, or by using a separating layer made of e.g. 200 g / m² polyester fleece between the waterproofing and the building protection mats.

7.11 Application temperature

Polyfin®- / Polyfin Duo®- /O.C.-Plan® roofing membranes may only be used in weather conditions that can have a negative impact on the performance to be achieved if special measures prevent adverse effects. Such weather conditions are e.g. temperatures below +5 ° C, wet, snow and ice or strong wind. These measures are to be planned taking into account the circumstances at the time of execution depending on the materials to be used and are to be provided as a special service

.

8. Certifications and tests

Basically, aspects such as the CE mark according to the area of application, national requirements for the type of construction (such as fire protection) and, if applicable, claims regarding the effects of roof waterproofing products on the environment must be taken into account during planning.

The following text lists the properties of the individual products with regard to the different requirements.

Not all national certificates and the application of the respective products are described in these installation instructions. The focus here is on the requirements and certifications relevant in Germany.

8.1 CE mark

Single ply roofing membranes are subject to harmonized European standards and must therefore have a CE mark in accordance with DIN EN 13956 so that they can even be traded as roofing membranes within the European Union. EN 13967 applies to waterproofing membranes. Polyfin FPO-Bahn and O.C.-Plan ECB-Bahn are properly CE-certified in accordance with the uses described in these installation instructions.

ATTENTION: A CE mark alone does not entitle you to use a roof seal for certain types. I.d.R. there are additional national requirements for the type. In Germany these are e.g. DIN SPEC 20.000-201 (roof) and DIN SPEC 20.000-202 (waterproofing of buildings), as well as DIN 18531 ff. and requirements for the fire behavior of a roof layer package when exposed to fire from the outside and possibly also from the inside.

8.2 DIN SPEC 20.000-201 and DIN SPEC 20.000-202

The products described in these installation instructions correspond to DIN SPEC 20.000-201 (roof) and / or DIN SPEC 20.000-202.

In the respective technical data sheets there is a corresponding marking using the abbreviations prescribed by the standards.

8.3 DIN 18531 seq.

The single ply roofing membranes from POLYFIN AG are intended to be used within the scope of DIN 18531 ff.

In particular, please note: FPO membranes such as Polyfin are “K2-capable” from an effective material thickness of 1.5 mm.

8.4 CE certifications, monitoring and testing - overview-

- DIN EN 13956 (plastic waterproofing membranes for roofs)
- DIN SPEC 20.000-201 (plastic waterproofing membranes for roofs- Germany)
- DIN EN 13967 (Geomembranes)
- DIN SPEC 20.000-202 (Geomembranes -Germany)
- DIN EN 13501-1 (Fire classification of construction products)
- DIN EN 13501-5 (Fire classification of construction products – system build ups)
- DIN V ENV 1187 (fire tests for roof build ups – testing methods)
- DIN 4102-7 (fire tests for roof build ups – testing methods - Germany)

8.5 External fire performance, „Resistance against spread of fire and radiant heat“ (GERMANY)

The requirements with regard to resistance to fire from outside are raised by model building regulations and state building regulations. DIN 4102-4 describes roof structures that meet the

Certifications and Tests

criteria of a “hard roof” without proof. For example, there are roofs with a load, e.g. from 5 cm of gravel 16/32, intensely green roofs and since 2016 also roofs with extensive green roofs, whereby the greening system also has certain requirements. The exact wording of the standard must be observed here. In Germany, other structures, especially those with weatherproof roof seals, require proof of a "General Building Inspectorate Test Certificate", which is usually based on a system test. according to CEN TS 1187-1 (tests according to DIN 4102-7 are still permitted), if necessary taking into account DIN 4102-23. Based on a test according to CEN TS 1187-1, a classification Broof (t1) can also be made using DIN EN 13501-5. However, such a classification report currently does not constitute proof of usability for Germany. The structures in the corresponding combinations (primarily roofing membrane and insulation material), for which the “hard roofing” has been demonstrated as described above, are shown in the product presentations at the beginning of the laying guidelines (as of October 2018).

8.6 Root resistance

The root strength of various POLYFIN AG membranes has been verified using the "FLL test". The "FLL test" corresponds to the test according to EN 13948. In contrast to this, however, in addition to the root resistance (test plant: firethorn), the rhizome resistance is also tested (test plant: couch grass). All appropriately tested railways have passed this test, and without the addition of root toxins!

8.7 Environment

The influence and effects on the environment of construction products can basically be viewed from different perspectives. In relation to polyfin, polyfin duo and O.C. plan products, the following core properties can be shown in this context: - PVC-free, plasticizer-free, solvent-free - Free of halogens such as Chlorine and bromine - Free from root toxins With regard to building certification systems such as LEED, DGNB and BREEAM, POLYFIN AG had fact sheets and declarations drawn up independently. The corresponding declarations are available on request.

8.8. Applicable standards, rules and guide lines (GERMANY)

DIN 18234 (Structural fire protection of large roofs)

DIN 18531 (Roof Sealings)

DIN 18336 (Sealing Work) = VOB

DIN 18338 (Roof Sealing Work) = VOB

DIN 1991-1-4: 2005/NA: 2010-12 (Calculation of loads and influences, wind loads)

DIN 18195 Sealing of buildings - Terms

DIN 18807, Parts 1 to 3 (steel trapezoidal profiles) DIN 18807, parts 1 to 3 (steel trapezoidal profiles)

DIN 4102 (Properties in relation to fire), DIN CEN TS 1187, DIN EN 13501

DIN 4108 (Thermal protection)

Important Remarks, Standards and Regulations

Energy Saving Ordinance „EnEV“

Industrial Construction, High-Rise and Hospital Directive

Technical rules for metalwork in roofing

If additionally agreed by the construction participants (guidelines of associations):

German roofing trade - rules for waterproofing - with flat roof directive

9. Important Remarks

The valid rules and standards such as DIN 13831, the technical rules for metalwork in the roofing trade, if necessary agreed by the flat roof directive, the safety regulations of the trade associations as well as all installation and use instructions of the accessories suppliers.

The information in this document is based on current knowledge and more than 45 years of experience. A legally binding assurance of certain properties or suitability for a specific purpose can only be made after written approval by POLYFIN AG. The multitude of possible operating conditions necessitate a responsible, professional inspection and handling by the user of the products.

Since our material warranty requires compliance with the above regulations, we recommend obtaining the consent of POLYFIN AG in case of local conditions, materials and techniques not described in this installation regulation.

This applies in particular to intended deviations from this processing rule and installation instructions as well as from the other provisions mentioned at the beginning of this notice.

With the publication of a newer edition of the installation manual, this edition loses its validity. The current version is available from POLYFIN AG.

The General Terms and Conditions apply.

10. POLYFIN- accessories

We offer you the right accessories for our Polyfin® / O.C. plan® roof and sealing webs. In our flat roof accessories brochure, for example, molded parts, connecting cuffs, roof gullies, system fans and other accessories are shown.

The flat roof accessories brochure, Polyfin® and O.C. plan® brochures as well as the technical leaflets can be downloaded from our homepage www.polyfin.de.

11. **Space for your notes**



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