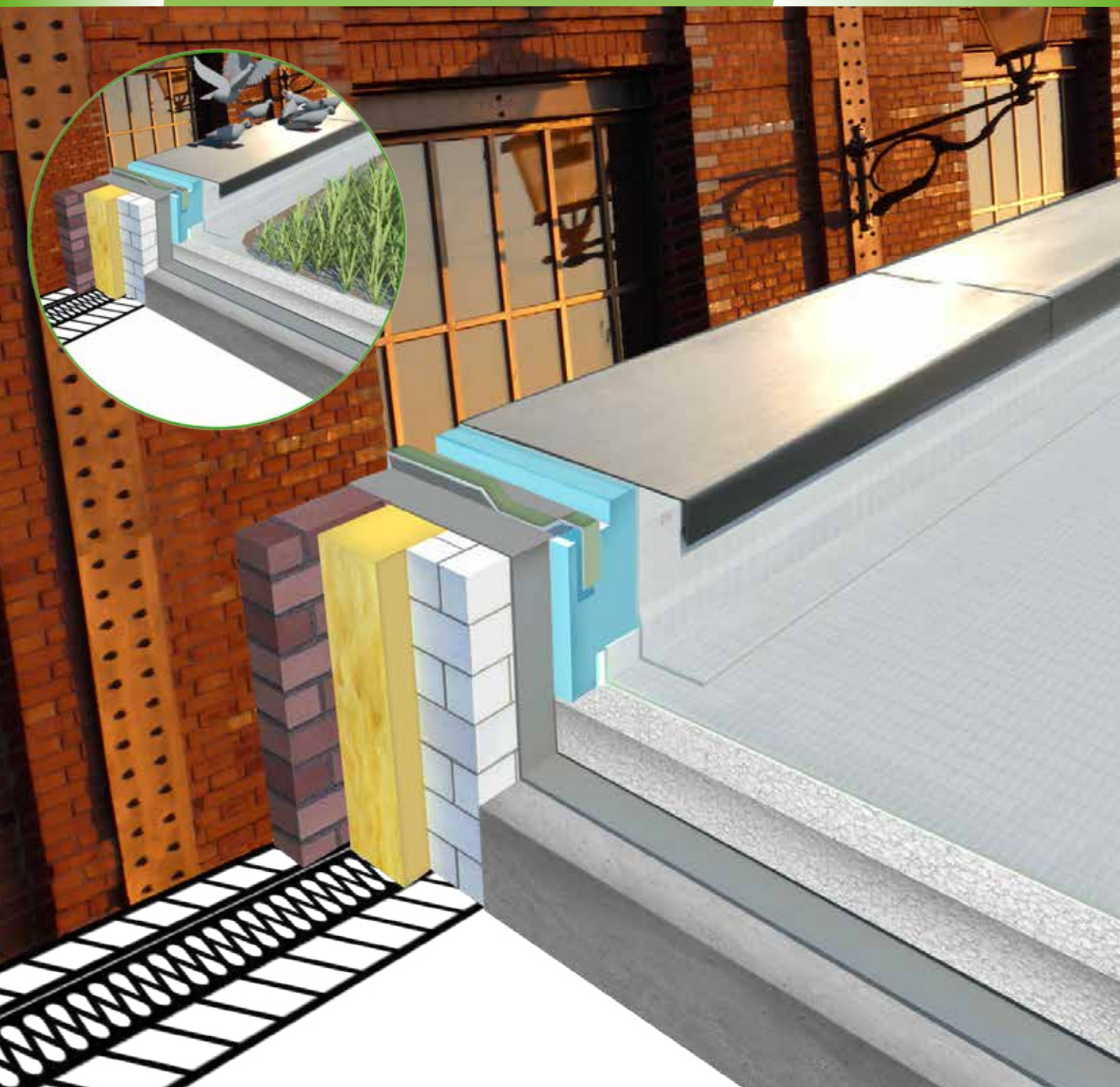
KÖSTER
Waterproofing Systems

THERMOPLASTIC POLYOLEFIN ROOFING MEMBRANES



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KÖSTER TPO Membranes
a TPO with advantages...

The composition of TPO can vary from manufacturer to manufacturer. KÖSTER TPO Membranes stand out through their excellent application, flexibility, and weldability within a broad temperature range. The unique composition allows for the membrane to achieve superior mechanical properties while simultaneously maintaining unusually low flammability. KÖSTER TPO Membranes are built based on 25 years of manufacturing experience in roof waterproofing.

The information contained in this brochure is non-binding and does not release the applicator from his responsibility for the correct application under consideration of the specific conditions of the construction site and for the final results of the construction process. The valid statements for testing and installation, acknowledged rules of technology as well as our technical guidelines have to be adhered to at all times.

Roofing and waterproofing standards

Roofs protect each and every building from various impacts and exposures such as cold, heat, rain, hail, snow, extreme wind, UV and infrared rays, as well as many different types of chemicals. Additionally, roofs are subject to movement and other mechanical stresses from the construction itself. As a result, roofs must be able to withstand a lot of stress. Continuously.

At the same time occupants and users place a variety of demands on roofs. They should be architecturally sophisticated, offer roof terraces with plenty of comfortable space to relax, or provide energy through attached solar panels. In addition, many other installations and structures can be found on roofs such as: ventilation shafts, transmitter masts, and chimneys.

In choosing a roof, the following factors must be considered:

- *Safety*
- *Durability*
- *Economic efficiency*
- *Environmental impact*
- *Light weight*
- *Easy application*
- *Low maintenance*

If roof waterproofing is well planned and executed, the building will be protected over many decades.

KÖSTER TPO Membranes

Flexible. Safe. Sustainable.
These three words describe the properties of a TPO (Thermoplastic Polyolefin). Hardly any other building material is as well suited for the waterproofing of roofs and allows such a quick and easy application.

KÖSTER TPO Membranes are resistant against UV rays and high mechanical stress. Through its great flexibility, it can easily withstand temperature induced stresses and is crack bridging as well as permanently watertight.

The application of the KÖSTER TPO Membrane is done by hot air welding its seams. By avoiding welding with an open flame, the KÖSTER TPO Membrane allows for a safe application – even in problematic areas.

Advantages of TPO Roofing Membranes

Does not contaminate groundwater

Direct application to EPS insulation possible

UV resistant

Low maintenance

Resistant to root and rhizome penetration

Rotproof

Does not contain non-molecularly bound plasticizers

Acid resistant

Why use TPO Roofing Membranes?

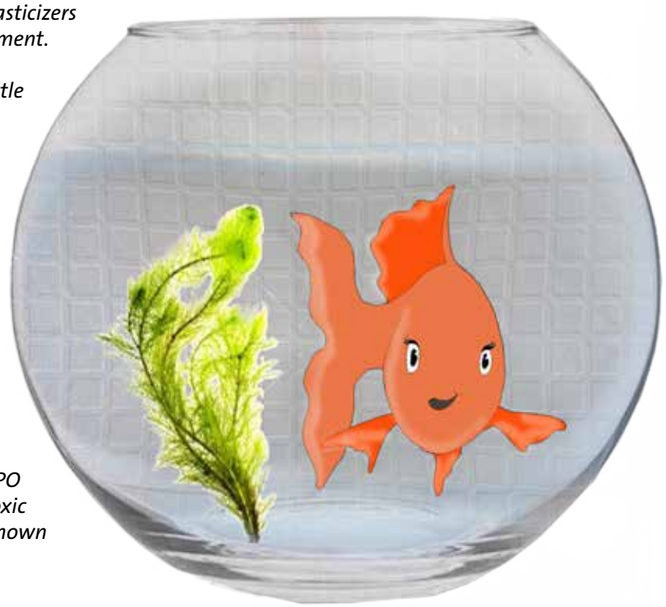
TPO is the abbreviation for Thermoplastic Polyolefine. TPO is derived from a composition of different polymers such as Polyethylene, Polypropylene, and Polyurethanes.

KÖSTER TPO Membranes are PVC free and do not contain non-molecularly bound plasticizers. As a result, no plasticizers are released into the environment. Due to these properties, the membranes will not turn brittle and crack over time which allows for a long lasting product with a lifetime of several decades.

TPO membranes stand apart due to their ability to be recycled over and over again. Additionally, TPO membranes do not release environmentally harmful halogens.

Furthermore, it has been proven in several tests that TPO membranes do not release toxic substances into water, also known as the Fish test.

Due to their great compatibility, KÖSTER TPO Membranes are suitable for installation over bitumen roofs and for the installation over EPS insulation materials.



Application

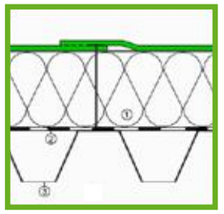
Roofing membranes are installed generally in three different ways: by mechanical fastening, loose laying with ballast, or full surface adhesion. In order to determine the appropriate installation method the following criteria should be taken into consideration: slope of the roof, wind exposure, architectural aspects such as a green roof, or if the building is a restoration project.

Regardless of the installation method, the seam welding of the membranes is always done with hot air. This not only enables a very safe and environmentally friendly process, but also creates a homogeneous bond. Due to the thermoplastic characteristics of the material, the two membranes become one and are inseparable.

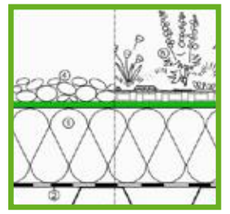
Welding instead of glue ...

A glued seam always presents a weak spot in the waterproofing. That's why KÖSTER TPO Roofing Membranes are welded together - creating an inseparable, durable, and homogenous bond.

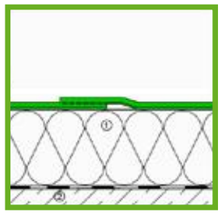
Installation methods:



Mechanical fastening



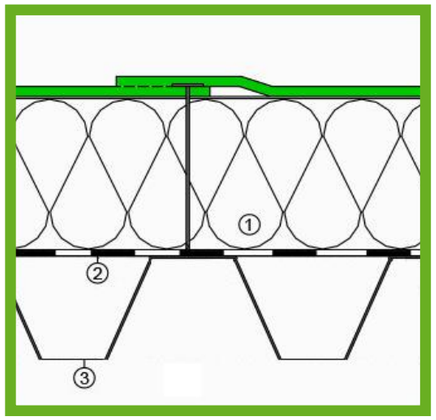
Loose laying with ballast



Full surface adhesion

Installation methods

Mechanical fastening



Layer construction: KÖSTER TPO Membrane (green); Insulation (1); Substructure (2); Trapezoidal sheet (3)

The most common method of installing TPO membranes is through mechanical fastening. The membrane is mechanically fastened to the roof structure, which can consist of either wooden sheathing, trapezoidal sheets, or a concrete slab.

The membrane is fastened through the thermal insulation, which requires special fasteners. Overlapping the membranes prevents the penetration of water into the installation.

Due to its great compatibility with various materials such as bitumen, the KÖSTER TPO Membrane is suitable for use in the renovation of roof waterproofing systems as well. For instance, the KÖSTER TPO Membrane can be directly fastened to the substructure without having to remove the old waterproofing system as long as the substrate is intact and structural aspects do not indicate otherwise.

Mechanical fastening allows for a quick installation and provides a high resistance to wind loads without placing an additional load upon the waterproofing system. The roof structure remains comparatively light in weight. Furthermore, mechanical fastening guarantees that the membrane will not slip, even on pitched roofs. Mechanical fastening even makes a green roof on a pitched roof possible.

Mechanical fastening

- resilient
- High security against wind loads
- also for pitched roofs
- no extra load

KÖSTER TPO Membrane

Mechanical fasteners

The KÖSTER TPO Membrane is mechanically fastened using disc anchors. The disc anchors are securely fixed through the insulation to the substructure (i.e. supporting construction). Upon request, KÖSTER can calculate the wind load in order to determine the number of fasteners required.

The KÖSTER TPO Membrane is mechanically fastened by attaching the disc anchors to the substructure. In this case, trapezoidal sheet metal.

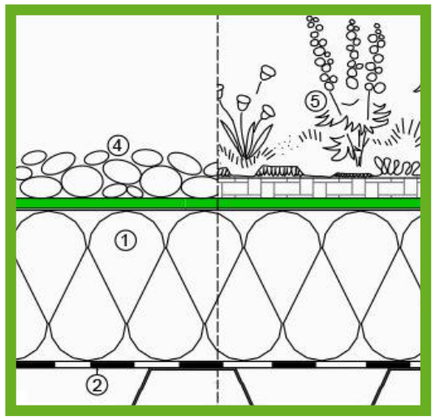
Disc anchors guarantee a secure fitting.

Fully fastened roofing membrane. Marks are pre-printed onto the membranes to ensure a proper overlapping of the next sheet.

Additional mechanical fastening centered in the membrane may be necessary in order to protect the TPO membrane against high loads.

Installation Methods

Loose laying with ballast



Layer construction: Insulation (1); Substructure (2); KÖSTER TPO Membrane (green); Gravel cover (4) / Landscaping (5)

A quick and secure way to install KÖSTER TPO Membranes is through loose laying with ballast. Ballast can consist of either gravel, paving slabs, or even green roofs. Ballast helps protect the roofing membrane against wind loads and can accommodate a wide range of architectural styles.

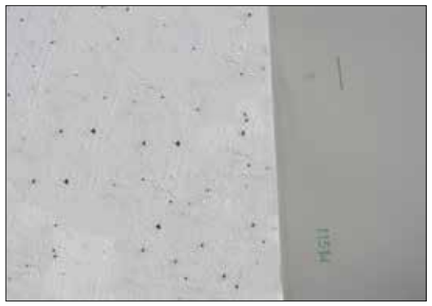
A special advantage of this installation method is that the roofing membrane does not need to be mechanically fastened to the substrate. Due to the weight of the ballast, higher loads must be taken into consideration in the roof load calculation.

If the membrane will be covered with a ballast such as gravel, the membrane can be loosely laid. By loose laying the membrane with ballast, mechanical fastening is no longer required.

Loose laying with ballast

- quick installation
- ideal for green roofs
- no fasteners needed
- noninvasive to substrate

KÖSTER TPO Membrane



Direct installation over EPS insulation

The KÖSTER TPO Membrane is unrolled.

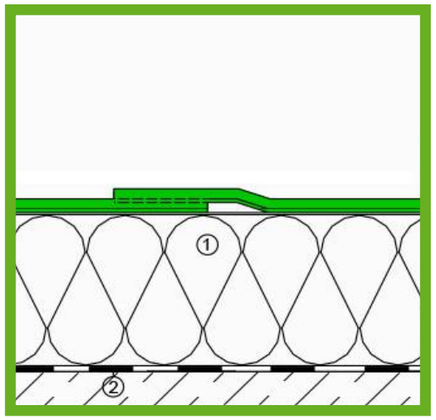
The membrane is positioned and then welded.

A welding machine simultaneously performs the tasks of pre-fixing, heating, and pressing, creating a homogenous bond among the membranes.

After welding all seams, the selected ballast can be installed.

Installation methods

Full surface adhesion



Layer construction: KÖSTER TPO Membrane (green); Insulation (1); Substructure (2)

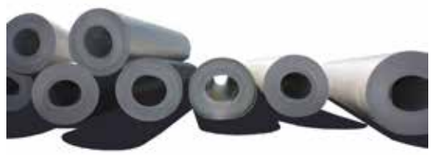
Full surface adhesion to the substrate offers a time-saving installation. The KÖSTER TPO Membrane features a special fleece coating which increases the bonding of the KÖSTER PUR Membrane Adhesive. This results in a high adhesive strength and creates a perfect bond to the substrate.

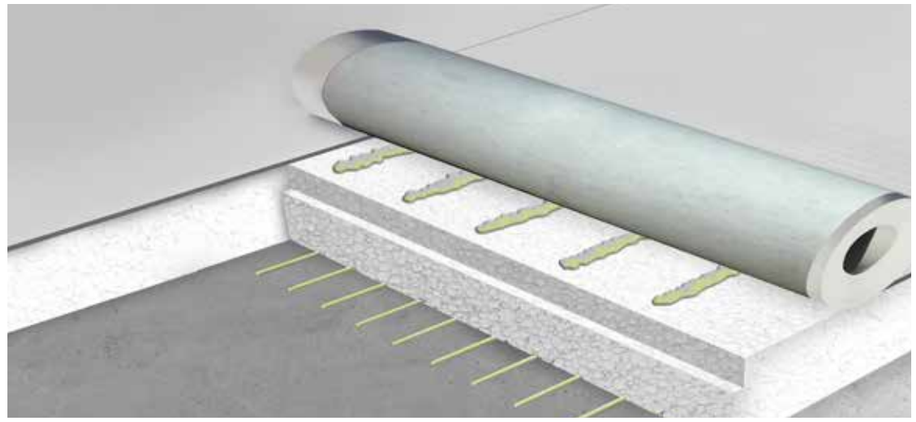
It is important that the substrate is suitable for a good adhesive bond. If necessary, an adhesive bridge can be applied. In addition, a wind load calculation must be prepared prior to the adhesion of the membrane.

The KÖSTER PUR Membrane Adhesive is applied in strips to the substrate, the fleece-coated KÖSTER TPO Membrane is unrolled, and the membrane is firmly pressed onto the substrate using a weighted roller. This enables the adhesive to be spread evenly and help achieve uniformity of the bond. When distributing the adhesive care must be taken to ensure that no material is applied to an area that is to be welded onto another sheet.

Full surface adhesion

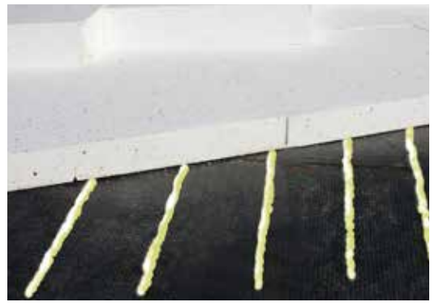
- noninvasive to substrate
- EPS compatible
- easy installation
- no ballast needed



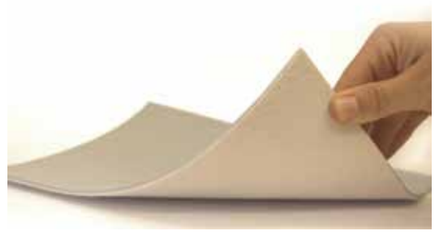


A fleece laminated membrane is used during full surface adhesion. Adhesion of the membrane is carried out with KÖSTER PUR Membrane Adhesive.

Preparation of a roof surface. A vapor barrier is used as the basis for further installation.



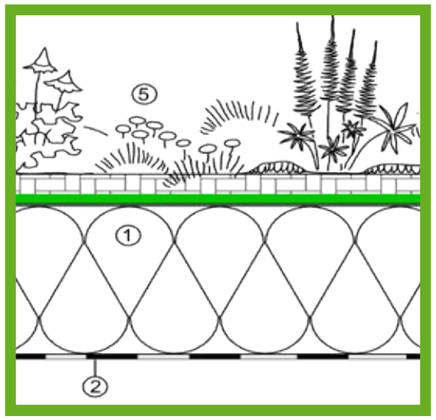
Next, the insulation is adhered. It is recommended to use KÖSTER PUR Membrane Adhesive.



Fleece laminated KÖSTER TPO Membrane.

KÖSTER TPO Membranes are connected to individual SHEV-flaps with KÖSTER Contact Adhesive.

Green roofs



KÖSTER TPO Membrane (green); Insulation (1); Substructure (2); Landscaping (3)

One method of green building is through a green roof. In special circumstances a green roof can be achieved on a pitched roof.

In its immediate environment, a green roof can have a positive impact on humidity, solar radiation, and air temperature. For instance, during summer months plants absorb and reflect a large part of UV radiation. Moreover, a further positive effect is observed through the evaporation of water on the leaf surface causing subsequent evaporative heat loss. In fact, various measurements showed a temperature difference up to + 10 °C between green and ungreen roof surfaces during midday hours.

Green roofs

- substitute habitat for plants and animals
- water retaining
- improved indoor climate
- protection against UV rays

Green building...

...focuses on the interrelationship between man and his building environment. The goal is to preserve the existing ecosystem in order to pass on a livable environment to future generations. Green building supports the application of sustainable building resources and the use of recyclable materials.

KÖSTER TPO membranes can be loose laid under green roofs where the green roof serves as a ballast and protects the membrane against wind uplift. Additionally, KÖSTER TPO Membranes are resistant to root and rhizome penetration. This allows for planting and cultivation directly on top of the membrane.

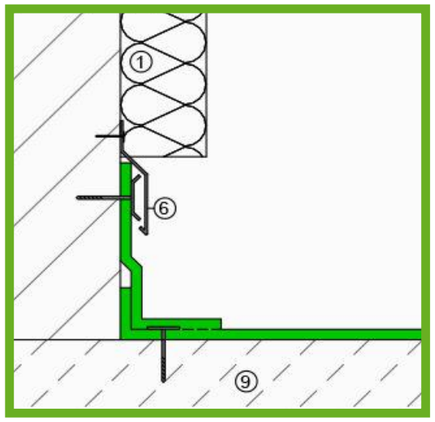
A greened flat roof with low vegetation. The individual flowerbeds are lined with gravel.

A greened and accessible flat roof with medium-high vegetation adjoined to a wooden terrace.

A greened and accessible flat roof with grass and vegetation.

The modern version of an extensively planted green roof: an inviting roof garden.

Connection examples

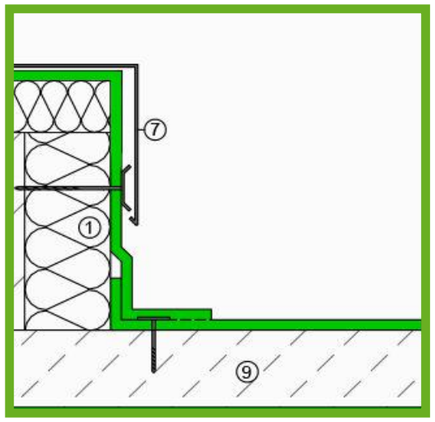


Wall connection

KÖSTER TPO Membranes are always installed in two layers at wall connections. The membranes can be installed loose or adhered in vertical areas with KÖSTER Contact Adhesive. At wall / floor connections the membranes must be mechanically fastened according to the Flat Roof Guidelines. In vertical areas the membranes must be mechanically fastened, for example with a clamping rail, along the upper edges in order to prevent sliding.

The height where the membranes are connected should be at least 15 cm above the water-bearing layer.

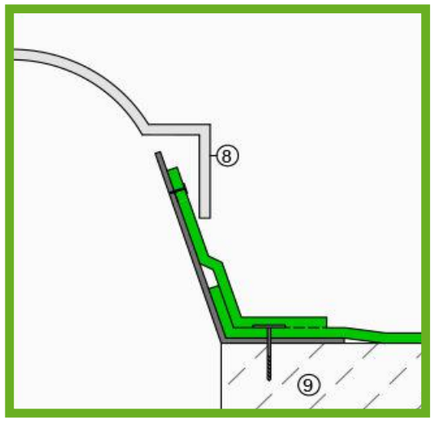
1) insulation; 6) clamping rail; 9) substructure



Parapet connection

A two-layer installation is required for installation over Atticas. The membrane must be applied completely over the Attica and fastened wind tight. This can be achieved by a clamping rail or a combi-band if required. If the Attica is higher than 50 cm it must be mechanically fastened at half height according to the Flat Roof Guidelines. If the membrane is fully adhered in vertical areas no mechanical fastening is required. At wall / floor connections the membranes must be mechanically fastened.

1) insulation; 7) metal flashing; 9) substructure



Skylight connection

Typically, skylights are mounted with brackets bolted onto the substrate. This also provides the base for the TPO membrane connection and detail solution.

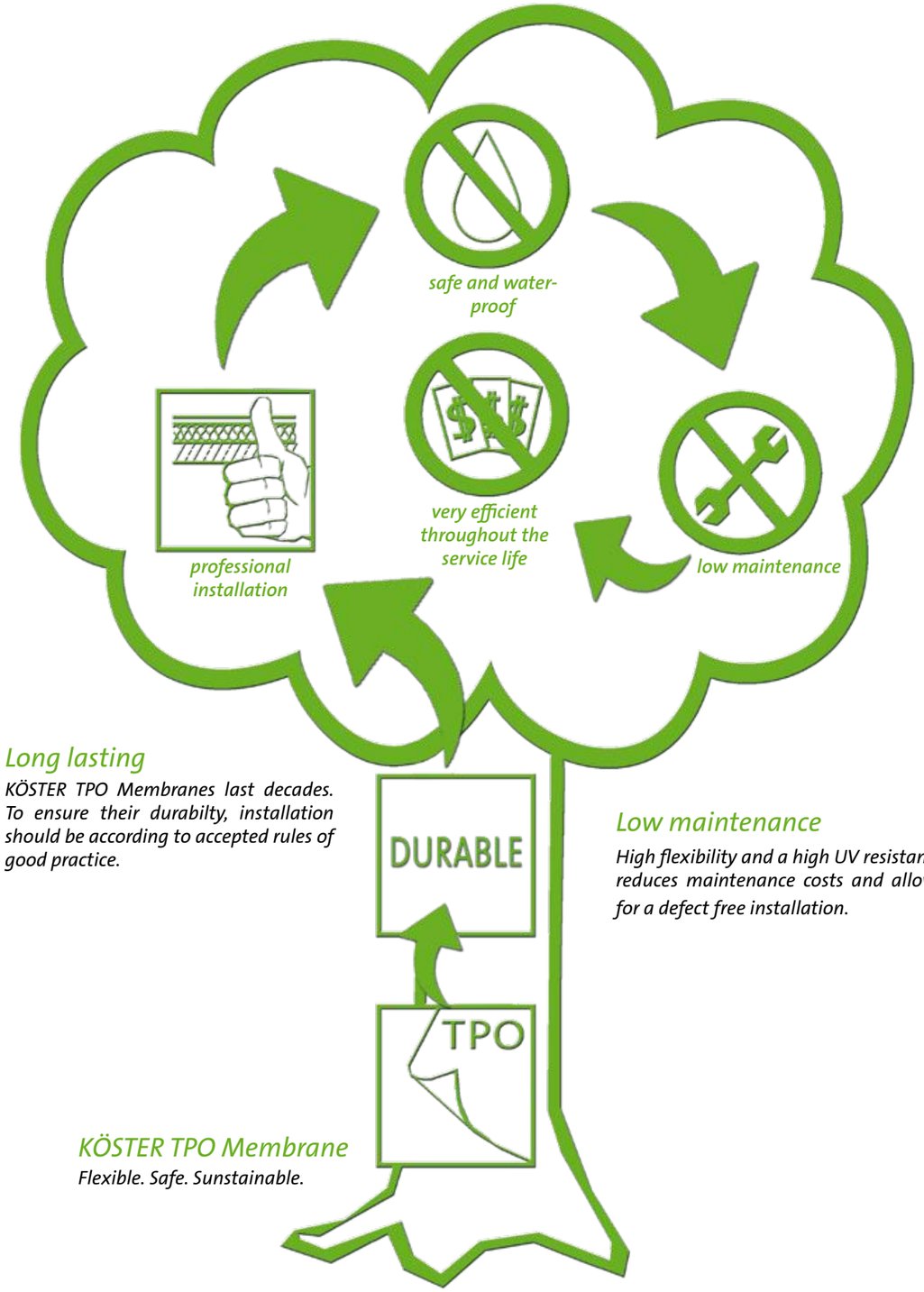
The KÖSTER TPO Membrane is mechanically attached in the corner areas. The bottom layer is fastened all the way into the corner. The first layer is installed farther than the corner area. The second layer is mechanically fastened to the upstand and is horizontally welded with the bottom layer.

Skylights and SHEV-flaps must be fastened as well. It is important that skylights cover the edges of the KÖSTER TPO Membrane.

8) skylight; 9) substructure

Further details, tips, and information can be found in the KÖSTER TPO installation guide.

TPO. Flexible. Safe. Sustainable.



Long lasting

KÖSTER TPO Membranes last decades. To ensure their durabilty, installation should be according to accepted rules of good practice.

Low maintenance

High flexibility and a high UV resistance reduces maintenance costs and allows for a defect free installation.

KÖSTER TPO Membrane

Flexible. Safe. Sunstainable.

Sustainability

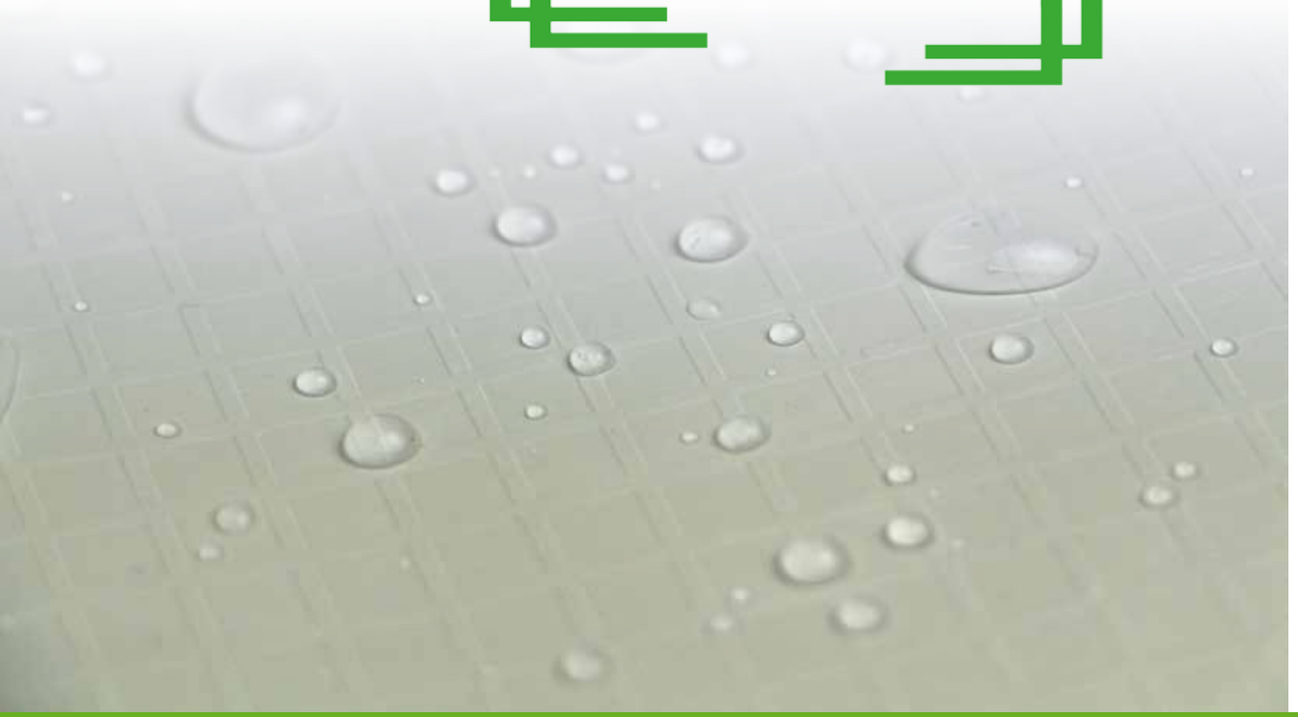
Sustainability is the conservation and preservation of the earth's resources. Likewise sustainable development strives to meet the needs of the present without negatively affecting the ability of future generations to meet their own needs. Sustainability includes aspects of ecology, economy, and social affairs.

KÖSTER TPO Roofing Membranes have received positive ratings due to their long-lasting durability and low maintenance as well as their ecological and economical contributions. They protect buildings against water penetration, the most common and costly causes of damage to buildings.

The building structure remains intact longer and important resources are preserved. KÖSTER TPO Roofing Membranes also allow the possibility of a light and resource-saving roof structure. They can reflect sunlight (in light colors) and can thus reduce the energy consumption of air conditioning systems, especially in warmer regions. Additionally they can be optimally combined with modern insulation materials and permit the installation of solar panels. In contrast to other roofing membranes, KÖSTER TPO Roofing Membranes can be recycled and do not release plasticizers into the environment. Moreover, they provide an optimal basis for green roofs, are climate-friendly, and support the advancement of the urban ecosystem.

Sustainability...

...is no longer just a buzz word but an ecological and economic reality for architects and builders. Minimizing the environmental impact of a construction project is now considered a standard in modern building design. Sustainability enables a livable world for both present and future generations.



Product catalogue

Polymer based waterproofing membrane embedded with glass fiber mesh reinforcement

Product name	*Thickness*	*Width*	*Length*	*Mechanical fastening*	*Lose laying with ballast*
KÖSTER TPO 1.6 - 2.10 m	*1.6 mm*	*2.10 m*	*20 m*	●	●
KÖSTER TPO 1.6 - 1.50 m	*1.6 mm*	*1.50 m*	*20 m*	●	●
KÖSTER TPO 1.6 - 1.05 m	*1.6 mm*	*1.05 m*	*20 m*	●	●
KÖSTER TPO 1.6 - 0.75 m	*1.6 mm*	*0.75 m*	*20 m*	●	●
KÖSTER TPO 1.6 - 0.525 m	*1.6 mm*	*0.525 m*	*20 m*	●	●
KÖSTER TPO 1.6 - 0.35 m	*1.6 mm*	*0.35 m*	*20 m*	●	●
KÖSTER TPO 1.6 - 0.25 m	*1.6 mm*	*0.25 m*	*20 m*	●	●
KÖSTER TPO 1.8 - 2.10 m	*1.8 mm*	*2.10 m*	*20 m*	●	●
KÖSTER TPO 1.8 - 1.50 m	*1.8 mm*	*1.50 m*	*20 m*	●	●
KÖSTER TPO 1.8 - 1.05 m	*1.8 mm*	*1.05 m*	*20 m*	●	●
KÖSTER TPO 1.8 - 0.75 m	*1.8 mm*	*0.75 m*	*20 m*	●	●
KÖSTER TPO 1.8 - 0.525 m	*1.8 mm*	*0.525 m*	*20 m*	●	●
KÖSTER TPO 1.8 - 0.35 m	*1.8 mm*	*0.35 m*	*20 m*	●	●
KÖSTER TPO 1.8 - 0.25 m	*1.8 mm*	*0.25 m*	*20 m*	●	●
KÖSTER TPO 2.0 - 2.10 m	*2.0 mm*	*2.10 m*	*20 m*	●	●
KÖSTER TPO 2.0 - 1.50 m	*2.0 mm*	*1.50 m*	*20 m*	●	●
KÖSTER TPO 2.0 - 1.05 m	*2.0 mm*	*1.05 m*	*20 m*	●	●
KÖSTER TPO 2.0 - 0.75 m	*2.0 mm*	*0.75 m*	*20 m*	●	●
KÖSTER TPO 2.0 - 0.525 m	*2.0 mm*	*0.525 m*	*20 m*	●	●
KÖSTER TPO 2.0 - 0.35 m	*2.0 mm*	*0.35 m*	*20 m*	●	●
KÖSTER TPO 2.0 - 0.25 m	*2.0 mm*	*0,25 m*	*20 m*	●	●
KÖSTER ECB 2.0 - 2.10 m	*2.0 mm*	*2.10 m*	*20 m*	●	●
KÖSTER ECB 2.0 - 1.50 m	*2.0 mm*	*1.50 m*	*20 m*	●	●
KÖSTER ECB 2.0 - 1.05 m	*2.0 mm*	*1.05 m*	*20 m*	●	●
KÖSTER ECB 2.0 - 0.75 m	*2.0 mm*	*0.75 m*	*20 m*	●	●
KÖSTER ECB 2.0 - 0.525 m	*2.0 mm*	*0.525 m*	*20 m*	●	●
KÖSTER ECB 2.0 - 0.35 m	*2.0 mm*	*0.35 m*	*20 m*	●	●
KÖSTER ECB 2.0 - 0.25 m	*2.0 mm*	*0.25 m*	*20 m*	●	●

Product catalogue

Polymer based waterproofing membrane with embedded glass fibre mesh reinforcement and fleece laminated underside (1mm) - suitable for bonded application

Product name	Thickness	Width	Length	Mechanical fastening	Lose laying with ballast	Bonded application
KÖSTER TPO 1.6 F - 1.50 m	1.6 mm	1.50 m	20 m	●	●	●
KÖSTER TPO 1.6 F - 1.05 m	1.6 mm	1.05 m	20 m	●	●	●
KÖSTER TPO 1.6 F 2S - 1.05 m *	1.6 mm	1.05 m	20 m	●	●	●
KÖSTER TPO 1.6 F - 0.525 m	1.6 mm	0.525 m	20 m	●	●	●
KÖSTER TPO 1.8 F - 1.50 m	1.8 mm	1.50 m	20 m	●	●	●
KÖSTER TPO 1.8 F - 1.05 m	1.8 mm	1.05 m	20 m	●	●	●
KÖSTER TPO 1.8 F 2S - 1.05 m *	1.8 mm	1.05 m	20 m	●	●	●
KÖSTER TPO 1.8 F - 0.525 m	1.8 mm	0.525 m	20 m	●	●	●
KÖSTER TPO 2.0 F - 2.10 m	2.0 mm	2.10 m	20 m	●	●	●
KÖSTER TPO 2.0 F - 1.50 m	2.0 mm	1.50 m	20 m	●	●	●
KÖSTER TPO 2.0 F - 1.05 m	2.0 mm	1.05 m	20 m	●	●	●
KÖSTER TPO 2.0 F 2S - 1.05 m *	2.0 mm	1.05 m	20 m	●	●	●
KÖSTER ECB 2.0 F - 2.10 m	2.0 mm	2.10 m	20 m	●	●	●
KÖSTER ECB 2.0 F - 1.05 m	2.0 mm	1.50 m	20 m	●	●	●
KÖSTER ECB 2.0 F 2S - 1.05 m *	2.0 mm	1.05 m	20 m	●	●	●
KÖSTER ECB 2.0 F - 0.525 m	2.0 mm	0.525 m	20 m	●	●	●

** double-sided welding edge*

Homogenous polymer based waterproofing membrane without fleece lamination for drain, flange, or corner reinforcement

Product name	Thickness	Width	Length	Mechanical fastening	Lose laying with ballast
KÖSTER TPO 2.0 U - 0.525 m	2.0 mm	0.525 m	20 m	●**	●**
KÖSTER ECB 2.0 U - 1.05 m	2.0 mm	1.05 m	20 m	●**	●**

***as accessory*

Accessory products are also supplied by KÖSTER

Range of products

W ***Waterproofing systems***
Basement, tank, and area waterproofing

M ***Masonry***
Restoration of masonry, anti mold systems

IN ***Injection systems***
Crack injection and crack repair systems

C ***Concrete protection and repair***
Concrete and mortar additives

SL ***Self leveling underlayments***
Self leveling mineral underlayments, floor patching materials, corresponding primers

CT ***Coatings***
Floor and corrosion protection coatings, moisture control systems

J ***Joint sealing***
Joint sealants, joint tapes

B ***Wet room waterproofing***

P ***Façade protection and paints***

R ***Roofing membranes, roof waterproofing***

X ***Accessories***

KÖSTER BAUCHEMIE AG develops, produces and supplies a comprehensive range of special construction materials in the areas of waterproofing and concrete repair. Being founded in 1982 in Germany, the KÖSTER Group consists meanwhile of 24 companies which are represented in more than 45 countries. It is our policy to offer construction materials of highest quality, durability and general performance.

Service you can depend on

With our service and distribution network in many countries world-wide we can offer you professional advice and technical support immediately and on the spot. Your required waterproofing materials can be delivered promptly and will protect your property efficiently and lastingly.

For further information, please contact:

KÖSTER Waterproofing Systems

DEUTSCHE BAUCHEMIE

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