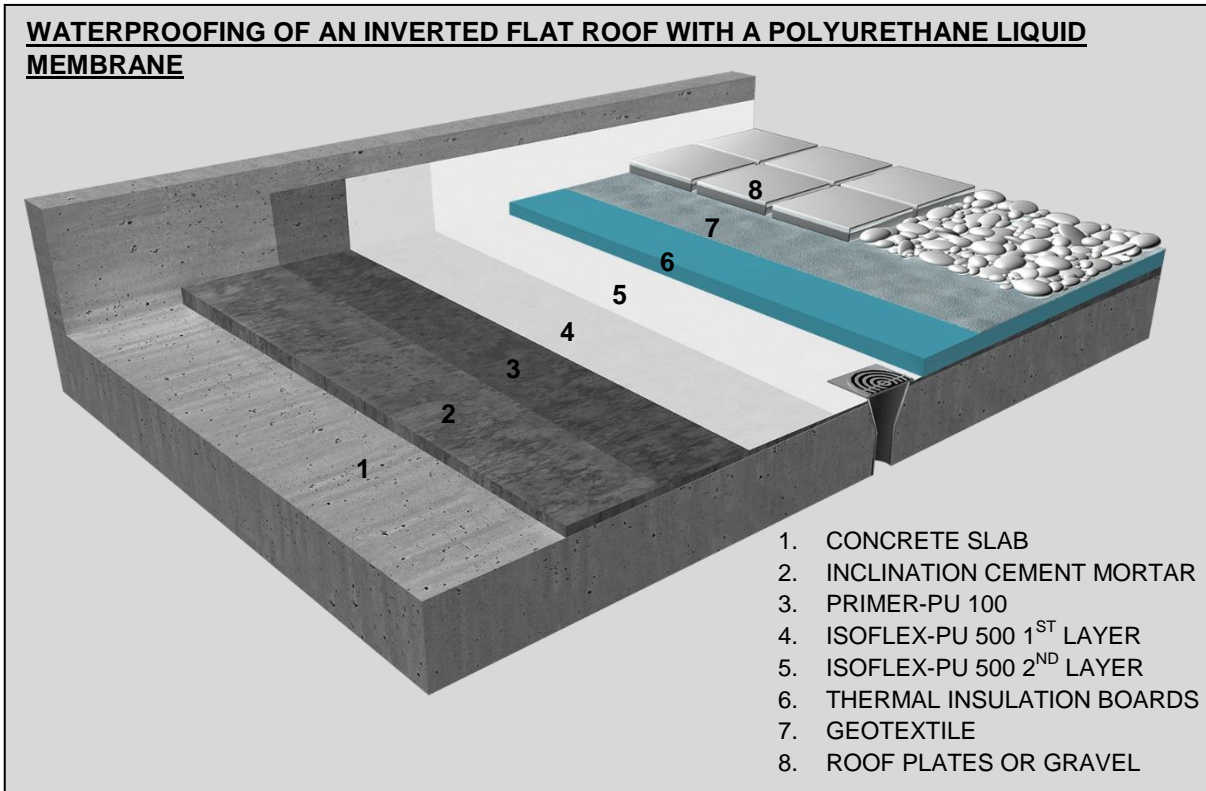


## WATERPROOFING OF AN INVERTED FLAT ROOF WITH A POLYURETHANE LIQUID MEMBRANE



**SOLUTION:** Waterproofing of an inverted flat roof with a polyurethane liquid membrane

### Related Materials

#### **ISOFLEX-PU 500**

One-component, polyurethane, waterproofing liquid membrane for flat roofs

#### **PRIMER-PU 100**

One-component polyurethane primer

#### **PRIMER-PU 140**

Two-component polyurethane primer for surfaces with high moisture content

#### **DUROCRET-PLUS**

Polymer-modified, fiber-reinforced repairing cement mortar

#### **SCREED-100**

Cementitious floor screed

#### **POLYESTER FLEECE 60 gr/m<sup>2</sup>**

Polyester fleece for reinforcing waterproofing layers

#### **FLEX PU-30 S/FLEX PU-50 S**

Polyurethane sealants

## I. NATURE OF THE PROBLEM-REQUIREMENTS

When selecting the solution of the inverted roof insulation where the waterproofing layer lies beneath the thermal insulation, the resilience of the sealing to residual moisture which is trapped between the thermal insulation and waterproofing layer, becomes extremely important. In addition, the waterproofing material must show excellent adhesion to the substrate, flexibility, reliability and durability.

The main advantages of the inverted roof insulation with ballast are:

- a) the permanent protection of the waterproofing membrane of the overlying layers from factors such as solar radiation, extreme temperature variations, mechanical stresses, etc.
- b) the easy placement or removal of the insulation boards and ballast materials with direct access and inspection of the waterproofing layer,
- c) avoiding condensation problems in the "cold side" of the thermal insulation boards, due to the good ventilation of the system,
- d) the low load of the ballast, compared to the construction of a cement slope mortar.

## II. SOLUTION

The above waterproofing requirements are completely covered by the one-component, polyurethane waterproofing liquid membrane, ISOFLEX-PU 500. By applying it on the roof, a strong and continuous elastic sealing layer is created, with excellent adhesion and resistance to permanent contact with moisture, able to successfully follow the expansion and contraction of the roof.

## III. APPLICATION

### Substrate preparation

The substrate must be dry (moisture content <4%) and free from loose particles, dust, grease, etc.

Local restorations or repairs of the roof elements (concrete, cement, etc.) are done using the polymer-modified, fiber-reinforced, PCC R3 type cement mortar **DUROCRET-PLUS**.

In case there is a need for filling or creating a total inclination layer, the ready-to-use, cementitious floor screed **SCREED-100** may be used.

### Surface priming

As soon as the materials that may have been used for smoothing the substrate have dried, the one-component polyurethane primer, **PRIMER-PU 100** is applied on the clean and dry concrete surface (moisture content <4%). The primer is evenly applied across the surface with a brush, roller or by spraying.

Consumption of polyurethane primer PRIMER - PU 100: 200-300 g/m<sup>2</sup>.

In case the substrate has moisture content >4%, the PRIMER-PU 140 which is a polyurethane, two-component primer for surfaces with high moisture content is applied instead of the polyurethane primer PRIMER-PU 100.

Consumption of PRIMER-PU 140: 200-250 g/m<sup>2</sup>.

### Application of the polyurethane, waterproofing, liquid membrane ISOFLEX-PU 500

#### Total waterproofing of the surface

Before the application, it is recommended to slightly stir ISOFLEX-PU 500, until it becomes homogeneous. Extensive stirring should be avoided, in order to prevent air entrapment in the material.

ISOFLEX-PU 500 is applied by brush or roller in 2 layers. The first layer is applied 2-3 hours after

priming and while PRIMER-PU 100 is still tacky. The second layer should be applied crosswise after 8-24 hours, depending on the weather conditions.

Consumption: approx. 1.0-1.5 kg/m<sup>2</sup>, depending on the substrate.

It is recommended to reinforce ISOFLEX-PU 500 with the polyester fleece along the edges at the junction of the flat roof with vertical elements (parapet, stairwell termination, etc.), pipe joints, ventilation joints, metal element joints, etc. As soon as the polyurethane primer PRIMER-PU 100 has set (approx. 2-3 hours), a coat of the polyurethane waterproofing liquid membrane ISOFLEX-PU 500 is applied along the junctions and, while it is still fresh, a 10 cm wide strip of polyester fleece (60 g/m<sup>2</sup>) is embedded. After 8-24 hours, depending on weather conditions, a second coat of the polyurethane waterproofing liquid membrane ISOFLEX-PU 500 is applied. After 8-24 hours, depending on the weather conditions, a third layer is applied in the spots where reinforcement has been used for its full coverage.

Total consumption of the polyurethane, waterproofing liquid membrane in combination with the polyester fleece ISOFLEX- PU 500: 2.0-2.5 kg/m<sup>2</sup>, depending on the substrate.

#### **A) In cases there are individual cracks in the substrate:**

As soon as the polyurethane primer PRIMER-PU 100 has set (approx. 2-3 hours), a coat of the polyurethane waterproofing liquid membrane ISOFLEX-PU 500 is applied along the cracks and, while it is still fresh, a 10 cm wide strip of polyester fleece (60 g/m<sup>2</sup>) is embedded. ISOFLEX-PU 500 is totally applied on the remaining surface in a single layer. After 8-24 hours, depending on weather conditions, a total second coat of the polyurethane waterproofing liquid membrane ISOFLEX-PU 500 is applied. After 8-24 hours, depending on the weather conditions, a third layer is applied in the spots where reinforcement has been used for its full coverage.

**Cracks on the substrate (wider than 1 mm) have to be initially primed locally and sealed with the polyurethane sealants FLEX PU-30 S or FLEX PU-50 S. In case of cracks < 1 mm, no sealing is required.**

It is recommended to reinforce ISOFLEX-PU 500 with the polyester fleece along the edges at the junction of the flat roof with vertical elements (parapet, stairwell termination, etc.), pipe joints, ventilation joints, metal element joints, etc.

ISOFLEX-PU 500 could be applied also with the addition of ACCELERATOR-5000. ACCELERATOR-5000 is a special set accelerator for ISOFLEX-PU 500 that enables its application at low temperatures or in thicker layers. It also increases the thixotropy and mechanical strength of ISOFLEX-PU 500.

Total consumption of the polyurethane, waterproofing liquid membrane, ISOFLEX-PU 500: 1.0-1.5 kg/m<sup>2</sup>, depending on the substrate.

#### **B) In cases there are dense, multiple cracks in the substrate:**

As soon as the polyurethane primer PRIMER-PU 100 has dried (approx. 2-3 hours), the polyurethane waterproofing liquid membrane ISOFLEX-PU 500 is totally reinforced with 100 cm wide strips of polyester fleece (60 g/m<sup>2</sup>), which overlap one other by 10 cm. The first layer of the polyurethane waterproofing liquid membrane ISOFLEX-PU 500 is applied in order to cover the reinforcement (to a width of 100 cm), and while it is still fresh, the strip of polyester fabric is embedded. The same application procedure is followed in the remaining surface. As soon as this

layer has set, after 8-24 hours depending on weather conditions, two extra layers of the polyurethane waterproofing liquid membrane ISOFLEX-PU 500 are applied on the entire surface of the roof, fully covering the reinforcement. The second coat can be applied as soon as the first one has dried, after 8-24 hours, depending on the weather conditions.

ISOFLEX-PU 500 could be applied also with the addition of ACCELERATOR-5000. ACCELERATOR-5000 is a special set accelerator for ISOFLEX-PU 500 that enables its application at low temperatures or in thicker layers. It also increases the thixotropy and mechanical strength of ISOFLEX-PU 500.

Total consumption of the polyurethane, waterproofing liquid membrane, ISOFLEX- PU 500: 2.0-2.5 kg/m<sup>2</sup>, depending on the substrate.

Waterproofing extends to the vertical surfaces (parapet, stairwell termination, etc.) to a minimum height of 15-20 cm, in order for a watertight basin to be formed.

**Cracks on the substrate (wider than 1 mm) have to be initially primed locally and sealed with the polyurethane sealants FLEX PU-30 S or FLEX PU-50 S. In case of cracks < 1 mm, no sealing is required.**

It is recommended to reinforce ISOFLEX-PU 500 with the polyester fleece along the edges at the junction of the flat roof with vertical elements (parapet, stairwell termination, etc.), pipe joints, ventilation joints, metal element joints, etc.

#### **IV. Applying the thermal insulation**

On the waterproofing layer and as soon as it has dried, extruded polystyrene panels, suitable for application to an inverted roof, are fitted by simple placement. The geotextile or plastic mat is then placed. Finally, paving slabs or gravel (layer thickness 6-8 cm) are added in order to protect the waterproofing membrane and the thermal insulation from the sun and the wind. At the same time, the easy accessibility of the roof is also ensured.

#### **V. NOTES**

- ISOFLEX-PU 500 may be applied when the ambient temperature is 5°C and rising, and the temperature of the substrate is a minimum of 3 degrees above the dew point. The maximum application temperature is approximately 35°C. Low temperatures retard curing while high temperature accelerates curing. High values of humidity may affect the final finish of the membrane.
- Maximum consumption of ISOFLEX-PU 500 per layer should not exceed 750 g/m<sup>2</sup>. With the addition of ACCELERATOR-5000 each layer should not exceed the 1.25 kg/ m<sup>2</sup>.
- The tools must be cleaned with the special solvent for polyurethane paints SM-16, while the polyurethane waterproofing membrane, ISOFLEX-PU 500, is still fresh.
- In case the substrate has moisture content >4%, the PRIMER-PU 140 which is a polyurethane, two-component primer for surfaces with high moisture content is applied instead of the polyurethane primer PRIMER-PU 100.