

LUCOBRIDGE® PV-BIT

WATERPROOFING MEMBRANES FOR STEEL BRIDGES

WATERPROOFING TECHNOLOGY WITH LUCOBRIDGE®



... a new Approach in Structural Waterproofing

A NEW APPROACH IN STRUCTURAL

WATERPROOFING

APPLICATIONS

The Lucobridge® PV-BIT membranes in combination with the proprietary adhesive system have been designed to waterproof any Steel Bridge construction. The advantages of using this innovative, new way of sealing steel bridge decks lies in its safe and simplified application.

The non-toxic way of applying the Lucobridge® system using an adhesive prevents damage to the membrane. In addition, resources are saved so that energy consumption has been reduced and thus contributes to saving CO₂ emissions to be released to the environment.

Consequently, the system has an extended lifetime due to its superior stress-crack resistance, resistance to perforation, pen-

etration and impact, low temperature workability, and thus also contributes to savings financial resources.

The hassle-free extended lifetime of the system was proven on steel bridge constructions. In that way it proved superior to the old-fashioned way of flaming membranes for waterproofing onto steel bridge constructions.

PRODUCT

Lucobridge® PV-BIT for steel bridges in combination with Lucobridge® Primer 2000P (proprietary resin priming coat for steel or concrete bridges) complies with ZTV-ING part 7, Section 1.

External tests showed that the Lucobridge® PV-BIT system exhibits an optimized interlocking system between the basic bridge construction and the top wearing course asphalt layers.

Lucobridge® PV-BIT consists of a 1,6 mm polymer modified bitumen thick ECB (ethylene-copolymer-bitumen) membrane with a glass-fiber fleece inlay and polyester mats on both sides. The top of this structure is then covered by a PmB layer (polymer modified bitumen). This side acts as a heat- and protective shield against hot asphalt mixes to be placed on top while the polyester fleece/mat on the bottom of the membrane is used as an interlocking layer between the membrane and the steel

construction below. The membrane is glued onto an evenly distributed layer of LUCOBIT AG's proprietary Lucobridge® Binder 2010SB adhesive after having primed the steel-base with Lucobridge® Primer 2000P.

This membrane system warrants an excellent cover for any cracks or breaks due to its superior elasticity even after ageing. The single ply membrane is conceived for the single-ply sealing under stone mastics asphalt, mastic asphalt or concrete.





ADVANTAGES

- Gluing of limits potential heat damage to the waterproofing membrane
- Reduced energy requirements
- Chlorine-free system
- Extremely tear-resistant due to built-in glass mat
- Easy to were flamed in both tested cases as single ply membrane for bridges
- High resistance to static loading due to its elasticity
- High resistance to impact, perforation and penetration
- Excellent behavior in low temperature
- Superior in counteracting cracks and breaks in the basic bridge structure
- Extremely high adherence to pretreated surfaces
- Excellent temperature resistance
- Aging-resistant
- UV-resistant

PROCESSING

The steel surface must be prepared according to regulations and must be pre-treated with Lucobridge® Primer 2000P primer (ZTV-ING Part 7, clause 1 resp. 4) and adhesive Lucobridge® Binder 2010SB.

Lucobridge® PV-IT has to be rolled out, free of voids with overlapping seams. These seams are glued with adhesive Lucobridge® Binder 2010SB according to detailed procedures. These details are found in the handling and laying instructions.

STORAGE

Lucobridge® PV-BIT should be stored upright, protected from moisture and heat.

WASTE DISPOSAL GUIDELINES

Polymeric bitumen- and bitumen membranes as well as other construction material waste acc. to the European Waste Catalogue EWC-No. 17 03 02 ("Bitumen mixtures") can be disposed of in and with thermal combustion disposal processes.



LINTRACK TEST RESULTS AT THE TU DELFT

Research investigations by using the membrane testing methodology developed at Delft University of Technology (TUD) shows that the adhesive strength of the membrane between the surfacing layers and the decks of steel bridges has a strong influence on the structural response of orthotropic steel bridge decks. The role of membrane layers in ensuring the composite action and hence the integrity of the surfacing system is crucial and is one of the most important requirements. In order to characterize the bonding response of the new bonding Lucobridge® technology of gluing the membrane onto the real bridge deck surfacing system, the LINTRACK accelerated pavement testing facility developed at TUD was utilized, see Figure 1 a.

The LINTRACK testing facility simulates a heavy vehicle moving on a real bridge deck panel. Depending on the requirement the tire load conditions, tyre type, number of passes and surrounding temperatures can be adjusted for any particular test. This testing facility can be used to evaluate the fatigue life and structural response of the pavement surface system, consisting of different layers of asphalt and membranes over a bridge deck panel, see Figure 1 b.

Experiments continued for 12 weeks during which membrane performances under strenuous exposure to tire pressure, various speeds as well as temperature fluctuations were assessed. The Lucobridge® membranes performed well during the testing period and no serious debonding or other damages were observed.

The tests revealed that strains on the steel deck were reduced after the asphalt surfacings were constructed. Although there is some minor difference in relative displacement (slipping) values between the Lucobridge® membrane and asphalt layer, the relative slip remained the same over time. On average, the relative slip between the top membranes remains around 0.7 mm throughout the test and not much difference has been observed with time, see Figure 2. Even after 12 weeks of continuous loading, no appreciable loss in stress carrying capabilities was detected both in transverse as well as in longitudinal directions.



Figure 1a: LINTRACK apparatus at TUD

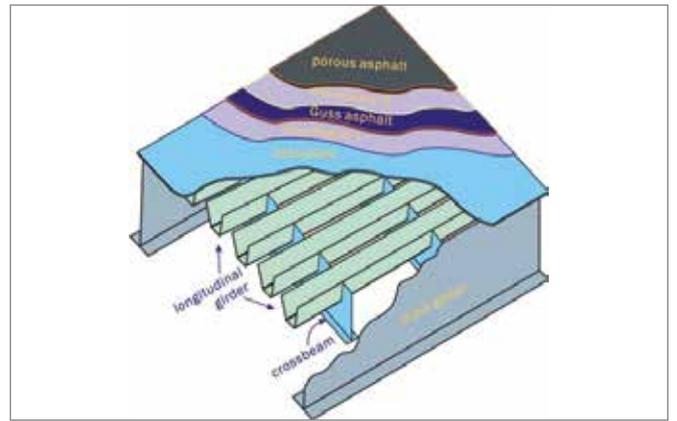
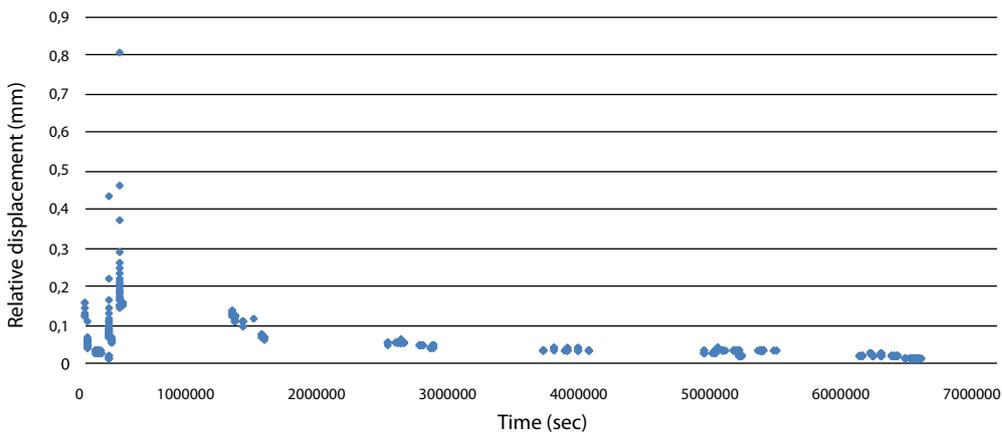


Figure 1b: Layout of the bridge deck surfacing system



Relative Displacement between Bottom Membrane and Guss-Asphalt in longitudinal Direction.

These test results impressively show that the new Lucobridge® Technology of gluing membranes has higher adhesive bonding strength with the surrounding material. Since NO adverse damage to the membrane through flaming can occur, thus, the waterproofing effect for bridge constructions has also been improved.

Table 1: 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 2: 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/m ²	1160	> 175
7.2	Type and property of reinforced sheet	DIN 18192	-	ECB-membrane	-
7.3	Surface weight total membrane	DIN 52123	g/m ²	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 3: 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

LOCATIONS



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