

General Building Code Test Certificate

- Translation -

Test Certificate No.: P-5147/258/09 MPA-BS
Test item: CEMflex VB and CEMflex VB NG

Intended use: Steel plate waterstop for construction joints and predetermined crack cross sections in in-situ concrete structures
(normal-flammability joint sealant for concrete members with a high water penetration resistance against pressing and non-pressing water and against ground moisture in compliance with Bauregelliste A, Part 2, No. 1.4)

Client: BPA-GmbH
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Date of first issue: 18/11/2009
Issued on: 24/08/2010
Valid until: 17/11/2014

Provided the conditions of this General Building Code Test Certificate are met, the above test item can be used as defined by Federal State Building Codes.

This General Building Code Test Certificate (abP) consists of 6 pages and 4 annexes.

This Test Certificate replaces Building Code Test Certificate (abP) No. P-5147/258/09 MPA-BS of 18/11/2009.



1 Test item and field of application

1.1 Test item

Both CEMflex VB and CEMflex VB NG are galvanised steel plates provided with a special, mineral-based coating on both sides. The steel plate waterstops have a cross section of 1.25 mm x 150 mm (CEMflex VB) and 1.25 mm x 150 mm, 30 mm of which are folded at a 90-degree angle on one side (CEMflex VB NG). The steel plate waterstops come in strip lengths of 2 metres, with Ω -shaped CEMflex holders and CEMflex clips or with Ω -shaped CEMflex holders and CEM 805 adhesive.

1.2 Field of application

The normal-flammability steel plate waterstops correspond to Bauregelliste A, Part 2, No. 1.4 (as amended). They are used to seal construction joints, vertical end joints of element walls and predetermined crack cross sections in in-situ concrete structures with a high water penetration resistance against pressing water. The CEMflex VB steel plate waterstop may be installed up to a water pressure of 0.8 bar (corresponds to an immersion depth of 8 m) in connection with construction joints, and up to a water pressure of 0.4 bar (corresponds to an immersion depth of 4 m) with end joints of element walls and predetermined crack cross sections in in-site concrete structures.

The CEMflex VB NG steel plate waterstop may be installed up to a water pressure of 2.0 bar (corresponds to an immersion depth of 20 m) in connection with construction joints.

The steel plate waterstops can be used in zones of frequently changing water levels. The waterstops comply with the utilization-class A requirements for stress classes 1 and 2 as set forth in the regulations for watertight structures (WU-Richtlinie) ¹.

The steel plate waterstops must be applied as specified in section 2.3 (product details).

2 Requirements made on the steel plate waterstop

2.1 Properties and characteristic values

The building products have the characteristic values shown in table 1, and they must be in conformity with these characteristic values.

The fitness for use of the steel plate waterstops was demonstrated in tests performed on the premises of the Materials Testing Institute (MPA) in Braunschweig. The test programme complied with the test principles for certification with General Building Code Test Certificates (abP) for joint waterstop elements used for concrete members with a high water penetration resistance against pressing and non-pressing water and against ground moisture (status: May 2008).

Construction joints and predetermined crack cross sections that are sealed with the CEMflex VB and CEMflex VB NG steel plate waterstops

¹ German committee for RC directive "Wasserundurchlässige Bauwerke aus Beton" (watertight structures made from concrete), November 2003



- provide adequate stability
- provide adequate adhesive strength
- are impervious to water
- provide adequate age resistance
for the field of application mentioned in section 1.2 above.

The building products conform with building class E requirements in accordance with DIN EN 13501-1.

2.2 Packaging, transport, storage and identification

The steel plate waterstops have to be handled and stored in such a way that they are not adversely affected in their intended properties.

The building products (packaging) have to be marked with product name, conformity mark (see section 4 below), name of manufacturer, date when produced, marking in compliance with the Ordinance on Hazardous Substances (GefStoffV), if required, as well as the batch number.

2.3 Product details

The steel plate waterstops normally have to be installed in a central position in construction joints / predetermined crack cross sections. The CEMflex VB steel plate waterstop must be embedded by at least 3 cm in the concrete on both sides. The CEMflex VB NG steel plate waterstop must be embedded by at least 6 cm in the concrete on both sides (e.g. 3 cm + 3 cm perpendicular leg). A minimum distance of 5 cm (or at least three times the size of the largest particle) must be maintained from the end of the member.

The waterstops are fixed on or at the reinforcement with the provided Ω -shaped CEMflex holders. Check that the waterstop cannot move or float while the concrete is being cast. CEMflex VB waterstop joints must overlap by > 5 cm and be secured with the provided CEMflex clips. CEMflex VB NG waterstop joints must overlap by > 5 cm and be glued tight with CEM 805 adhesive.

The manufacturer's product details in annexes 1 to 3 must be complied with.

3 Declaration of conformity

3.1 General

Confirmation that the above steel plate waterstops and adhesive are in conformity with the requirements set forth in the present General Building Code Test Certificate shall be provided for each production plant in the form of a manufacturer's conformity declaration. This declaration shall be issued on the basis of factory production control (FPC) and on the basis of an initial type test for the product, which is performed by an approved inspection body.

3.2 Type test

An initial type test is not required, because the samples used for testing were taken from the production process in the production plants as part of fitness-for-use attestation. If the conditions under which the product is manufactured should change, an initial type test must be made by an inspection body approved by construction supervisory authorities.



For initial type testing, the characteristic values must be verified on the basis of table 1. The obtained values must not differ from reference values by more than the tolerances shown in that table.

3.3 Factory production control (FPC)

A factory production control programme must be established for, and factory production control must be performed in, each production plant in compliance with DIN 18200.

Factory production control must be performed in compliance with the specifications shown in table 1, which reflect the special features of the products and the conditions for producing these products. The requirements made are based on the results of the initial test.

The results of factory production control must be recorded and evaluated by the manufacturer. The records must include the following details as a minimum:

- Name of the product
- Type of test or inspection
- Date when produced and date of test
- Test results and comparison with requirements
- Signature of person in charge of factory production control

The records must be kept for a minimum of five years and must be presented upon request.

Should testing supply inadequate results, the manufacturer must take immediate action to remedy any deficiencies noted. Non-conforming building products must be handled so that confusion with conforming and faultless building products is positively prevented. Once the deficiency has been corrected, the required test must be repeated to the extent that is necessary to prove adequate correction.

Table 1: Type and frequency of tests to be performed as part of factory production control

Properties	Test conditions	Requirements	Frequency
CEMflex VB and CEMflex VB NG steel plate waterstop			
Inspection of source materials	Manufacturer's declaration or suitable tests	No signs of change	Per shipment lot
Plate thickness Coating thickness Height	-	0.75 mm ± 10 % 0.25 mm ± 10 % 150 mm ± 10 % or 120 mm + 30 mm leg mm ± 10 %	Per lot or every 1,000 m
Bond characteristics	Section 4.4.1.1 of the test principles	1.0 N/mm ² ± 20 %	Per lot or every 1,000 m
Weight per unit area	-	1048 g/m ± 5 %	Per lot or every 1,000 m

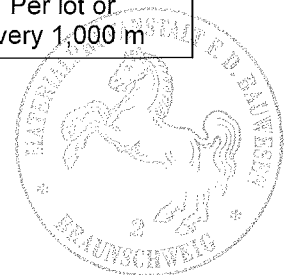


Table 1, cont'd: Type and frequency of tests to be performed as part of factory production control

Properties	Test conditions	Requirements	Frequency
CEMflex VB and CEMflex VB NG steel plate waterstop			
<u>Coating material</u> Ignition loss at T = 450 °C Ignition loss at T = 1000 °C SiO ₂ (silicon oxide) CaO (calcium oxide)	Test Report No. 900 8410 000 (MPA Stuttgart)	17.4 wt % ± 5 % (rel.) 28.0 wt % ± 5 % (rel.) 72.4 wt % ± 5 % (rel.) 22.6 wt % ± 5 % (rel.)	Per lot
CEM MS 805 adhesive			
Inspection of source materials	Manufacturer's declaration or suitable tests	No signs of change	Per shipment lot
Density:	DIN EN ISO 1183-1 immersion method	1.52 g/cm ³ ± 3 %	Per lot
Infrared spectrum	see annex 4	No signs of change	Per lot

4 Conformity mark

The building product must be marked by the manufacturer, using the conformity mark ("Ü" mark) in compliance with the conformity marking regulations of the federal states. The conformity mark must be provided on the packaging with all the required details.

5 Legal basis

This General Building Code Test Certificate (abP) is issued on the basis of articles 25a and following of the building code of Lower Saxony (NbauO) in conjunction with Bauregelliste A, Part 2, No. 1.4 (as amended).

6 General annotations

- 6.1 The General Building Code Test Certificate (abP) shall not be construed as replacing any of the building permits, approvals and certificates required by law for the performance of building projects.
- 6.2 The General Building Code Test Certificate (abP) is issued without prejudice to the rights of third parties, in particular, private property rights.
- 6.3 The contractor shall hold the General Building Code Test Certificate (abP), with all the details of execution (instructions for installation), available on site.



- 6.4 The General Building Code Test Certificate (abP) may not be copied unless as a complete text. Excerpts of the Certificate may only be published with the prior permission of the inspection body issuing the Certificate. The wording of, or drawings used in, advertising brochures must not be in conflict with the contents of the General Building Code Test Certificate. Translations of the General Building Code Test Certificate shall bear the note "translation of the German original not checked by the Braunschweig Materials Testing Institute".
- 6.5 The General Building Code Test Certificate (abP) is subject to revocation. The provisions of the General Building Code Test Certificate (abP) may be subsequently amended or revised, in particular if and when required as a result of new technical findings.

This document is the translated version of General Building Code Test Certificate No. P-5147/258/09 MPA-BS dated 24/08/2010. The legally binding text is the aforementioned German



Dr.-Ing. K. Herrmann
Head of Testing Laboratory



i.A.



M. Pankalla
Engineer/official in charge

Manufacturer's instructions for installation (annexes 1 to 3)

CEMproof®

CEMflex VB - "active" steel plate waterstop

Waterstop coated on both sides - for joint connection and sealing (with abP certificate)

With General Building Code Test Certificate (abP)!

CEMflex VB steel plate waterstop with connecting and sealing functions

... offers a much higher reliability than conventional waterstop plates, without the need of elaborate plate folding operations!

The **CEMflex VB** elements are provided on both sides with a **patented special coating**.

Since the special coating connects with the wet concrete, moisture is reliably prevented from bypassing the CEMflex VB waterstop system. In addition to providing an extremely good bond with the surrounding concrete, the special coating also "actively" enhances the natural sintering process that takes place in the concrete (active formation of limestone; active crystallisation).

Only 3 cm of the plate have to be embedded in the concrete for excellent sealing effects. Owing to the perfect bond, leaks that may result from concrete shrinkage are prevented at points of connection. The different elements are 2,000 mm long, 150 mm high and about 1.25 mm thick. The special coating is not sticky and therefore does not have to be covered with a protective film that has to be removed before the concrete is cast.

CEMflex VB - fields of application

CEMflex VB can be used in all construction joints, either horizontally or vertically, in the presence of pressing or non-pressing water.

Fields of application:

- Construction joint in wall/base areas, in the presence of pressing and non-pressing water
- Construction joint in wall/wall, floor/floor areas
- or in wall/ceiling areas
- Prefab-element connection: wall/base areas, corners, predetermined break zones

CEMflex VB product characteristics

Galvanised steel plate (0.75 mm wide; 2,000 mm long; 150 mm high); both sides provided with an 0.5-mm thick special "**active**" coating along their entire height of 150 mm. This coating forms a chemical bond with the concrete and permanently seals construction joints (► crystallisation).

CEMflex VB is an active steel plate waterstop that actively starts the crystallisation and sintering process!!

This active sealing process has been patented!!

CEMflex VB properties

The extremely good bonding effect produced between the coating and the concrete provides a perfectly tight material connection between the waterstop plate and the surrounding concrete.

The special coating, in addition, actively enhances the natural sintering/crystallisation process so that the joint becomes tighter and tighter.

CEMflex VB installation

The **CEMflex VB steel plate waterstop** with coating on both sides has to be placed centrally into the construction joint and fixed in that position (with Ω -shaped **CEMflex** holders).

Joints only require a 5-cm overlap. To adapt to bends and corners, the **CEMflex VB** plate can easily be bent to give it the required shape.

Joints do not have to be glued together, and there is no protective film that has to be removed before the concrete is cast! **CEMflex VB** can also simply be pushed into the freshly placed concrete (floor-to-wall joints)!

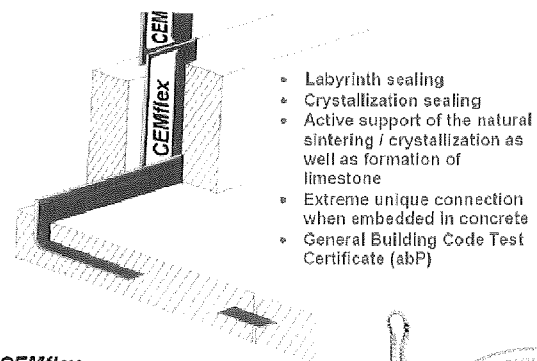
Delivered sizes

The different elements are 2,000 mm long, 150 mm high and 1.25 mm thick. They are delivered in wooden boxes with 50 units each = 100 running metres.

Storage

When kept in a cool and dry place, **CEMflex VB** can be stored for an unlimited period of time.

Installation example



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

CEMflex
steel plate waterstop

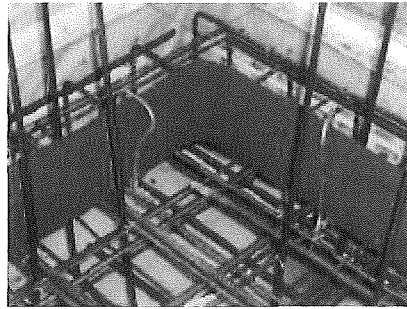
CEMflex Ω - holder



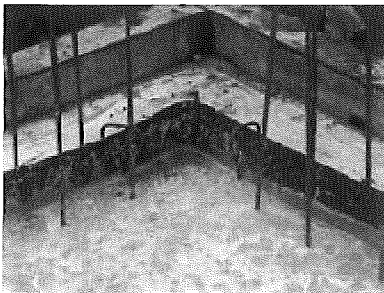
CEMflex VB - "active" steel plate waterstop

Installation options and accessories

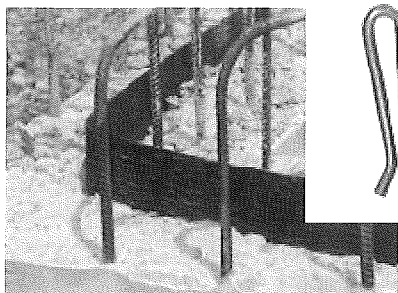
Installation options for the CEMflex VB steel plate waterstop



The **CEMflex VB steel plate waterstop** with coating on both sides has to be placed centrally into the construction joint and fixed in that position with **Ω-shaped CEMflex holders** (provide about 2 to 3 **Ω-shaped CEMflex holders** per element).



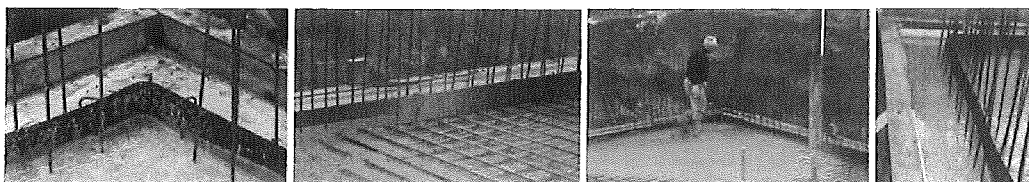
Do not remove cement spatter from the installed **CEMflex VB steel plate waterstop** after concreting. Cement spatter on the CEMflex VB do not have any adverse effect on the sealing properties in the joint, because the CEMflex VB coating is an active coating so that these areas will also fully crystallise! ► Active reliability!



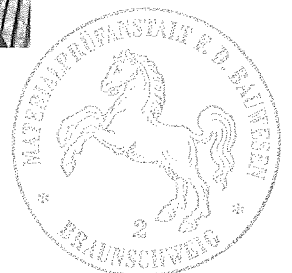
Place the **CEMflex VB steel plate waterstop** with active coating on both sides into the fresh concrete and fix overlaps with **CEMflex clips**. CEMflex VB can also simply be pushed into the freshly placed concrete! In this case **no** Ω-shaped CEMflex holders are required for fixing it!

- Joints only require a 5-centimetre overlap. Joints do not have to be glued! There is no protective film that has to be removed!
- To adapt to bends and corners, the **CEMflex VB** plate can easily be bent to give it the required shape.

Installation options for the CEMflex VB steel plate waterstop



CEMflex VB is very easy to handle and still offers active reliability!
Absolutely convincing technology!



CEMproof®

CEMflex VB NG - "active" steel plate waterstop

"New generation" (NG) waterstop coated on both sides - for joint connection and sealing

CEMflex VB NG steel plate waterstop with connecting and sealing functions

... offers a much higher reliability than conventional waterstop plates, without the need of elaborate plate folding operations!

The **CEMflex VB NG** elements are provided on both sides with a **patented "new generation" special coating**.

Since the special coating connects with the wet concrete, moisture is reliably prevented from bypassing the CEMflex VB NG waterstop system. In addition to providing an extremely good bond with the surrounding concrete, the special coating also "actively" enhances the natural sintering process that takes place in the concrete (active formation of limestone; active crystallisation).

Only 3 cm of concrete cover are necessary for excellent sealing effects. Owing to the perfect bond, leaks that may result from concrete shrinkage are prevented at points of connection.

The different elements are 2,000 mm long, 120 mm high, about 1.25 mm thick, and bent to produce a 30-mm leg. The special coating is not sticky and therefore does not have to be covered with a protective film that has to be removed before the concrete is cast. The plate leg, too, is completely coated for additional sealing effects and reliability!

CEMflex VB NG - fields of application

CEMflex VB NG can be used in all construction joints, either horizontally or vertically, in the presence of pressing or non-pressing water.

Fields of application:

- Construction joint in wall/base areas, in the presence of pressing and non-pressing water
- Construction joint in wall/wall, floor/floor areas
- or in wall/ceiling areas
- Prefab-element connection: wall/base areas, corners, predetermined break zones

CEMflex VB NG product characteristics

Galvanised steel plate (0.75 mm wide; 2,000 mm long; 120 mm high, 30 mm which are folded at a 90-degree angle); both sides provided with an 0.5-mm thick special "active" coating along their entire height H. This coating forms a chemical bond with the concrete and permanently seals construction joints (► crystallisation, swelling, sintering).

CEMflex VB is an active steel plate waterstop that actively starts the crystallisation and sintering process!!

This active sealing process is unique!!

CEMflex VB NG properties

The extremely good bonding effect produced between the coating and the concrete provides a perfectly tight material connection between the waterstop plate and the surrounding concrete.

The special coating, in addition, actively enhances the natural sintering/crystallisation process so that the joint becomes tighter and tighter.

CEMflex VB NG installation

The **CEMflex VB NG steel plate waterstop** with coating on both sides has to be placed centrally into the construction joint and fixed in that position (with Ω -shaped **CEMflex** holders).

Joints only require a 5-cm overlap. To adapt to bends and corners, just cut the **CEMflex VB NG** plate and bend it to give it the required shape.

Joints are permanently glued together with CEM 805 adhesive!

Delivered sizes

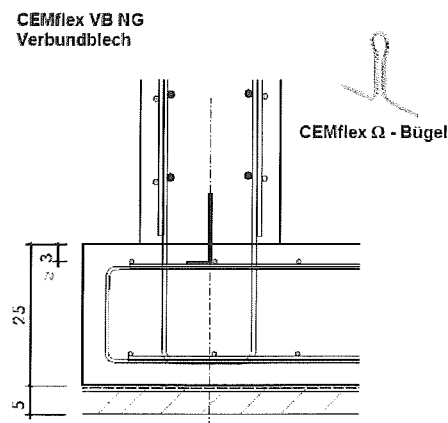
The different elements are 2,000 mm long, 120 mm high, 1.25 mm thick, and bent to produce a 30-mm leg. They are carefully packed in wooden boxes with 50 units each = 100 running metres.

Storage

When kept in a cool and dry place, **CEMflex VB NG** can be stored for an unlimited period of time.

Installation example

CEMflex VB NG steel plate waterstop



Ω -shaped CEMflex holder

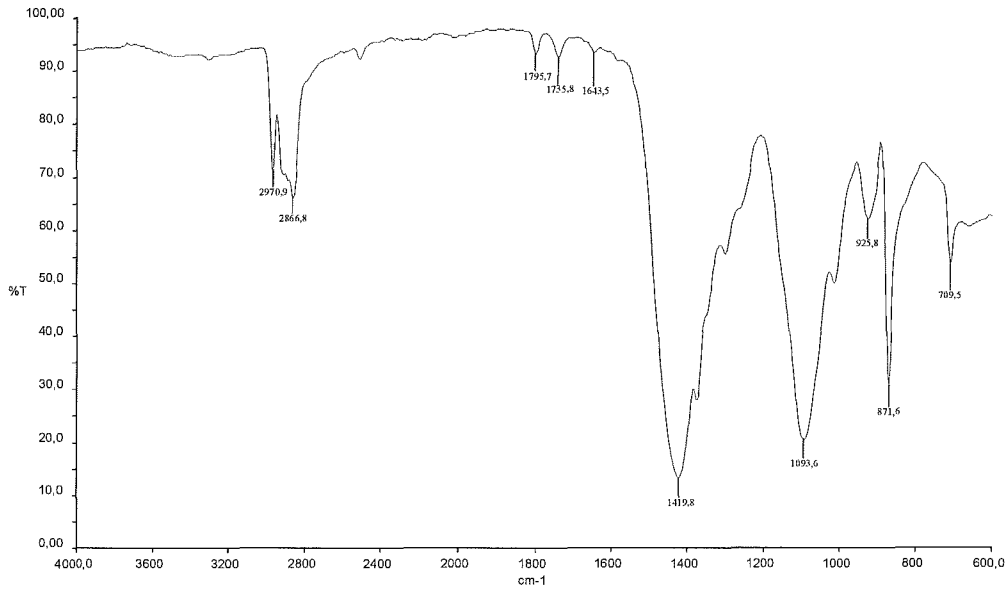


IR spectrum

CEM 805 adhesive

The infrared spectrum was recorded (pyrolysis) within a wave number range of 4,000 cm⁻¹ to 600 cm⁻¹. The layer thickness was selected so that the DIN 51451 requirements respecting extinction conditions were complied with.

Materialprüfanstalt für das Bauwesen,



53855x.sp - 13.10.2005 - Kleb-und Dichtstoff MS 805,

