

Protectosil® – Innovative building protection

Exemplary case studies for the
effects of Protectosil®



EVONIK
INDUSTRIES

Longest sea bridge in the world Hang Zhou Bay Bridge (CN)

Test results from drill cores of the bridge

Concrete quality treated with	C40 Protectosil® CIT	C50 Protectosil® BHN
coefficient of water absorption [mm/min ^{1/2}]	0,009	0,007
penetration depth (concrete C45) [mm]	3,16	2,7
reduction of chloride uptake [%]	90,3	90,8

Protectosil® BHN and Protectosil® CIT meet the requirements set by Chinese standard JT/T 275-2000 and help raise the service life of this bridge to over 100 years.

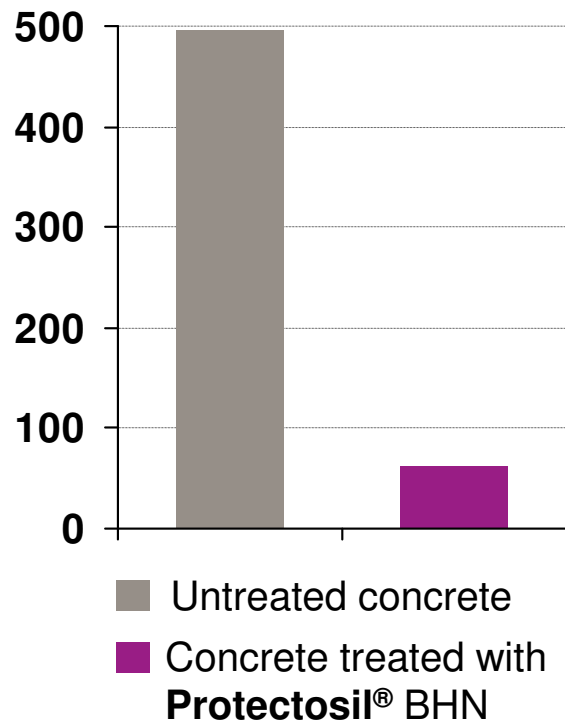
Info Hang Zhou Bay Bridge

- Built between 2003-2008 south of Shanghai
- 36 km total length
- Pillars protected with **Protectosil® CIT**, joints of bridge deck protected with **Protectosil® BHN**

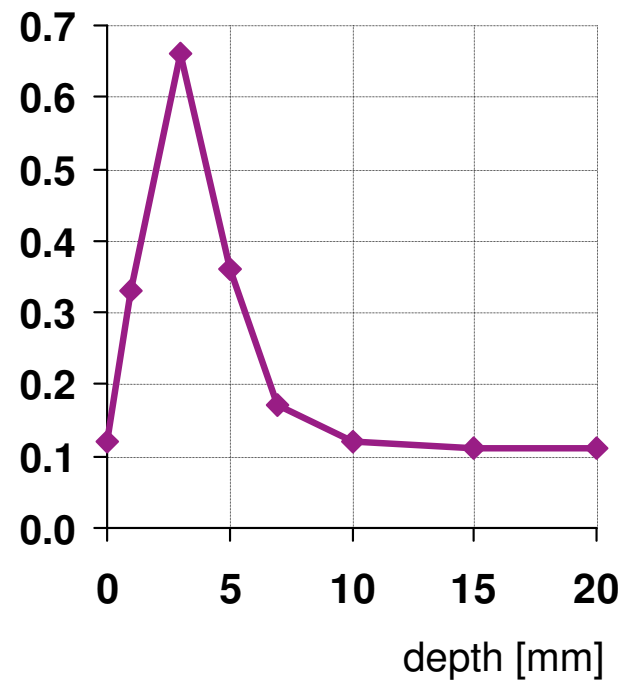


Storebelt West Bridge (DK)

Water uptake [g/m²]



Silane concentration [%]



Info Storebelt West Bridge:

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

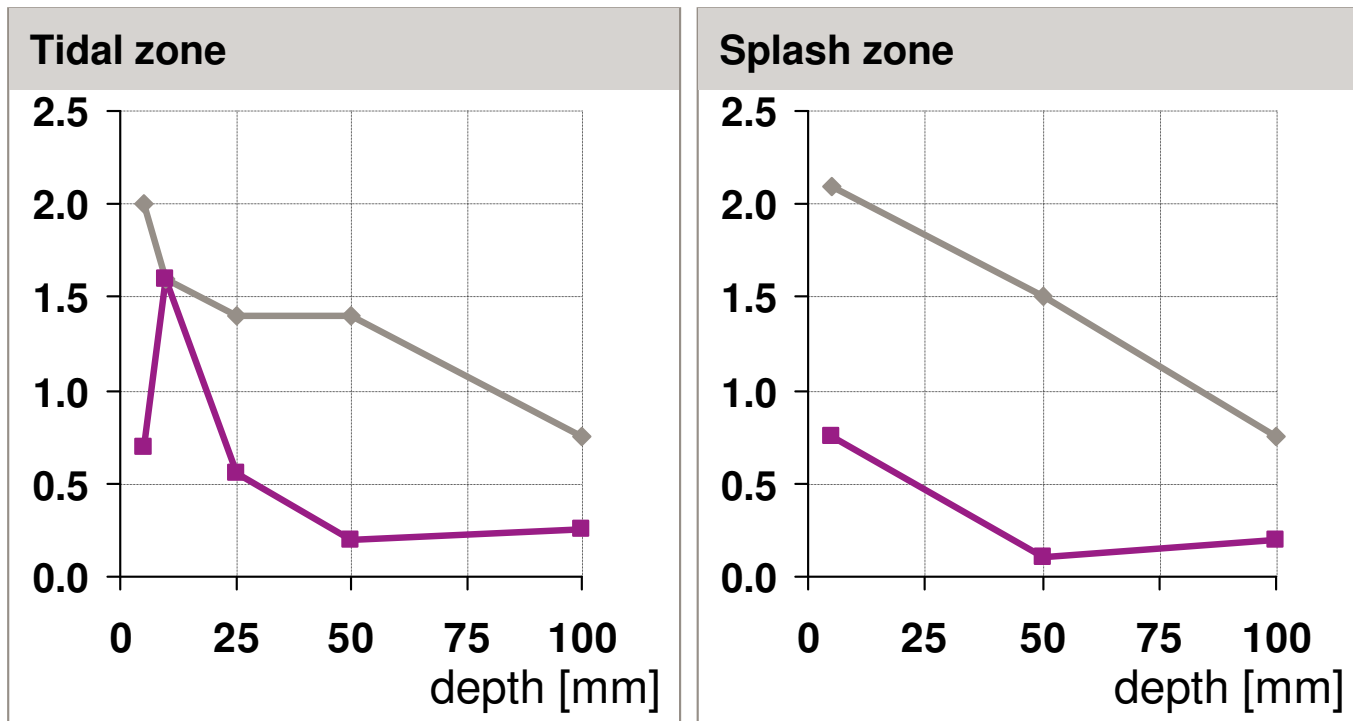


A reduction of water uptake of appr. 87% together with a high penetration depth are the reasons for the long lasting protection offered by **Protectosil**[®] BHN

Containerterminal Zeebrugge (BE)

Chloride concentration [% cement content] in 2005

— Untreated — Protectosil® BHN treated



- The chloride content in concrete with Protectosil® BHN protection was significantly lower after 12 years in service
- The service life was prolonged to over 100 years

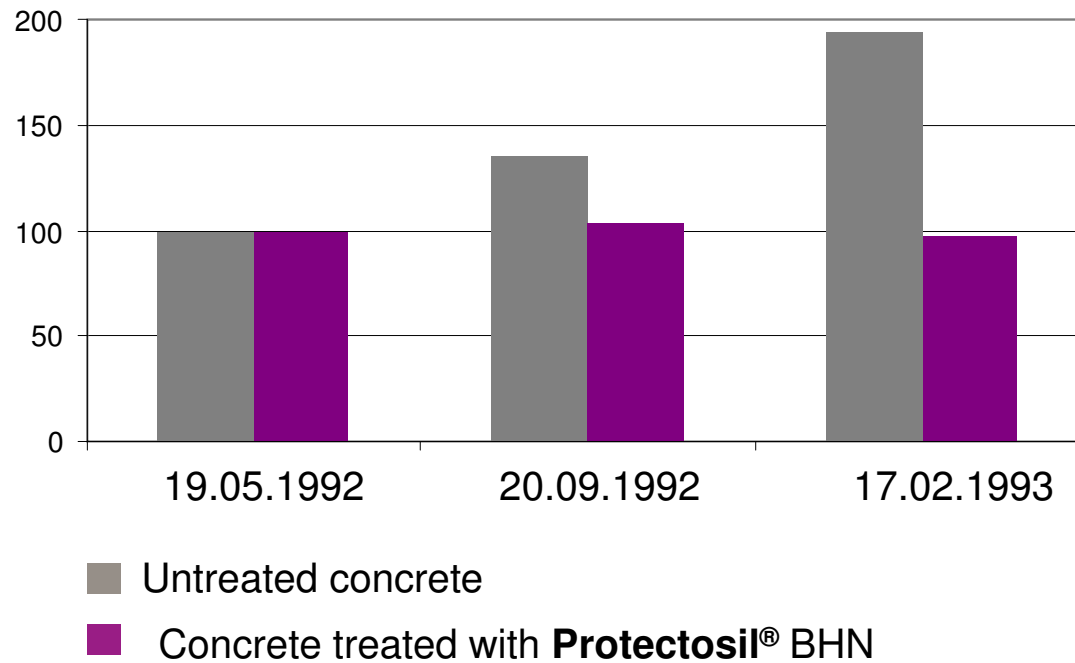
Info Containerterminal Zeebrugge

- Start of construction 1992
- Application of **Protectosil® BHN** in 1993
- Consumption 120-150 g/m² applied in 2 coats with a drying period of 7 days (total amount applied: appr. 300 g/m²)



Alkali-silica reaction successfully stopped: Railway sleepers (AUS)

% cracking [normalized to 100 at beginning of survey]



Info Railway sleepers (AUS)

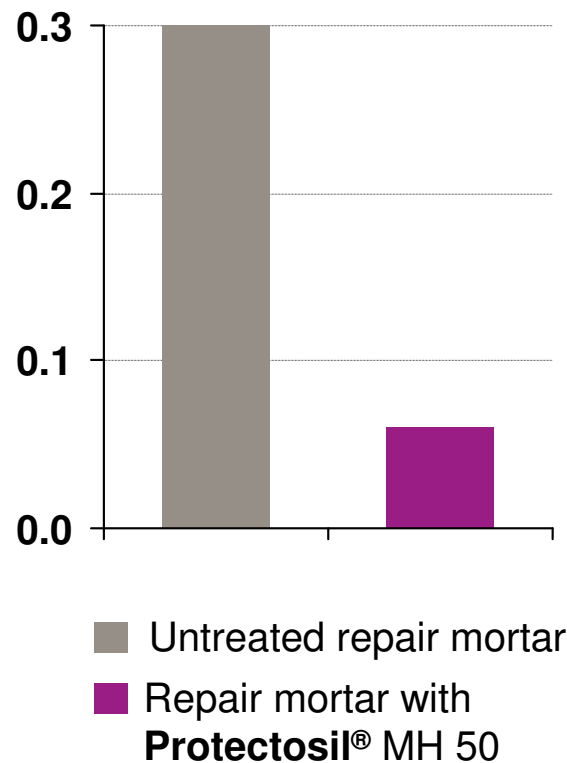
- Railway sleepers cast in 1978-1982 for Eastern Goldfield Railway
- Severe cracking due to ASR by 1992
- Treated with **Protectosil**[®] BHN (appr. 0,5 l/m²) in 1992



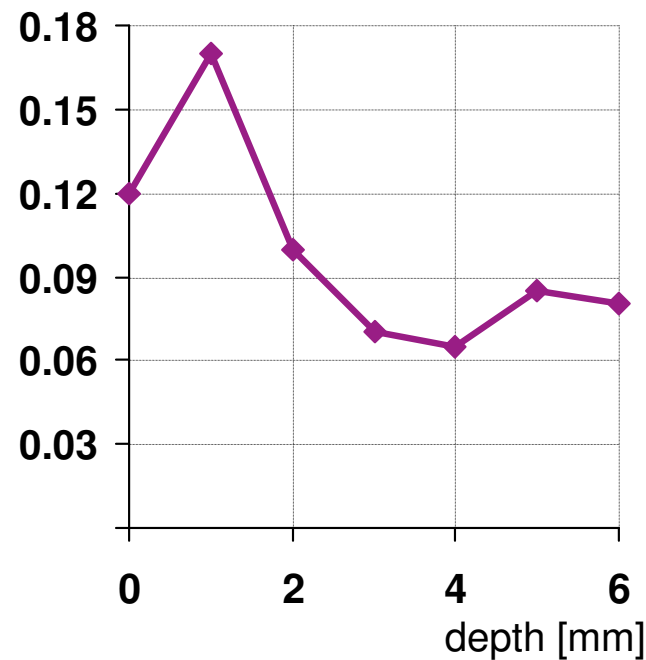
Protectosil[®] BHN stopped ASR and efficiently prevented further cracking.

Parking Garage, Basel (CH)

Water uptake [kg/m²h^{0,5}]



Silane concentration [%]



Info Parking Garage

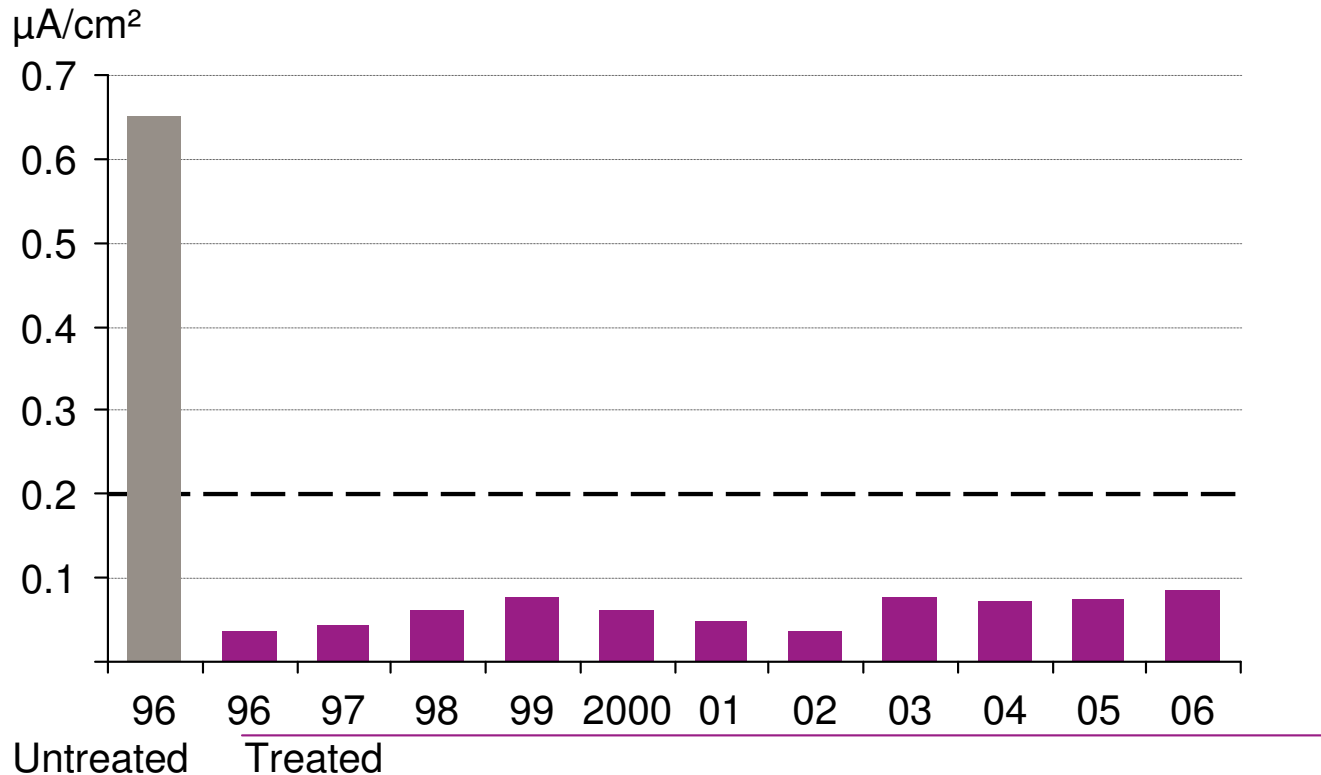
- Repair in 2002
- Repair mortar modified with **Protectosil®** MH 50 (2,6 wt% rel to cement weight)



A reduction of water uptake of approx. 90% was realized by the treatment with **Protectosil®** MH 50

Parking Garage, Pennsylvania (USA)

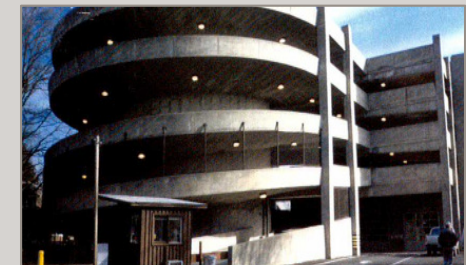
Average corrosion rate



- After the **Protectosil® CIT** treatment the average corrosion rate dropped well below the critical limit of $0,2 \mu\text{A}/\text{cm}^2$
- The rebars stayed passive for over 11 years now

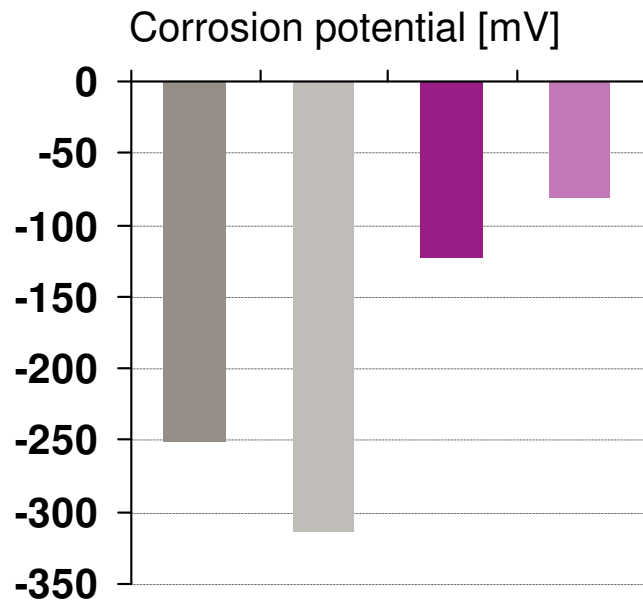
Info Parking Garage

- Built in 1960s, repair in 1996
- Rebar corrosion caused by the ingress of chlorides
- Treatment of 20.000 m^2 with **Protectosil® CIT**

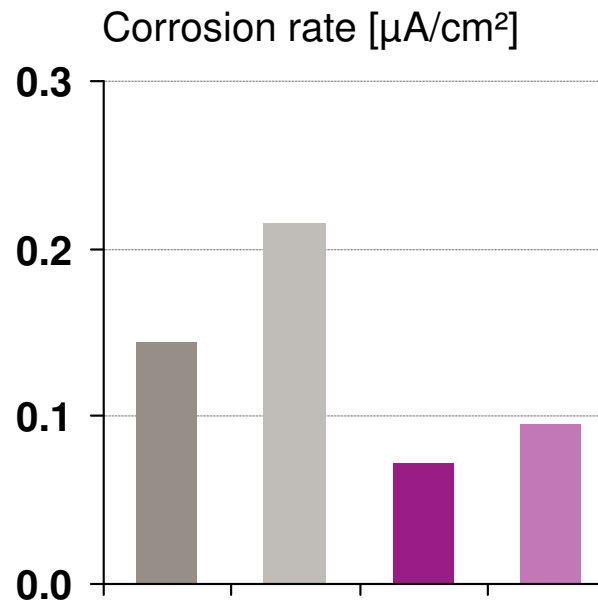


Commodore Barry Bridge (USA)

Long lasting protection from corrosion



Corrosion potential permanently reduced after **Protectosil®** CIT treatment



Corrosion rate permanently reduced after **Protectosil®** CIT treatment

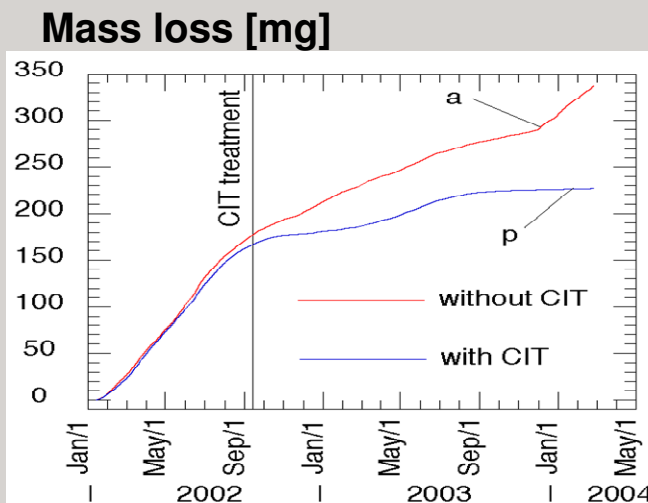
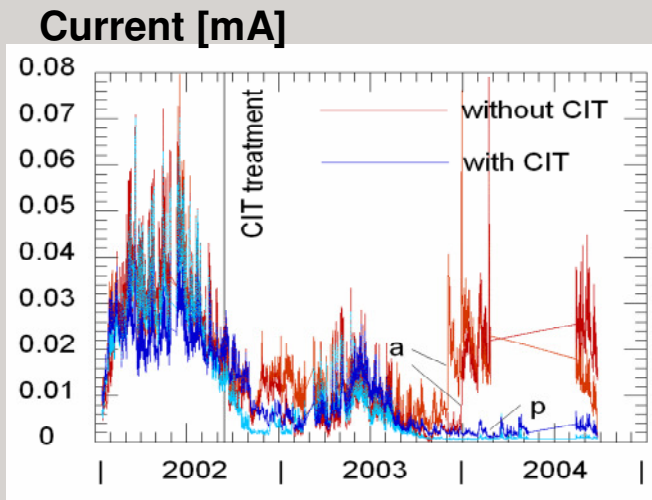


Info Commodore Barry Bridge

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



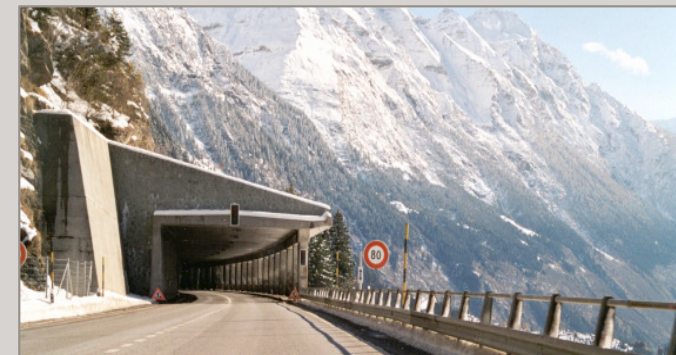
Gallery Cianca Presella (CH)



Protectosil® CIT protects the pillars from rebar corrosion and passivates corroding rebars.

Info Cianca Pressella

- Rebar corrosion caused by the ingress of chlorides
- Every second pillar treated with **Protectosil® CIT** (500 g/m²) in 2002
- Online monitoring of treated and untreated pillars over 3 years



Protectosil ANTIGRAFFITI® is highly effective



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



For more information visit:

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