Structural waterproofing

Joint Sealing Solutions for Waterproof Concrete Structures

www.dichte-bauwerke.de
BPA-GmbH
Manufacturer of high-quality sealing systems

- Founded: 1998
- 100% owned by CEMproof - Holding AG / CH
- Location: Herrenberg / Germany
- DIN EN ISO 9001:2008
- Manufacturing Locations in Germany and Switzerland
- All products are certified and approved (abP Public Test Approval / CE-Marks / Ü-Marks)
- Member: ÖVBB, DBV and STUVA

www.dichte-bauwerke.de
Dichte Bauwerke – Waterproof Construction

www.dichte-bauwerke.de
BPA joint sealing products
Quality made by BPA
Quality made in Germany
and Switzerland

BPA GmbH
Herrenberg, DE

www.dichte-bauwerke.de
Our References…

Neufeldtunnel in CH
Bjorvika Tunnel in NO
Seewinkeltherme in AT

Wankdorfstadion in CH
Potsdamer Platz in D
Linkou Tunnel Taiwan

B188 Silvrettastrasse in AT
Metro (Station) Sofia in BG
Bahnhof Zürich in CH

…and worldwide we do have many more references!
Structural Waterproofing...

Structural Waterproofing of Concrete Structures:

Water-resistant concrete structures, the so called „Waterproof Concrete Structures“ have gained increasing importance in recent years.

The weak points in these structures are the joints as well as all penetrations through the concrete structure itself. Specialized Engineers are therefore required to exercise particular care and observe best practice in their detailing and sealing in order to guarantee satisfactory waterproofing performance.

Sometimes additional water-reactive membranes such as CEMtobent, SilverSeal or DualProof can be additionally used in order to avoid concrete crack leakages.

We support you in all questions concerning the right and cost-effectice waterproofing design of your structure!

www.dichte-bauwerke.de
Structural Waterproofing and Joint Sealing…

1. Joint sealing / lift shaft
2. Joint sealing / sump pit
3. Joint sealing / CEMflex VB without a kicker
4. Joint sealing / rebar coupler
5. Joint sealing / expansion joint
6. Joint sealing / crack inducer
Joint Sealing:

**Construction Joint**
Joint formed between concrete bays marking a break in concreting operations; continuous reinforcement
- Quellmax, Predimax, CEMflex VB, Adhesive strip seal

**Expansion Joint**
Joint formed with gap between concrete faces permitting relative movement in at least one of several directions; discontinuous reinforcement
- CEMproof PVC waterbar

**Full-depth contraction Joint**
Joint separating structural elements over entire depth, allowing shrinkage (where joint opens) and compressive force transmission in case of expansion; discontinuous reinforcement
- CEMswell, Predimax, CEM 11, Adhesive strip seal

**Dummy Joint**
Controlled crack joint caused by shrinkage and thermal action.
- Crack inducer system with Quellmax or Predimax,
- Crack inducer system with CEMflex VB,
- CEMproof Crack inducer tube or
- Adhesive strip seal systems
Structural Waterproofing…

**Joint Sealing:**

- **CEMflex VB**
  - Embedding in concrete ≥ 3 cm *(No Kicker!)*
  - „active internal waterstop“
  - Tested up to 80 meter waterpressure = 8 bar

- **CEMproof waterbar**
  - Concrete Kicker required „external waterstop“
  - DIN 18197, DIN 18541

- **CEMproof waterbar**
  - Concrete Kicker required „internal waterstop“
  - DIN 18197, DIN 18541

- **CEMproof waterbar**
  - Adjustment to reinforcement „internal waterstop“
  - DIN 18197, DIN 18541

**Weiße Wanne**

- DIN 1045, DIN EN 206-1, DAFStb – wu Richtlinie, DBV-Merkblätter
- ÖVBB – Richtlinie „weiße Wanne“
- SIA 272
Structural Waterproofing...

Joint Sealing:

**PREDIMAX / CEM11**
Injection hose system
*Public Test Report* according to *German Standard = abP*

**QUELLMAX** bentonite waterstop
CEMswell hydrophilic rubber waterstop
abP

CEMproof liquid seal
CEMflex EP-sealing strip
Adhesive sealing strip 2000
abP

CEMproof liquid seal
CEMflex EP-sealing strip
Sealing strip 2000
abP

*With General Building Code Test Certificate (abP)*

[www.dichte-bauwerke.de](http://www.dichte-bauwerke.de)
Structural Waterproofing… …„Waterproof Concrete Structures“

„Weiße Wanne“ = „Waterproof Concrete Structures“
CEMflex VB Coated metal waterstop

CEMflex VB is a mineral coated steel plate waterstop! CEMflex VB is patented!
CEMflex VB is a "active" waterstop!

CEMflex VB is tested up to 8 bar waterpressure!

- Labyrinth sealing
- Crystallization sealing
- Active support of the natural sintering / crystallization as well as formation of limestone
- Extreme unique connection when imbedded in concrete
- General Building Code Test Certificate (abP)

CEMflex VB is an active cold joint waterstop. The active sealing is based on crystallization!

www.dichte-bauwerke.de
CEMflex VB Coated metal waterstop

Beginning: CEMflex VB has an extremely good connection to the surrounding concrete.

Water will be stopped in the cold joint!

Beginning of the crystallization process

Beginning of the sintering in the structure of the concrete natural formation of limestone.

This unique crystallization and sealing process is tested up to 5 bar water pressure at the University of Stuttgart / Germany and up to 8 bar at Vattenfall / Sweden.
CEMflex VB Coated metal waterstop

CEMflex VB supports the natural sintering / crystallization of the cold joint as well as the cracks. The overlapping is completely active sealed by crystallisation!

The CEMflex VB crystallization shown under a microscope

Calciumhydroxy based crystalline fibers
Calciumhydroxy based crystalline needles

The overlapping area of CEMflex VB (only 5 cm required) will react and seal automatically by water ingress! The active waterproofing process is finished within only a few hours and as a result water has no chance to enter!
CEMflex VB Coated metal waterstop

CEMflex VB
the crystallisation is already visible!

Crystallization! An active self healing process
► CEMflex VB is an „active“ waterstop steel plate!

www.dichte-bauwerke.de
CEMflex VB Coated metal waterstop

CEMflex VB, can be put directly into the fresh concrete!

CEMflex VB is an innovation by BPA!
CEMflex VB Coated metal waterstop

With General Building Code Test Certificate (abP)!
CEMflex VB is tested up to 5 bar waterpressure (German test report) and in Sweden approved for the use up to 8 bar waterpressure!
CEMflex VB Coated metal waterstop

CEMflex VB, is an active and very secure joint sealing waterstop and very simple to use!
CEMflex VB steel plate waterstop

...bituminous coated steel plate waterstops are not an option!
Traditional coated steel plate waterstop

Bituminous coated steel plate waterstop needs to be protected with a silicon paper.

Unpractical fitting = cost-intensive installation
Unpractical fitting = the removal of the silicon paper is very unpractical and therefore a risk for the total system!
Unpractical fitting = unpractical handling on construction site
Unpractical fitting = high risk because of sources of error!
Unpractical fitting = bituminous material is quite hard in winter time and quite soft in summer time. Bituminous material is a thermoplastic material and therefore is the handling dependent on the temperature!

The solution!
The waterreactive CEMflex VB! = utmost security!
No sources of error!
CEMflex VB steel plate waterstop

Form of Delivery / Storage
The single element is 2,000 mm long, 150 mm high and about 1.25 mm thick. In wooden boxes of 50 pieces = 100 m.

CEMflex VB can be stored in dry and cold conditions.

The elements are 2,000 mm long, 150 mm high and about 1.25 mm thick. The special coating is not sticky and therefore no protection foil is necessary, which has to be removed before concrete work starts.
CEMflex VB steel plate waterstop

Areas of Application CEMflex VB
CEMflex VB can be used in all construction joints, horizontally or vertically, up to a maximum water-pressure of 80 meter (8 bar).
Areas of application:
- Horizontal + vertical sealing of any concrete construction joints!
- Waterproof cold joints in foundation-, basement-, civil engineering work as well as in tunnel constructions, underground constructions and special-purpose solutions.

www.dichte-bauwerke.de
CEMflex VB steel plate waterstop

CEMflex VB, can be used easily in combination with so called sacrificial formworks. CEMflex VB is a very cost effective but also very secure solution for all kinds of cold joints.
CEMflex VB steel plate waterstop

Floor slab-sealing additionally with CEMtobent
CEMflex VB
site pictures
CEMflex VB
site pictures
CEMflex VB
Prefab elements
Joint Sealing with CEMflex VB

CEMflex VB
site pictures
**CEMflex VB**
CEMflex clamping plate for watertight connection to PVC waterbar (expansion joint)
BPA expansion joint waterbar
### CEM11
injection hose / injection tube

<table>
<thead>
<tr>
<th></th>
<th>CEM-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working material</td>
<td>PVC</td>
</tr>
<tr>
<td>Inside diameter of hose</td>
<td>6 mm (1/4”)</td>
</tr>
<tr>
<td>Outside diameter of hose</td>
<td>11 mm (7/16”)</td>
</tr>
<tr>
<td>Materials to be injected</td>
<td>PU- / EP- Resins, Acrylates, Unique - injectable</td>
</tr>
<tr>
<td>Max. length of injection hose</td>
<td>10 m</td>
</tr>
<tr>
<td>Outlet opening of outer hose</td>
<td>5 mm in distance of 2.5 cm</td>
</tr>
<tr>
<td>Weight</td>
<td>0.10 kg/m</td>
</tr>
</tbody>
</table>

(1 Zoll = 1 Inch = 2.54 cm)
CEM11
Block joint tunnel – practice pictures

Different injection hoses in one joint.

www.dichte-bauwerke.de
Construction joint in different steps – practice pictures

Construction

Application

Result
CEM11
CEM11 + CEMswell
CEMswell
hydrophilic rubber waterstop

For prefabricated concrete elements!
Tested and approved for 2 bar water-pressure!
CEMswell

For Tunnel Segments!
Tested and approved for
2 bar waterpressure!

Hydrophilic rubber waterstop!
CEMswell
Quellmax bentonite waterstop tape

Installation of QUELLMAX - with fitting rail -

Installation of QUELLMAX - with CEMstar adhesive -

www.dichte-bauwerke.de
Quellmax

QUELLMAX®
with rain-protection
= QUELLMAX - PLUS
with machine applied coating
-patented system-

QUELLMAX®
without rain-protection
= QUELLMAX - Blackstop

www.dichte-bauwerke.de
Quellmax

Installed with bonding agent
Quellmax

Installed with bonding agent corner
Quellmax

QUELLMAX®-Plus
72 hours rain-protection

Rainy days are QUELLMAX – PLUS days
Dichte Bauwerke – Waterproof Construction

Quellmax

www.dichte-bauwerke.de
Hydrophilic waterstop

Quellmax ◀ ▶ CEMswell

Quellmax is a bentonite based swelling waterstop and CEMswell is a hydrophilic rubber based waterstop.

- Bentonite based waterstops (QUELLMAX) are not staple during the swelling process and are increasing their volume (irregular in all directions) and are changing their structure as well as their form. The major advantage for the bentonite based waterstops is the self-injecting behaviour during the swelling process. Quellmax bentonite waterstop tapes are able to swell into the concrete honeycombs, cracks and joints to seal them! Bentonite waterstop tapes are swelling into the direction of the lowest resistance. The bentonite waterstop tape penetrated deep into the concrete structure and seals the cold joints permanent and secure.

- Hydrophilic rubber based waterstops (CEMswell) are staple during the swelling process and are just increasing their volume (in all directions the same rate) but are not changing their structure as well as their form. Therefore hydrophilic rubber based waterstops are not able injecting themselves into any honeycombs or concrete cracks. For this reason we do not suggest CEMswell for the use for in-situ concrete constructions but for prefabricated concrete construction.
Quellmax - CEMswell

In situ concrete construction

Cold joint sealing

Hydrophilic waterstop tapes can be used also for so-called open joints.

Prefabricated concrete elements

www.dichte-bauwerke.de