

LUCOBRIDGE® PV-BIT

WATERPROOFING MEMBRANES FOR STEEL BRIDGES

INSTRUCTION MANUAL



... Waterproofing that lasts

BRIDGE SEALING WITH LUCOBRIDGE® PV-BIT



1 PREFACE

In Germany, the base structures of bridges are made from steel or concrete. The more than 120,000 bridges in Germany must withstand increasing heavy loads-traffic, de-icing salt, UV radiation, heat, rain or frost and must be free of corrosion, cracks and imperfections. All of the systems must be tested and approved by the Federal Highway Research Institute (BAST). These suitability tests are carried out by accredited institutions to meet the required high quality standards.

The technology in most common use is a bitumen membrane to seal building constructions (ZTV-ING, Part 7 Sections 1 and 2). Single or double layer polymer-modified bitumen membranes are used; bitumen membranes which are installed beneath the asphalt layers.

The number of bridges requiring renovation today, some 6,000 of the 40,000 bridges of German motorways, make an innovative sealing system necessary.

The Lucobridge® system from LUCOBIT AG is a major departure from the products which were commonly used in the past where the bitumen membrane was usually fixed onto the main bridge body (concrete or steel) by heating a polymer-modified bitumen (PmB) adhesive layer with the bitumen membrane taking on the sealing function at the same time.

Lucobridge® membranes feature a plastic membrane made of ECB, tried and tested in roofing and waterproofing membrane applications for more than 50 years. These Lucobridge® membranes assume the sealing function when permanently applied to the concrete or steel construction in both the familiar PmB flame procedure (BIT type) and the innovative adhesive procedure (PV-BIT type) with the environmentally-friendly acrylate system.

2 APPLICATION

2.1 Preparing the surface of the Steel Bridge

Remove the old surface evenly through (shot) blasting. The tear strength must be at least 1.5 N/mm².



Figure 1: Remove the old surface

2.2 Steel surfaces

In steel constructions, make sure the surface is corrosion-free and has been roughened up. We recommend using sandblasting to remove all traces of dust particles.

2.3 Priming with Lucobridge® Primer 2000P

Priming and/or sealing applies for both steel and concrete surfaces. The Lucobridge® Primer 2000P (mixing regulation, section 5) is mixed at the construction site and applied over the entire area. The thickness of the layer should be approx. 1 mm.

Ensure no moisture or air bubbles are trapped.



Figure 2: Priming the surface

2.4 Binding with Lucobridge® Binder 2010 SB

For steel bridges, polymer membranes made of Lucobridge® PV-BIT are applied in a cavity-free manner over the entire surface. The environmentally-friendly acrylate Lucobridge® Binder 2010SB (activated with Lucobridge® Hardener 2001H) is applied evenly and over a wide area to the clean steel surface sealed with hard-set Lucobridge® Primer 2000P.



Figure 3: Binding the surface

Pay attention to the given environmental conditions to prevent a delayed or premature binding. Make sure the adhesive binding is complete. To prevent unnecessary odors from forming, please follow the information about binding time given in the mixing regulations and consider it a lower threshold. Membrane edges, which may not lie on the adhesive layer, must be weighed down. Distribute the adhesive evenly to prevent spilling over from the sides.

After mixing Lucobridge® Binder 2010SB with Lucobridge® Hardener 2001H at ambient temperatures, the application time (max. time for the membrane to be placed onto the adhesive layer) should not exceed approx. 2/3rds of the gel time (see Table 2). Otherwise, the binder will be too hard for the membrane to be glued to the steel deck.

2.5 The overlay of with Lucobridge® PV-BIT membranes

The primary membrane layer is to be laid into the active adhesive and arranged on-edge. After allowing curing of the adhesive, the resulting seams should be waterproofed by welding the Lucobridge® BIT membrane - cut in strips of approx. 10-12cm strips (weld strip) - onto the primary membrane layer's seam. The overlap-strips are to be welded very carefully. After heating (torch or hot air), the soft sealing-overlaps are to be pressed down preferably with a hand-roller. At 'T-points', the double overlay is to be heated, pressed down and smoothed out so that their heights are within tolerable levels. For waterproofing bridges, the rolls are to be arranged in traffic-direction. The rolls are never to be cut skewed except at the outer ends of the structure. Applied on curved bridges, the membrane-rolls are to be cut in shorter strips and arranged so that the overlap is never less than the prescribed length (see Figure 6a).



Figure 4: Laying edge-to-edge membranes

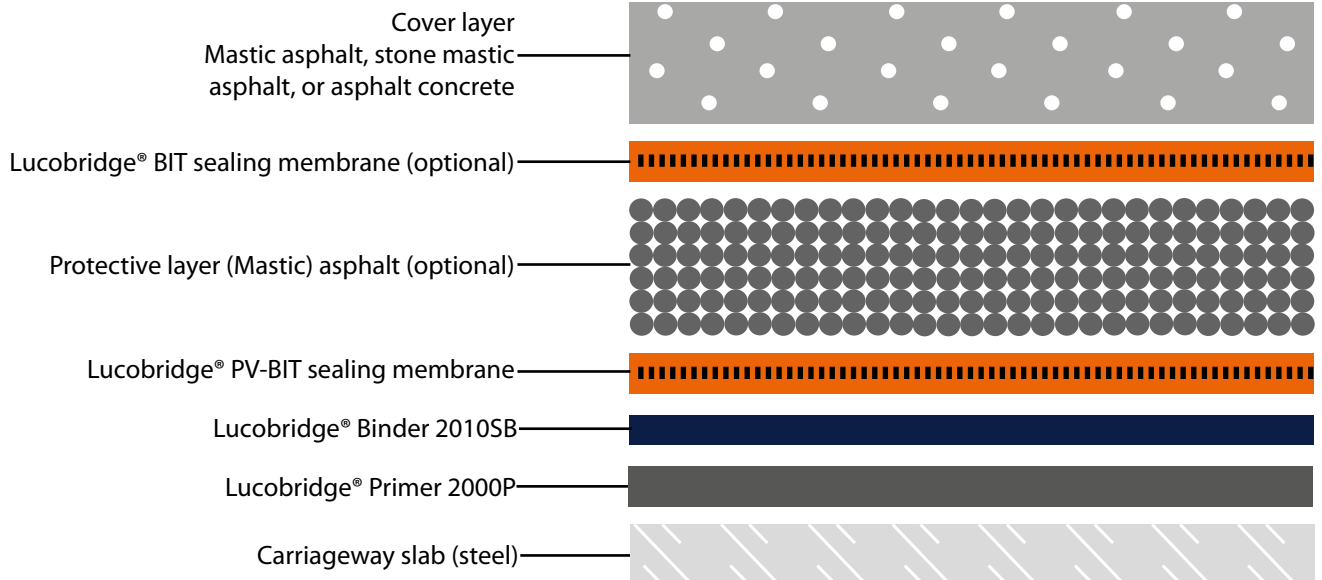


Figure 5: Two-membrane layers (mandatory) Dutch Bridge Design

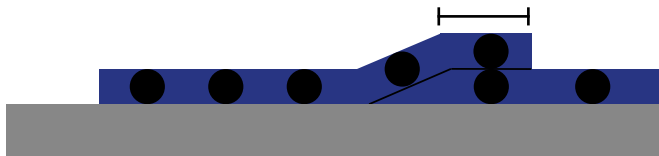


Figure 6a: Overlapping

If edge-to-edge welding was chosen, the overlay should be a 20cm Lucobridge BIT strip welded on top of the waterproofing layer with 10 cm on each side of the bottom edge-to-edge laid membranes (see Figure 6b).

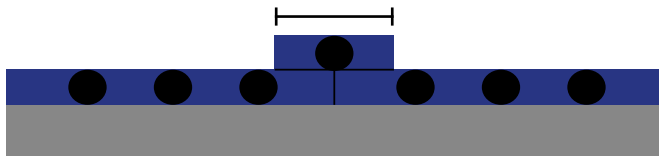


Figure 6b: Edge-to-edge

3 OTHER ATTACHMENTS

3.1 Mastic asphalt

The required layer of asphalt can be applied directly onto the closed surface of the Lucobridge® membrane with the PmB layer on top.



Figure 7: Lucobridge® PV-BIT membrane

3.2 Porous Asphalt

If a second seal is required, a Lucobridge® BIT sheet is welded onto the cooled asphalt. The hot seal must be compressed by means of a suitable tool (e.g. pressure block) in order to prevent cavities from forming in the area of overlap.

A cover layer can again be applied to this bituminous surface of the polymer membrane, e.g. mastic asphalt or also porous asphalt.

3.3 Additional scope of application

As well as sealing bridge supports made of steel or concrete, carriageways made with Lucobridge® are used as per DIN ISO 18532 for the permanent sealing of car parks, subterranean garages and tunnel constructions.

4 LUCOBRIDGE® PRIMER 2000P

The Lucobridge® Primer 2000P is mixed to form a ready-to-use mixture in portions with the enclosed Lucobridge® Hardener 2001H (Section 5).

The primer was tested by KIWA, Flörsheim, as per TL/TP-BEL-EP of ZTV-ING Part 7 Bridge Surfacing (test report P 9526 dated 17/09/2015).



Figure 8: Priming the surface

For Lucobridge® Primer 2000P, the manufacturing process and self-monitoring is certified according to EN ISO 9001.

The results are listed in Table 3a and 3b.

5 MIXING AND PROCESSING OF LUCOBRIDGE® PRIMER 2000P

5.1 Mixing with Lucobridge® Hardener 2001H

The Lucobridge® Hardener 2001H must be added to the Lucobridge® Primer 2000P in the amount indicated on the packaging and must be stirred intensively for at least 3 minutes. The powder must be dissolved fully in the primer. Do not stir by hand, always use a mechanical stirrer! (E.g. power drill with stirring apparatus etc.).

The sizes of the Lucobridge® Primer 2000P containers are 1 to 20 litres. A container of 20 L Lucobridge® Primer 2000P can be used to prepare from 40 m² (steel) up to 15 m² (concrete) depending on the substrate.

5.2 Processing and binding times

The Lucobridge® Primer 2000P mixed with the Lucobridge® Hardener 2001H responds quickly. The processing time for a mixture is influenced by the temperature and the amount of hardener used as shown in the following chart. The gel time is the time in which the material transitions from liquid to a solid state. Afterwards, the activated primer can no longer be processed. The binding time is the period of time after the material was applied to the surface and has completely cured.

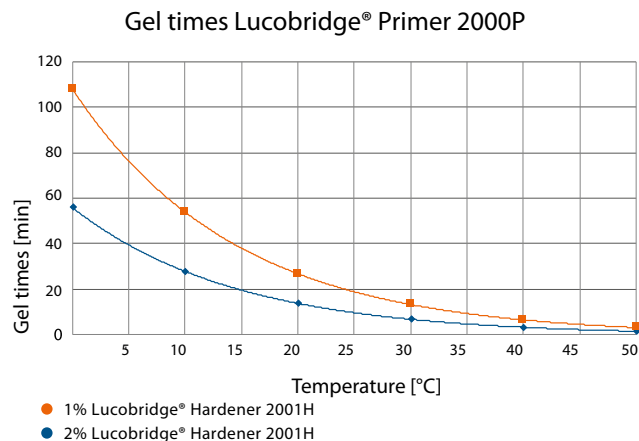


Figure 9: Gel times of the Lucobridge Primer 2000P with different hardener additives

These gel times are laboratory values taken from 50 g samples in each case. (see Table 1)

During the curing reaction of Lucobridge® Primer 2000P, re-action heat is released. This released heat accelerates the re-action and shortens the potential processing time and must be taken into account. This typical property of reaction resins can - for the most part - be compensated by splitting fresh mixtures into several smaller containers.

The binding time of the primer depends on the temperature of the substrate and the layer thickness (approx. 60 minutes/20 °C). After this time, layers with a thickness of approx. 300 µm are hard, adhesive-free and can be reworked. An additional waiting period for the next construction step is not required.

5.3 Requirements for the substrate

The following holds for all substrates: The surface must be dry, clean, free of substances which could interfere with the adhesion proven as well as sufficiently firm and load-bearing. The dew point of air during processing must be at least 3 °C higher than the temperature of the substrate.

Pay attention to direct sunlight! Lucobridge® Primer 2000P responds more quickly to warm substrates!

Steel: Without scale, rolling skin, and rust. A pre-treatment through sand- and shot blasting (surface quality "SA 2½") is appropriate.

Non-ferrous metals, zinc, aluminium: Lucobridge® Primer 2000P is not suitable as a primer for these metals. In these special cases, talk to our technical team.

Concrete: Cement laitance and fine layers must be removed, minimum strength 1.5 N/mm² in the tensile test.

5.4 Application

To prevent defects, Lucobridge® Primer 2000P must be applied in two layers. The product is liquid; it is appropriate to use rollers with a short thread as recommended similar to applying paint. The product should be rolled out fully and evenly; avoid puddling. Before applying the second layer, layer one should be fully hardened.

The primer does not need to be sanded down neither after the 1st nor after the 2nd step. Work can be resumed directly after curing in both the bitumen based construction using the torching method using Lucobridge® BIT as well as adhesive structure with the Lucobridge® Binder 2010SB and Lucobridge® PV-BIT binding agents.

Table 1: Approx. Gel Times of Lucobridge® Primer 2000P in minutes with Lucobridge® Hardener 2001H.

TEMPERATURE		0°C	5°C	10°C	15°C	20°C	25°C	30°C	40°C	50°C
1% Hardener	minutes	105	75	55	35	25	20	13	6	3
2% Hardener	minutes	55	40	28	20	14	10	6	3	1,5

5.5 Cleaning agent

Fresh contaminations through Lucobridge® Primer 2000P and the processing equipment can be removed by wiping off/ rinsing with the special cleaning agent (Lucobridge® Solvent 450); hardened product can only be removed mechanically.

5.6 Safety instructions

When working with the product, wear safety goggles and gloves. Lucobridge® Primer 2000P has an intensive odor before curing. When working with it in closed rooms, make sure there is adequate ventilation. The liquid product is combustible. When working with it do not smoke, and avoid open flames, fires and sparks.

Note the information in the PDS and MSDS (material safety datasheet)!

- Store Lucobridge® products in a cool, shaded place
- Never process Lucobridge® Primer 2000P without a hardener
- Always mix the primer and hardener thoroughly with a stirring apparatus
- Apply the primer thickly and evenly, avoid defects
- Note the dew point
- Do not mix too much material. Remember the reaction heat
- At elevated temperatures, distribute the material into multiple containers
- Remove fresh contamination from Lucobridge® Primer 2000P immediately
- When working with the product, wear safety goggles and gloves
- When working with the product, do not smoke, avoid open flames or light
- Follow the safety instructions in the Safety Data Sheet

Disposal instructions

Polymer bitumen- and bitumen membranes and site waste (European Waste Catalogue EWC Number 17 03 02 "Bitumen mixtures") can be used in thermal application processes without any harm to the environment.

6 LUCOBRIDGE® BINDER 2010 SB

The Lucobridge® Binder 2000SB is mixed with the Lucobridge® Hardener 2001H to form a ready-to-use mixture. The adhesive was tested by KIWA, Flörsheim, Report P9369

from 24.03.2017 as per TL/TP-BEL-ST of ZTV-ING Part 7 Bridge Surfacing. The results are listed in Table 3a and 3b.

Product benefits Lucobridge® Binder 2010SB

- high shear resistance during adhesion
- very good crack-bridging capacity
- wide working window
- excellent adhesion on pre-treated substrates
- high temperature resistance towards hot, directly applied asphalt
- corresponds to ZTV-ING Part 7 Section 1 and TL-BEL-B Part 1 and DIN 18195-2, Table 4, Line 11
- tested product monitored by third parties
- extremely low viscosity
- still hardens at low temperatures down to 5 °C
- heat-resistant, even when applying onto bitumen weld sheets

For adhesive Lucobridge® Binder 2010SB, the manufacturing process and self-monitoring is certified according to EN ISO 9001.

7 MIXING AND APPLICATION OF THE LUCOBRIDGE® BINDER 2010SB

7.1 Mixing with Lucobridge® Hardener 2001H

Spread the powder Lucobridge® Hardener 2001H in Lucobridge® Binder 2010SB and stir intensively until the powder is completely dissolved in the adhesive for at least 3 minutes. Do not stir by hand, always use a mechanical stirrer! (E.g. power drill with stirring apparatus etc.).

7.2 Processing and binding times

Lucobridge® Binder 2010SB mixed with hardener reacts quickly. The processing time of a mixture and thus the installation time of the sealing membrane is influenced by the temperature and amount of hardener (see following diagram). The gel time is defined as the time in which the material transitions from liquid to a solid state and can no longer be processed. After the gel time, the binding time begins in which the adhesive hardens.

Table 2: Approx. Gel Times of Lucobridge® Binder 2010SB in minutes with Lucobridge® Hardener 2001H

TEMPERATURE		0°C	5°C	10°C	15°C	20°C	25°C	30°C	40°C	50°C
1% Hardener	minutes	105	75	55	35	25	20	13	6	3
2% Hardener	minutes	55	40	28	20	14	10	6	3	1,5

Gel times Lucobridge® Binder 2010SB

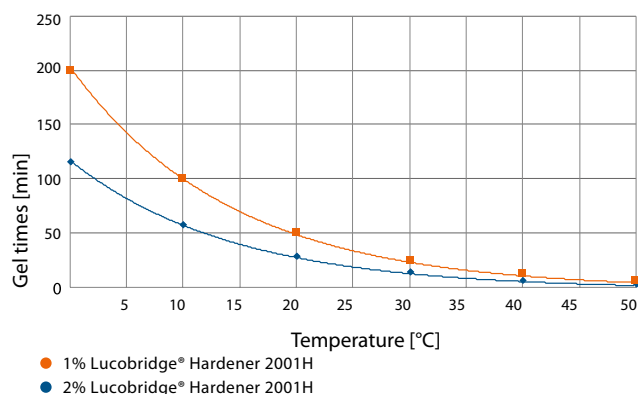


Figure 10: Gel times of the Lucobridge® Binder 2010SB with different hardener additive

These gel times are laboratory values taken from 50 g samples in each case. (see Table 2)

When using Lucobridge® Binder 2010SB reaction heat is released. This reaction heat accelerates the reaction and shortens the potential processing time and needs to be taken into account. This typical property of all reaction resins can for the most part be compensated by distributing fresh mixtures on several smaller containers. The binding time of the primer – depending on the temperature of the substrate and the layer thickness – approx. 60 minutes/20 °C. After this time, layers with a thickness of $\geq 500 \mu\text{m}$ are hardened.

7.3 Requirements for the substrate

The following holds for all substrates: The surface must be pre-treated with Lucobridge® Primer 2000P as an adhesive bridge, must be dry and clean. The dew point of air during processing must be at least 3 °C higher than the temperature of the substrate.

Pay attention to with direct sunlight! Lucobridge® Binder 2010SB responds more quickly to warm substrates!

7.4 Application

For the necessary adhesion of the sealing sheet over a large area, the adhesive bed must be sufficiently thick and even. To this end, toothed spatulas or toothed blades are used (a tool with a replaceable, serrated strip is suitable, with sharp teeth and 2 mm deep recesses). When installing over a larger surface, the activated adhesive must be applied with suitable machines. With blades vertical to the substrate, approx. 1 - 1.2 kg Lucobridge® Binder 2010SB is applied per m^2 with this configuration.

7.5 Cleaning agent

Fresh contamination through Lucobridge® Binder 2010SB and the processing equipment can be removed by wiping off/rinsing with the special cleaning agent Lucobridge® Solvent 450); hardened product can only be removed mechanically.

7.6 Safety instructions

When working with the product, wear safety goggles and gloves. Lucobridge® Binder 2010SB has an intensive odour before curing. When working in closed rooms, make sure there is adequate ventilation. The liquid product is combustible. When working with it do not smoke, and avoid naked flames, fire and sparks.

Note the information and MSDS (material safety datasheet)!

- Store Lucobridge® products in a cool, shaded place
- Never process Lucobridge® Binder 2010SB without a hardener
- Always mix the primer and hardener thoroughly with a stirring apparatus
- Apply the primer thickly and evenly, avoid defects
- Note the dew point
- Do not mix too much material. Remember the reaction heat
- At excessive temperatures, distribute the material into multiple containers
- Remove fresh contamination from Lucobridge® Binder 2010SB immediately
- When working with the product, wear safety goggles and gloves
- When working with the product, do not smoke, avoid open flames or light
- Follow the instructions in the safety datasheet

Disposal instructions

Polymer bitumen and bitumen membranes and site waste (European Waste catalogue EWC Number 17 03 02 "Bitumen mixtures") can be used in thermal application processes without any harm to the environment.

8 LUCOBRIDGE® PV-BIT MEMBRANE

Lucobridge® membranes consist of a "polymer core", an ECB (ethylene copolymer bitumen) sheet with a centered glass fiber mat which is enclosed on both sides with a polyester fleece.

With the Lucobridge® PV-BIT, only the upper side is given an additional PmB layer. It is used as a heat shield against asphalt layers to be installed subsequently securing the frictional connection with the Lucobridge® PV-BIT membrane.

The fleece on the reverse side however is firstly adhered to the steel surfaces prepared with Lucobridge® Binder 2010SB using Lucobridge® Primer 2000P.

External system tests have shown that the Lucobridge® system as a polymer cover exhibits an optimal shear coupling between steel and the asphalt cover. Given that a test and authorization standard does not currently exist for polymer membranes, the familiar TL/TP-BEL-ST documents were used as the basis for the assessment as given in table 4a and 4b.

Table 3a: Lucobridge® Primer 2000P and Lucobridge® Binder 2010SB - basic tests in accordance to TL/TP-BEL-ST, report P9369 dated 24.03.2017, KIWA

TL/TP-BEL-ST		STANDARD	CONDITIONS	UNIT	LUCOBRIDGE® PRIMER 2000P	LUCOBRIDGE® BINDER 2010SB	REQUIREMENTS TL/TP-BEL-ST
PROPERTIES OF LUCOBRIDGE® PRIMER 2000P UND BINDER 2010H, ISOLATED SUBSTANCES							
4.1	Density	ISO 2811	20°C	g/cm ³	0,944	1,169	-
4.2	Flow time	ISO 2431		sec	46 (4 mm)	-	-
4.3	dynamic viscosity	ISO 3219	23°C, 750 s-1	mPas	110	1200	-
4.4	IR spectrum	DIN 51451	-		passed	passed	-
4.5	TGA - mass lost	ISO 11358	600°C	%	98,5	71,5	-

Table 3b: Lucobridge® Primer 2000P and Lucobridge® Binder 2010SB - suitability tests in accordance to TL/TP-BEL-ST, cured, report P9369 dated 24.03.2017, KIWA

TL/TP-BEL-ST		STANDARD	CONDITIONS	UNIT	LUCOBRIDGE® PRIMER 2000P	LUCOBRIDGE® BINDER 2010SB	REQUIREMENTS TL/TP-BEL-ST
PROPERTIES OF LUCOBRIDGE® PRIMER 2000P UND BINDER 2010H, CURED SUBSTANCES							
5.1	Ash content	ISO 3451-1	16 h / 600°C	%	0	27,4	-
5.2	Non-volatiles content	ISO 3251		%	98,7	92,7	> 10
5.3	Content of binder	TP-BEL-ST 5.3		%	98,7	65,3	-
5.4	Pot life	TP-BEL-ST 5.4	up to 40°C	min	passed	passed	-
5.6	Grade of dryness	ISO 6427			passed	-	grade 6 after 24 h
5.9	Availability	TP-BEL-ST 5.9		MPa		1,6	N/A
5.12	Tear strength of binder layer	ISO 4624	30°C	MPa	-	2,5	>1,5

Table 4a: Lucobridge® PV-BIT membrane - basic tests in accordance to TL/TP-BEL-ST, report P9369 dated 24.03.2017, KIWA

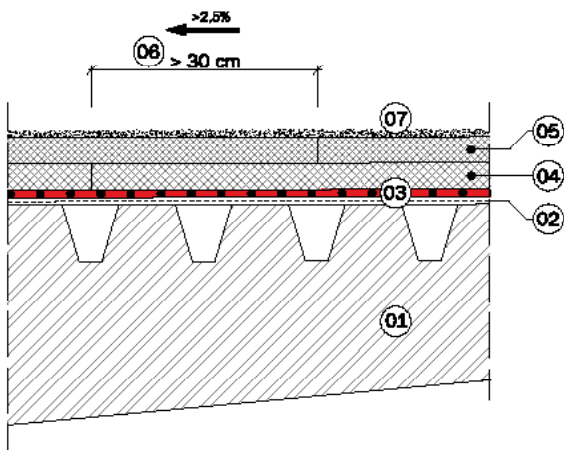
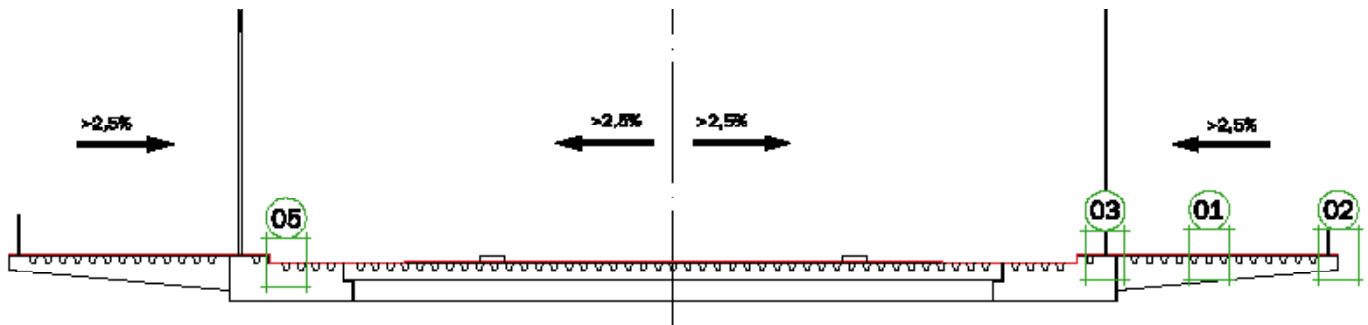
TL/TP-BEL-ST		STANDARD	UNIT	LUCOBRIDGE® PV-BIT	REQUIREMENTS TL/TP-BEL-ST
PROPERTIES OF LUCOBRIDGE® PV-BIT MEMBRANE					
7.1	Surface weight raw reinforcement insert	DIN 52123	g/m²	1160	> 175
7.2	Type and property of reinforced sheet	DIN 18192	-	ECB-membrane	-
7.3	Surface weight total membrane	DIN 52123	g/m²	2180	> 4500
7.4	Thickness of sheet	acc. to DIN 52123	mm	2,5*	4,5<xi<5,5
7.5	Thickness of adhesive layer top	TP-BEL-ST 7.5	mm	0,8*	< 0,5
7.7	Roll width	TP-BEL-ST 7.6	mm	104,4*	100 +/-1
7.8	Content of soluble parts	DIN 52123		44,7	> 70
7.9	Type and property of sheet	DIN 52133		ECB-membrane upper layer PmB (15% SBS)	no complaint
7.10	Distribution of polymers in the adhesive mass	TP-BEL-ST 7.10		N/A	
7.11	Maximum tensile force of sheet	acc. to DIN 52123	N/50 mm	1125 / 660 / 720	> 550
7.11	Elongation of sheet for maximum tensile force	acc. to DIN 52123	%	49 / 103 / 85	> 30
7.12	Water impermeability	acc. to DIN 52123	24 h / 2bar	passed	passed
7.13	Heat resistance	acc. to DIN 52123	°C	> 100	> 100
7.14	Availability at low temperatures	TP-BEL-ST 7.15	°C	-25	no crack -15

* The requirements of TL/TP-BEL-ST are not applicable

Table 4b: Lucobridge® PV-BIT system - suitability tests in accordance to TL/TP-BEL-ST, adhered, report P9369 dated 24.03.2017, KIWA

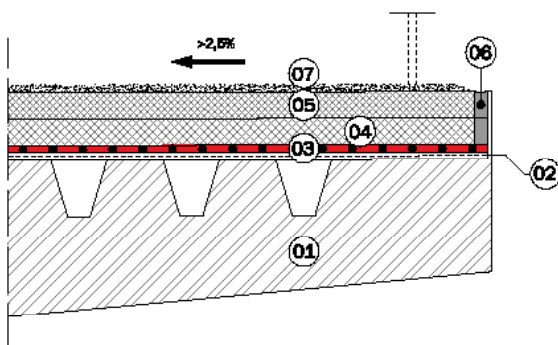
TL/TP-BEL-ST	STANDARD	CONDITIONS	UNIT	LUCOBRIDGE® PRIMER 2000P	LUCOBRIDGE® BINDER 2010SB	LUCOBRIDGE® PV-BIT	REQUIREMENTS TL/TP-BEL-ST
PROPERTIES OF LUCOBRIDGE® PV-BIT, ADHERED							
11.1	Heat resistance	16 h / 600°C	%		no glide down		no glide down
11.2	Tear strenght B _{HZ} of the adhesive layer at different temperatures	8°C 23°C 30°C	MPa		1,1 0,6 0,4		≥ 0,7 ≥ 0,4 ≥ 0,3
10.3.3	Resistance against corrosion	DIN 50021	14 d - salt spray test				no bubbles, no cracks corrosion grade Ri'=0 Wb < 2 mm
	Defects	DIN 55670	up to 40°C				no sparkover
	Tear strenght	acc. ISO 4624		MPa	2,3 - 4,2		> 3,0
11.5	Fatigue test	TP-BEL-ST 9.2.5		MPa	0,6		> 0,5

01 STEEL DECK BRIDGE-ROAD | ONE LAYER



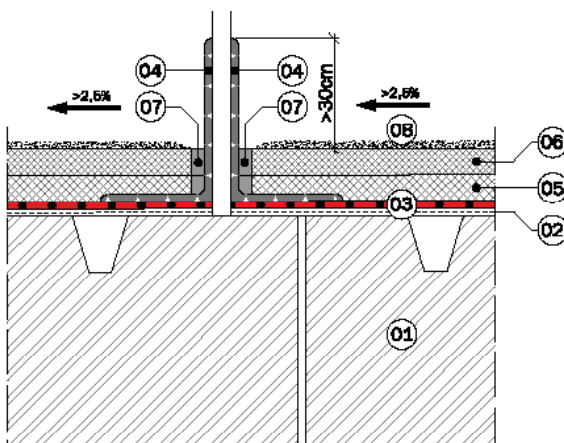
Detail 01 Pavement structure

- 07 Spread (grit)
- 06 Seam
- 05 Wearing course of mastic asphalt
- 04 Protective coat of mastic asphalt
- 03 Lucobridge PV-BIT waterproofing membrane
- 02 Primer + Binder
- 01 Steel bridge construction



Detail 02 Shaping of borders

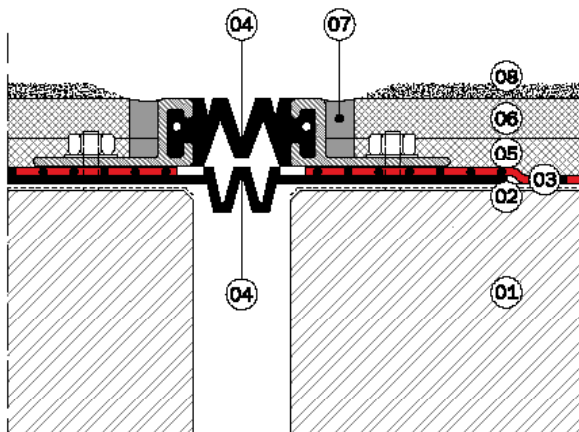
- 07 Spread (grit)
- 06 Bituminous joint
- 05 Wearing course of mastic asphalt
- 04 Protective coat of mastic asphalt
- 03 Lucobridge PV-BIT waterproofing membrane
- 02 Primer + Binder
- 01 Steel bridge construction



Detail 03 Light tower

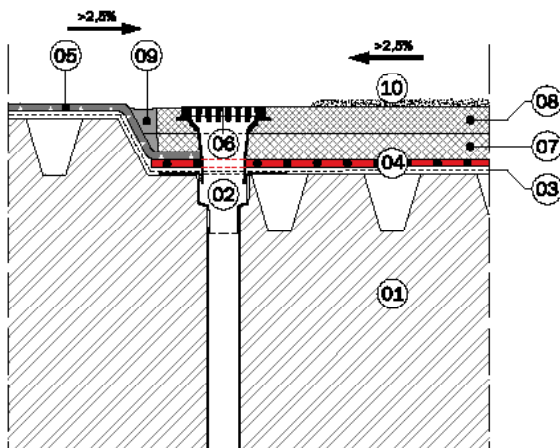
- 07 Spread (grit)
- 06 Bituminous joint
- 05 Wearing course of asphalt mastic
- 05 Protective coat of asphalt mastic
- 04 Waterproofing, liquid polymer, >30 cm a.TOS
- 03 Lucobridge PV-BIT waterproofing membrane
- 02 Primer + Binder
- 01 Steel bridge construction

01 STEEL DECK BRIDGE-ROAD | ONE LAYER



Detail 04 Expansion joint

- 08 Spread (grit)
- 07 Bituminous joint
- 06 Wearing course of mastic asphalt
- 05 Protective coat of mastic asphalt
- 04 Joint profile
- 03 Lucobridge PV-BIT waterproofing membrane
- 02 Primer + Binder
- 01 Steel bridge construction

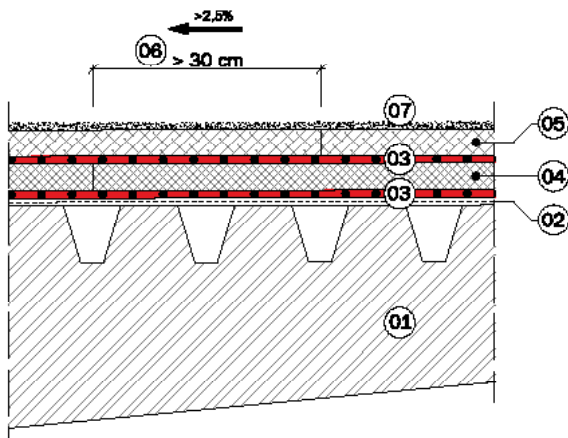
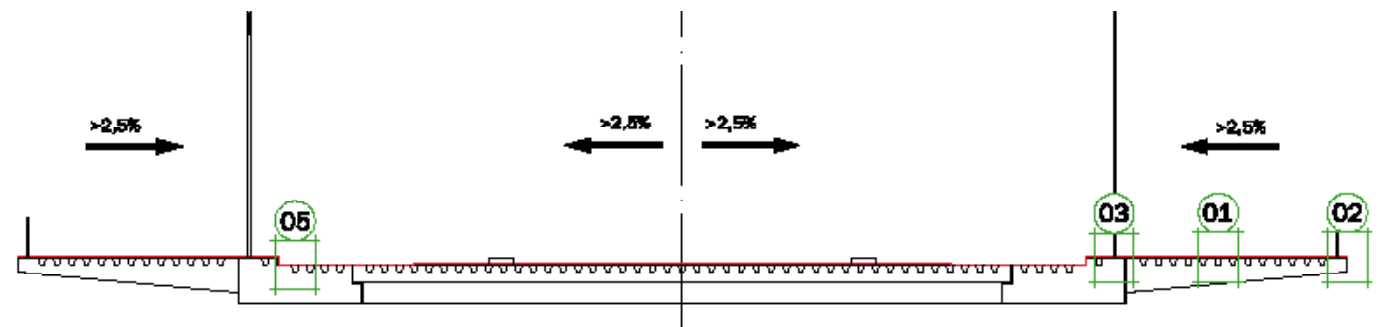


Detail 05 Bridge drains

- 10 Spread (grit)
- 09 Bituminous joint
- 08 Wearing course of mastic asphalt
- 07 Protective coat of mastic asphalt
- 06 Floor drain top section
- 05 Waterproofing, liquid polymer
- 04 Lucobridge PV-BIT waterproofing membrane
- 03 Primer + Binder
- 02 Floor drain subpart, welded
- 01 Steel bridge construction

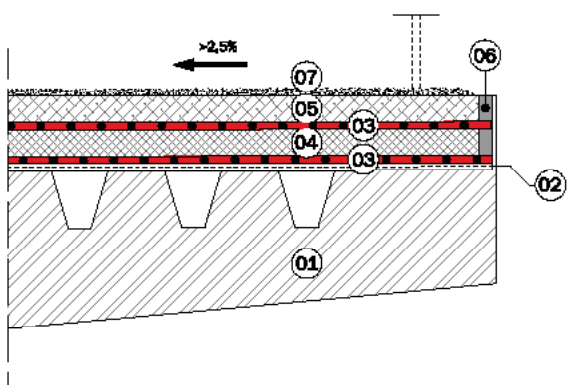


01A STEEL DECK BRIDGE-ROAD | DOUBLE LAYER



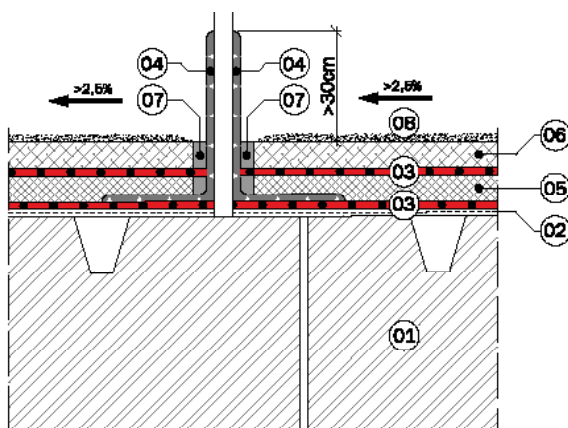
Detail 01 Pavement structure

- 07 Spread (grit)
- 06 Seam
- 05 Porous asphalt
- 04 Protective coat of mastic asphalt
- 03 Lucobridge PV-BIT / BIT waterproofing membrane
- 02 Primer + Binder
- 01 steel bridge construction



Detail 02 Shaping of borders

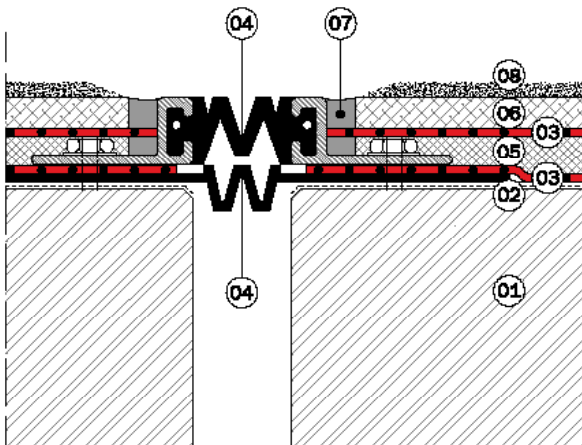
- 07 Spread (grit)
- 06 Bituminous joint
- 05 Porous asphalt
- 04 Protective coat of mastic asphalt
- 03 Lucobridge PV-BIT / BIT waterproofing membrane
- 02 Primer + Binder
- 01 Steel bridge construction



Detail 03 Light tower

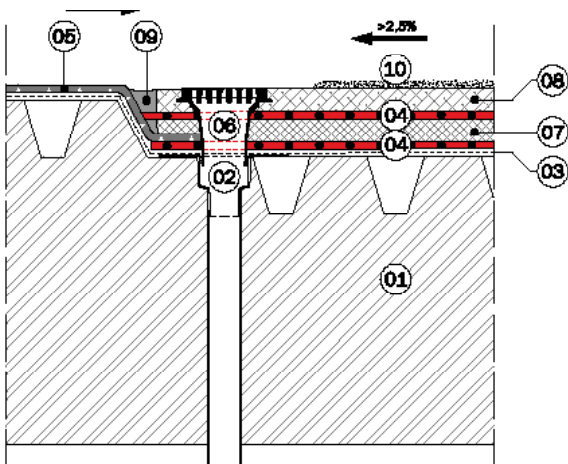
- 08 Spread (grit)
- 07 Bituminous joint
- 06 Porous asphalt
- 05 Protective coat of mastic asphalt
- 04 Waterproofing, liquid polymer, $>30\text{ cm}$ a.T.O.S
- 03 Lucobridge PV-BIT / BIT waterproofing membrane
- 02 Primer + Binder
- 01 Steel bridge construction

01A STEEL DECK BRIDGE-ROAD | DOUBLE LAYER



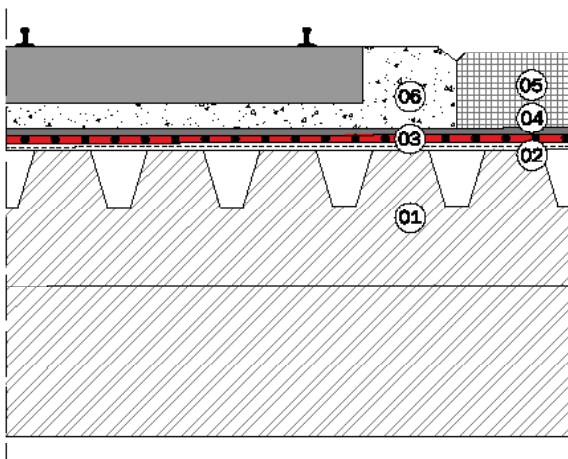
Detail 04 Expansion joint

- 08 Spread (grit)
- 07 Bituminous joint
- 06 Porous asphalt
- 05 Protective coat of mastic asphalt
- 04 Joint profile
- 03 Lucobridge PV-BIT / BIT waterproofing membrane
- 02 Primer + Binder
- 01 Steel bridge construction



Detail 05 Bridge drains

- 10 Spread (grit)
- 09 Bituminous joint
- 08 Wearing course of mastic asphalt
- 07 Protective coat of mastic asphalt
- 06 Floor drain top section
- 05 Waterproofing, liquid polymer
- 04 Lucobridge PV-BIT / BIT waterproofing membrane
- 03 Primer + Binder
- 02 Floor drain subpart, welded
- 01 Steel bridge construction



Detail 06 Safety curbs

- 06 Track bed
- 05 Safety curb
- 04 Protection mat
- 03 Lucobridge PV-BIT / BIT waterproofing membrane
- 02 Primer + Binder
- 01 Steel bridge construction

REFERENCES

BRIDGE CROSSING THE MAIN-RIVER AT
BETTINGEN

.....



DONNERSBERGER BRIDGE, MUNICH

.....



BRIDGE CROSSING THE MAIN-RIVER AT
MARKTBREIT

.....



GROSSHESSELOHER BRIDGE, MUNICH

.....



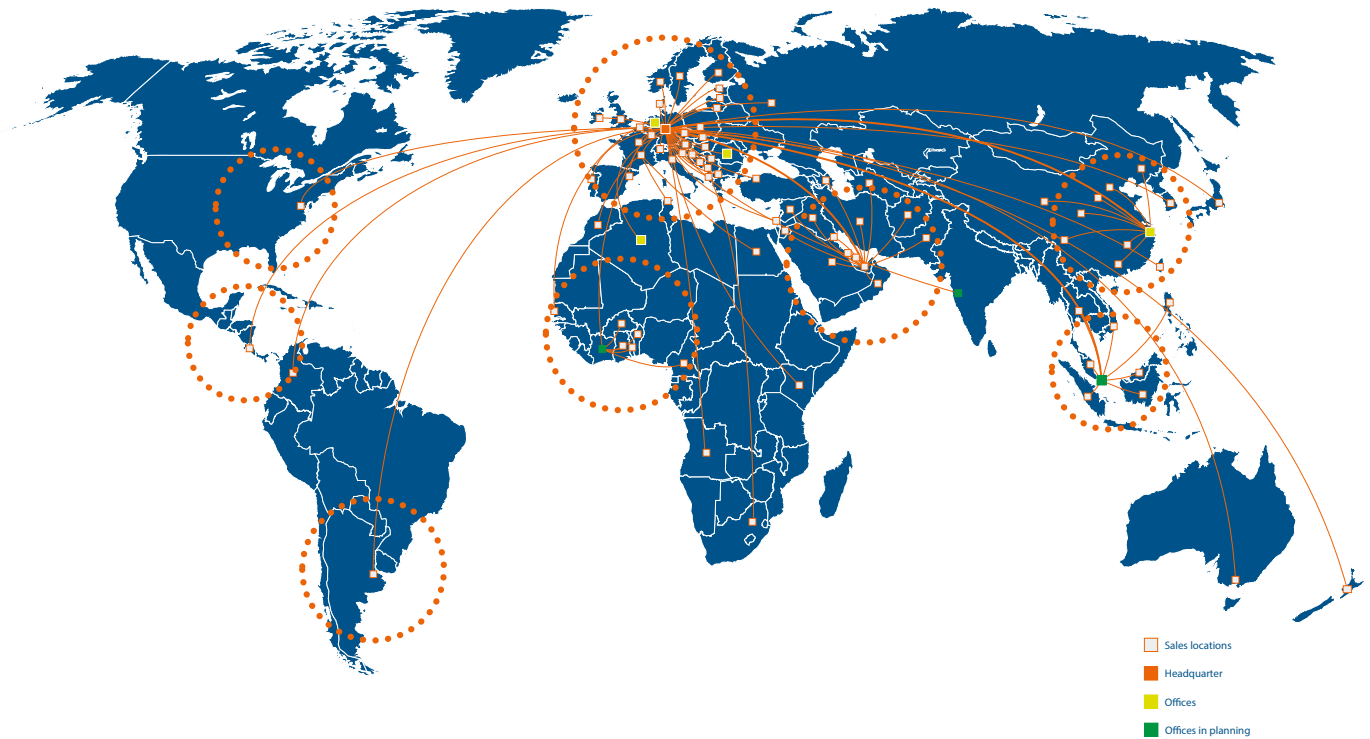
ICE BRIDGE, WALLDORF

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LOCATIONS



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