Repair and protection of bridges with Protectosil®

April 2011
Today’s challenges

- By the use of efficient surface protection the cost for repair of e.g. bridges can be reduced by up to 98%.
- Protectosil® materials have been proven to allow for an ecologically and economically sustainable repair and protection.*
- Typical problems such as freeze/thaw attack, alkali-silica reaction, ettringit formation or corrosion of reinforcement can be prevented by a protection with Protectosil®.

Our solutions for the repair and protection of bridges

**Protectosil® BHN**
- Hydrophobizing impregnation for concrete
- Excellent performance and outstanding durability because of deep penetration, high alkaline stability and water vapor permeable protection

**Protectosil® CIT**
- Hydrophobizing impregnation of concrete
- To stop and prevent chloride induced corrosion
- Excellent performance and outstanding durability because of deep penetration, high alkaline stability and water vapor permeable protection
- Unique mode of action

**Both systems**
- Are supplied ready-to-use
- Are easily and very fast applied by airless-spraying
- Are suitable for all types of concrete, old and new
Protectosil® BHN und CIT

- Are controlled according to DIN EN 1504-2
- Have the CE-sign
- Are listed at the German Federal Highway Research Institute (BASf)
## Repair and protection of bridges with Protectosil® BHN

### Storebelt West Bridge (DK)

**Info Storebelt West Bridge:**
- Built in 1992-98
- Length: appr. 6,6 km
- Treated with Protectosil® BHN (150 g/m²) in 1993

### Water uptake [g/m²]

<table>
<thead>
<tr>
<th></th>
<th>Untreated concrete</th>
<th>Concrete treated with Protectosil® BHN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>500</td>
<td>10</td>
</tr>
</tbody>
</table>

### Silane concentration [%]

<table>
<thead>
<tr>
<th>Depth [mm]</th>
<th>Untreated concrete</th>
<th>Concrete treated with Protectosil® BHN</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.7</td>
<td>0.1</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>0.5</td>
</tr>
</tbody>
</table>

A reduction of water uptake of appr. 87% together with a high penetration depth are the reasons for the long lasting protection offered by Protectosil® BHN.
Commodore Barry Bridge (USA)

- Built in 1970
- Length: appr. 3 km
- Rebar corrosion caused by the ingress of chlorides
- Treated with Protectosil® CIT (400 g/m²) in 2001

Long lasting protection from corrosion

Corrosion potential [mV]

Corrosion rate [µA/cm²]

Corrosion potential permanently reduced after Protectosil® CIT treatment

Corrosion rate permanently reduced after Protectosil® CIT treatment
References Bridges (excerpt)

1. Kantonstraße, Kanton Uri (CH), 1983
   Protectosil® BH
2. Albert Bridge, Windsor (UK), 2003
   Protectosil® CIT
   Protectosil® BH
4. Traneberg Brücke (S), 2005
   Protectosil® BHN
5. Tren Urbano (San Juan, PRI), 2000
   Protectosil® CIT
6. Hang Zhou Bay Bridge (CN), 2008
   Protectosil® BHN und CIT
7. Autobahn N5, Kanton Solothurn (CH), 2001
   Protectosil® BHN and ANTIGRAFFITI
8. A3 Biebelried, Rottendorf BW 300 (D), 2009
   Protectosil® ANTIGRAFFITI PRIMER and Protectosil ANTIGRAFFITI®
Protectosil ANTIGRAFFITI® is highly effective

Concrete wall for test purposes at Gate 3 of Evonik Degussa’s site in Rheinfelden

Sprayed paint does not adhere to surfaces treated with Protectosil ANTIGRAFFITI®