

General Appraisal Certificate

Certificate number: P-5120/231/09 MPA-BS

Subject: Pentaflex[®] KB, Pentaflex[®] FTS, Pentaflex[®] OBS and
Pentaflex[®] ABS.

Intended use: Seam joints for sealing construction joints and break-off
elements in in-situ concrete structures

(Standard flammable joint seals for concrete
construction elements (FBB) with high water-ingress
resistance against pressurised and non-pressurised
water and ground humidity in accordance with
Building Regulations List A, Part 2, Sequential No. 1.4)

Applicant: H-Bau Technik GmbH
Am Güterbahnhof 20
79771 Klettgau

Application date: 11.08.2010

Valid until: 11.10.2014

This general appraisal certificate permits the use of the above-referenced products in accordance with Regional Building Regulations.

This general appraisal certificate replaces the general appraisal certificate no. P-5120/231/09 MPA-BS of 22.03.2010.

This general appraisal certificate comprises 6 pages and 15 appendices.

1. **Subject and range of applications**

1.1 **Subject**

Pentaflex® KB is made from galvanised steel plate with bitumen coating on both sides. The seam joint has the dimensions 167 mm x 1.4 mm (height x thickness) or 80 mm x 1.4 mm and is supplied with easily-removable protective strips.

For the Pentaflex® FTS and Pentaflex® OBS type of seam joint, additional metal plate profiles are provided on the Pentaflex® KB seam joint (dimensions 167 mm x 1.4 mm) as an aid in creating break-off locations.

The Pentaflex® ABS formwork elements into which the Pentaflex® KB seam joints are inserted.

1.2 **Range of applications**

The standard flammable seam joints can be assigned to the Building Regulations List A, Part 2, Sequential No. 1.4 as amended from time to time, and serve to seal working joints, vertical butt joints for prefabricated walls and planned break-off sections in in-situ concrete structures with high water-ingress resistance for sealing of structures against pressurised water up to a pressure of 2.0 bar (dimensions 167 mm x 1.4 mm) and accordingly 1.0 bar (dimensions 120 mm x 1.4 mm and 80 mm x 1.4 mm).

The seam joints are suitable for water change zones. The sealing fulfils the requirements of Utility Class A for Load Categories 1 and 2 corresponding to the directives¹ on water impermeability.

In principle, the seam joints are to be inserted in accordance with the details given in 2.3 (erection).

2 **Laminate sheet requirements**

2.1 **Characteristic values and properties**

The construction products exhibit the characteristic values given in Table 1 and must be consistent with these.

The verification of the serviceability of the seam joints was undertaken in the Materialprüfanstalt [Material Testing Institute], Stuttgart or the Materialprüfanstalt, Braunschweig. The test programme corresponded to the testing principles for the issuance of general appraisal certificates for joint sealings for concrete construction elements with high water-ingress resistance against pressurised and non-pressurised water and ground humidity (status 05/2008).

The sealed working joints and break-off sections using the Pentaflex® KB, Pentaflex® FTS, Pentaflex® OBS and Pentaflex® ABS seam joints are suitable for the application areas specified in section 1.2.

¹ German Committee for Reinforced Concrete Guidelines "Water impermeable concrete structures" November 2003 Issue

- stable
- excellent bonding
- water impermeable
- non-ageing

The construction products fulfil the requirements of building materials class E in accordance with DIN EN 13501-1.

2.2 Packing, transport, storage and labelling

Packing, transport and storage must be carried out such that the effectiveness of the seam joints is not impaired. It is necessary to ensure that the protective film is not damaged or removed prematurely.

The building products (packaging) are to be labelled with the product name, conformity mark (see section 4), manufacturer's name, date of manufacture and, if required, labelling in accordance with GefStoffV [Hazardous Substances Ordinance] as well as the batch number.

2.3 Erection

Generally, the seam joints are inserted centrally in the construction joints or break-off sections. The seam joints must be embedded in the concrete at least 3 cm on each side. Maintain a minimum separation of 5 cm, or at least three times the size of the largest grain, from the edge of the construction element.

The joints are attached using the appropriate, variable, holding modules on or at the reinforcement. Make sure that no displacement or floating is possible during concreting. The butt areas are overlapped > 5 cm and pressed firmly together after removing the protective film. Finally, the areas are secured using the appropriate joint clips.

The respective protective film should be removed shortly before concreting.

Annexes 1 to 15 contain manufacturer's information on the erection. The information has been checked with regard to consistency in the results of the first test and for plausibility.

3 Proof of conformity

3.1 General

Confirmation of the conformity of the designated seam joints Pentaflex® KB, Pentaflex® FTS, Pentaflex® OBS and Pentaflex® ABS with the provisions of this General Appraisal Certificate must be made for each manufacturer's plant with a manufacturer's declaration of conformity on the basis of an in-house production control (WPK) and an initial type-test of the product by an appropriately accredited test institute (UHP).

3.2 Initial type-test

The initial type-test can be omitted because the samples for the tests within the framework of the proof of fitness for purpose were taken from the ongoing production at the manufacturing plant. If the production circumstances change, an initial type-test must be undertaken by an appropriately accredited test institute.

Verification of the characteristic values given in Table 1 is to be undertaken within the framework of the initial type-test. In this, the maximum deviation of the test values from the reference values must match the tolerances stated in the table.

3.3 In-house production control (WPK)

The manufacturer must set up and carry out an in-house production control (WPK) in accordance with DIN 18200.

The in-house production control must be carried out according to the stipulations given in Table 1 for the products and the provisions matched to their conditions of manufacture. The results of the basic test form the basis of the specified requirements.

The manufacturer logs and assesses the results of the WPK. As a minimum, the logs must contain the following information:

- Identification of the product
- Control method
- Date of manufacture and date of test
- Control result and comparison with the requirements
- Signature of the person responsible for the WPK

The logs must be retained for at least 5 years and must be made available on request.

In the event that there are not sufficient control results, the manufacturer must immediately implement the necessary corrective measures. Building products that do not meet the requirements must be handled such that they cannot be confused with compliant, defect-free building products. Once the defect is corrected – insofar as it is necessary to verify correction of the defect – the relevant test is repeated.

Table 1: Type and frequency of the tests to be carried out within the framework of the WPK

Properties	Test conditions	Requirements	Frequency
Check of the original materials	Manufacturer's declaration or appropriate checks	No reference to changes	per supplied batch

Table 1 (cont.): Type and frequency of the tests to be carried out within the framework of the WPK

Properties	Test conditions	Requirements	Frequency
Sheet steel thickness Coating thickness Height	- - -	0.60 mm \pm 10% 0.30 mm \pm 10% 167 mm \pm 10% or 80 mm \pm 10%	each batch or every 1000 m
Adhesion properties	Section 4.4.1 of the test principles	1.0 N/mm ² \pm 20%	each batch or every 1000 m
Mass per unit area	-	Height 167 mm = 920 g/m \pm 3% Height 80 mm = 447 g/m \pm 3%	each batch or every 1000 m
Fusion point	DIN EN 1427	104°C \pm 5%	each batch
Needle penetration test	DIN EN 1426	66 ¹ / ₁₀ mm \pm 5%	each batch
Ash content	DIN 52005 (550°C)	0.24% \pm 10% (relative)	once per year

4 Conformity mark

The building product must be labelled with the conformity mark (Ü-Zeichen) in accordance with the Länder Conformity Mark Regulation. The Ü-Zeichen together with the specified information must be attached to the packaging.

5 Legal basis

This General Appraisal Certificate is issued on the basis of §§ 25a ff of the Niedersächsischen Bauordnung (NBauO) [Lower Saxony Building Code] in conjunction with the Building Regulations List A, Part 2, sequential No. 1.4.

6 General notes

- 6.1 The general appraisal (building regulations) certificate does not replace the legally prescribed approvals, compliances and certifications for the execution of building projects.
- 6.2 The general appraisal (building regulations) certificate is issued without prejudice to the rights of third parties, in particular private trademark rights.
- 6.3 The company must keep the general appraisal (building regulations) certificate, including the execution instructions, on the building site.

- 6.4 The general appraisal (building regulations) certificate may only be duplicated in its entirety. Publication of extracts requires the approval of the issuing Testing Institute. Texts and drawings of advertising brochures must not be in contradiction to the general appraisal certificate. Translations of the general appraisal certificate must contain the advice “Translation of the original German version not reviewed by the Material Testing Institute for the Building Industry in Braunschweig”.
- 6.5 The general appraisal certificate as issued is revocable. The provisions of the general appraisal certificate can be supplemented and revised retrospectively, particularly if new technical expertise makes this a requisite.

Braunschweig, 11.08.2010

on behalf of

[signature]

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[signature]

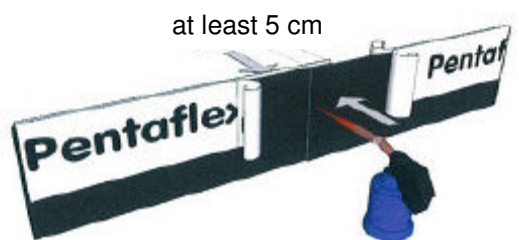
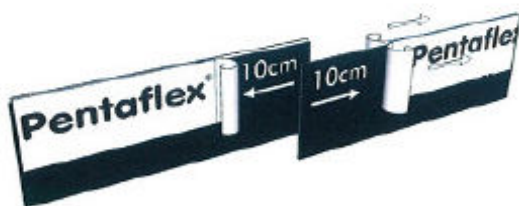
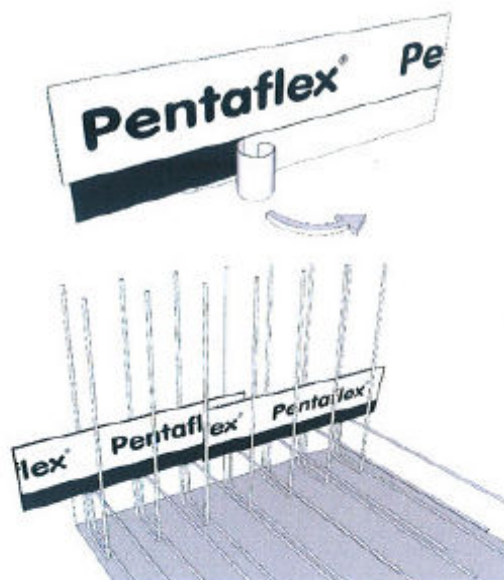
Dr.-Ing. K. Herrmann
Manager - Test Institute

M. Pankalla
Technical Administrator

Manufacturer's Installation Instructions

Installation instructions: Pentaflex KB 16.7 and KB 12

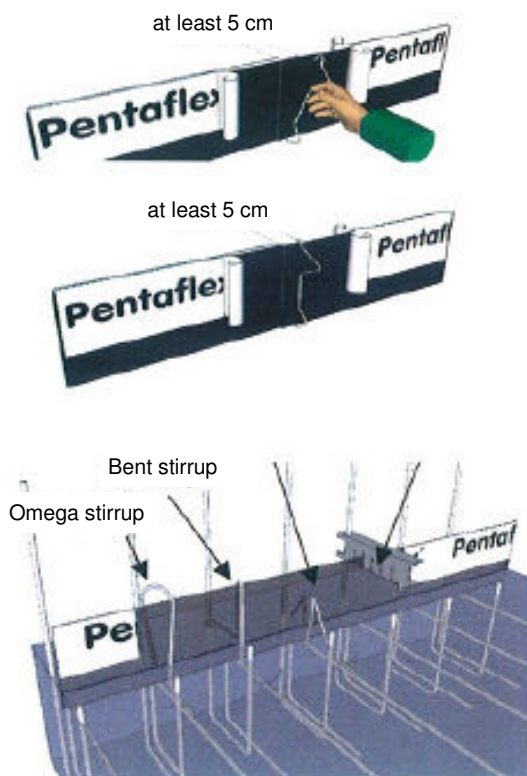
Construction joint: Floor/wall



- ❶ Remove the film from the underside (The overlapping strip must be on the bottom)
- ❷ Distribute (place) the elements in the vertically-rising reinforcement.
- ❸ Peel back the film approx. 10 cm in the end areas.
- ❹ Overlap the elements by at least 5 cm and bond together by pressing them firmly together. For temperatures below 5°C, warm the joints gently with a small blow-lamp.

Installation instructions: Pentaflex KB 16.7 and KB 12

Construction joint: Floor/wall



- 5 Attach a thrust retaining element to each joint. Hook the joint clip onto the underside first.

As additional security, peel back the film strip over the connection again and press down.

- 6 The elements are now fixed by installing retention stirrups with a spacing of 1 metre

There is a choice of 4 types of stirrup for this. Please select these from our brochure.

If the application is the wall/bottom joint of prefabricated walls, we recommend 2 retention stirrups per metre, to ensure the necessary alignment.

Attachment accessories:

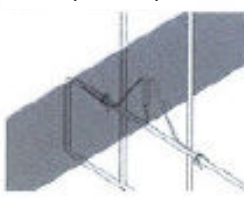
Omega stirrup



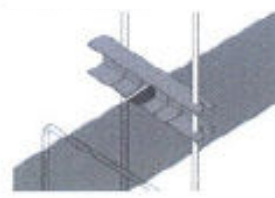
Bent stirrup



Clamp stirrup



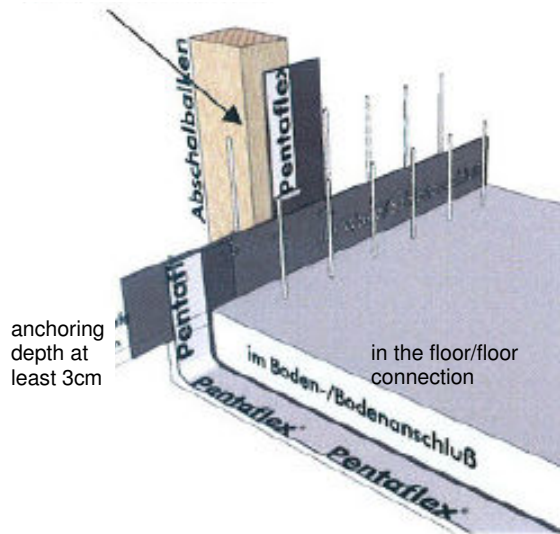
Retention module



Installation instructions: Pentaflex KB 16.7 and KB 12

Construction joint: Floor/floor, ceiling/ceiling and wall/wall

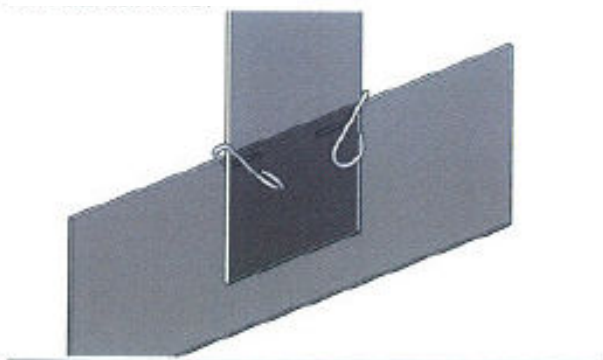
half-side shuttering as wall/wall joint



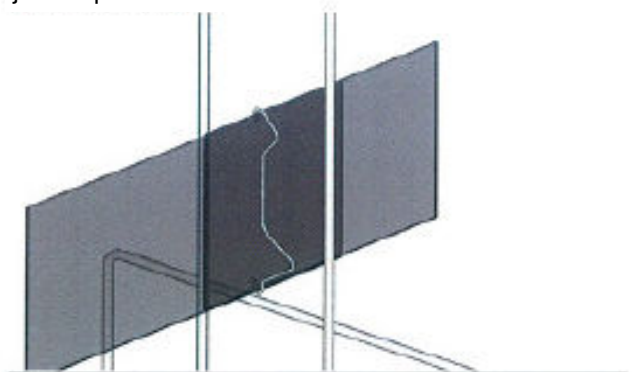
- 7 The upper film should only be peeled back once the first element has been concreted, so that the coating doesn't get dirty. This is important since the dirt may create leak points.
- 8 T joints and cross-points should be secured on both sides using the brackets supplied. Each crate contains 50 thrust clips and 8 cross clips.
- 9 Note: During concreting of the floor/floor joint, particular care must be taken with the free-cavity sealing in the area under the coated joint element!
- 10 Before concreting the second section remove the protective films from the KB element.

Butt joints:

cross clip

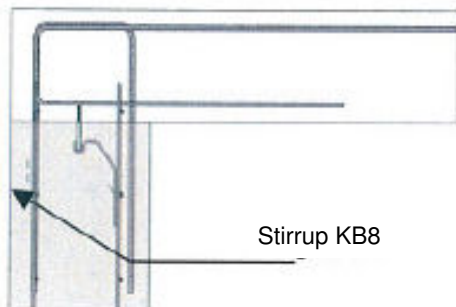


joint clip



Installation instructions: Pentaflex KB 8

Construction joint: Wall/ceiling



- 1 Fasten the retention stirrup KB8 (approx. 2 pieces per metre) onto the vertically-rising wall reinforcement. If the retention stirrups are being inserted into prefabricated walls they must be attached to the grid supports such that one PENTAFLEX KB8 element is held by at least 2 stirrups.



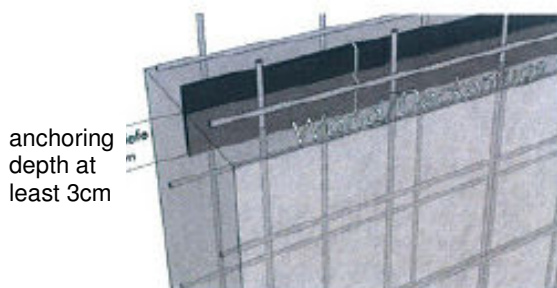
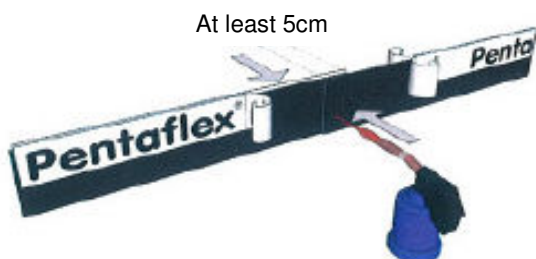
- 2 Remove the film from the underside of the PENTAFLEX KB8 elements.



- 3 Distribute the elements and suspend them in the retention stirrups.

Installation instructions: Pentaflex KB 8

Construction joint: Wall/ceiling

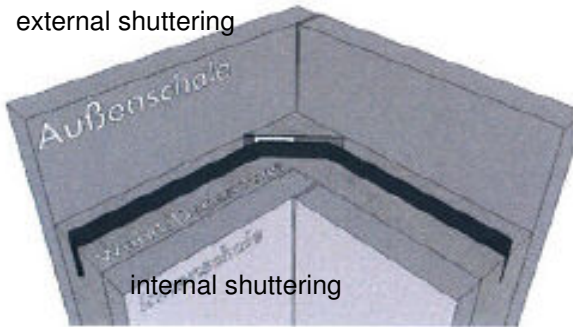


- ④ Peel back the film at the ends by approx. 10 cm.
- ⑤ Overlap the elements by at least 5 cm and press them firmly together to make the connection. If the temperature is below 5°C, heat the butt surfaces with a blowlamp or gas torch.
- ⑥ Create a thrust retaining element at each connection point using "joint clips 80". Roll the films strips back over the connection and press them on to provide additional protection.
- ⑦ When concreting ensure that the KB 8 is anchored at least 3 cm into the wall concrete.
- ⑧ Do not remove the upper film until concreting of the wall is completed.

Installation instructions: Pentaflex KB 8

Construction joint: Wall/ceiling

external shuttering



internal shuttering



Wall/ceiling joint

- 9 Corner construction: Corners and angles can be produced by appropriate bending of the KB 16.7 or KB 8.

- 10 T joints, connections or height offsets are produced by making connections as described in point 5.

To be observed when using prefabricated walls

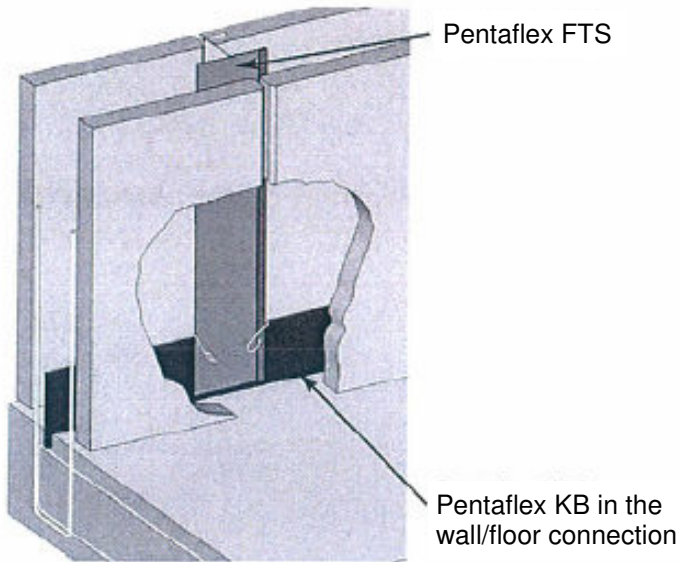


- 10 Pentaflex KB-corner 16.7 and 8 are also supplied as mouldings.

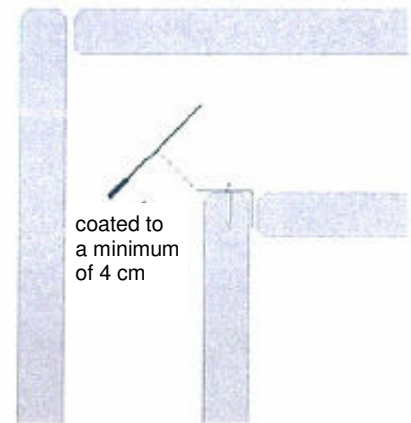
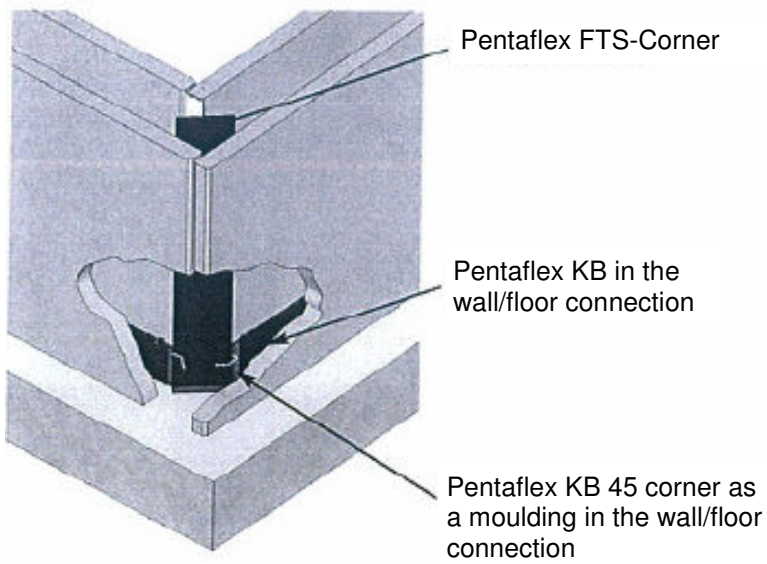
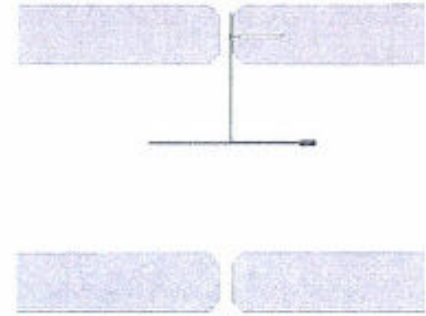
Status: 09.07.2009

We reserve the right to make technical changes to our products that do not affect our test principles and the "ABP".

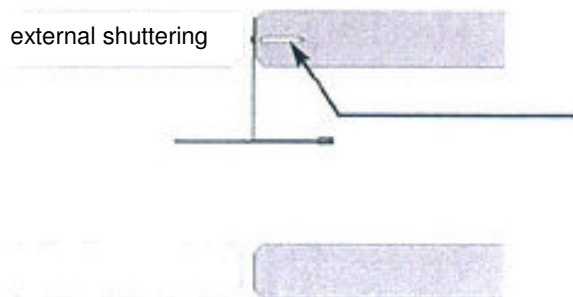
Installation instructions: Pentaflex FTS



Plan view
Pentaflex FTS

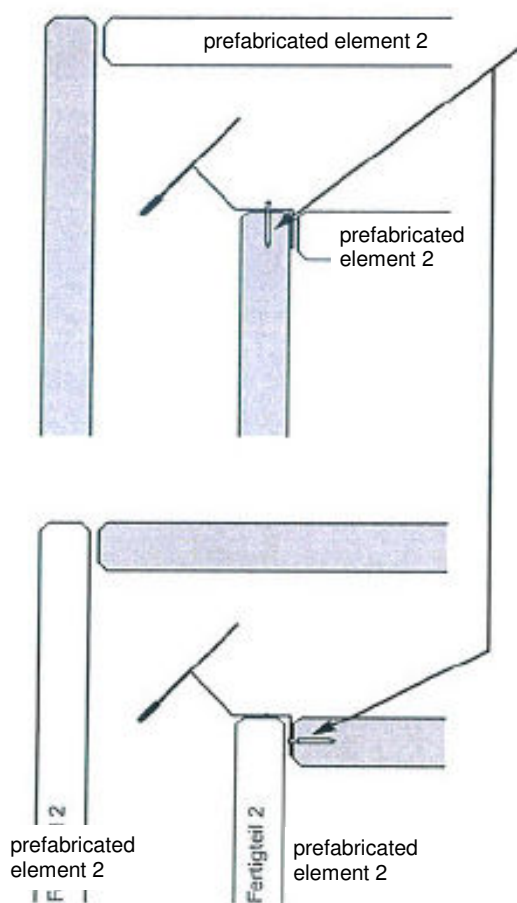


Installation instructions: Pentaflex FTS



- ❶ Remove the protective films from the Pentaflex sealing plate
- ❷ Fix the uncoated wing to the face side (as a rule – external shuttering) using shear dowels.
- ❸ Connect the coated sealing element with the Pentaflex KB to the floor slab, min. 5 cm overlap and fix the butt using cross clips! If the temperature is below 10°C, heat up.

Assembly of FTS-corner elements

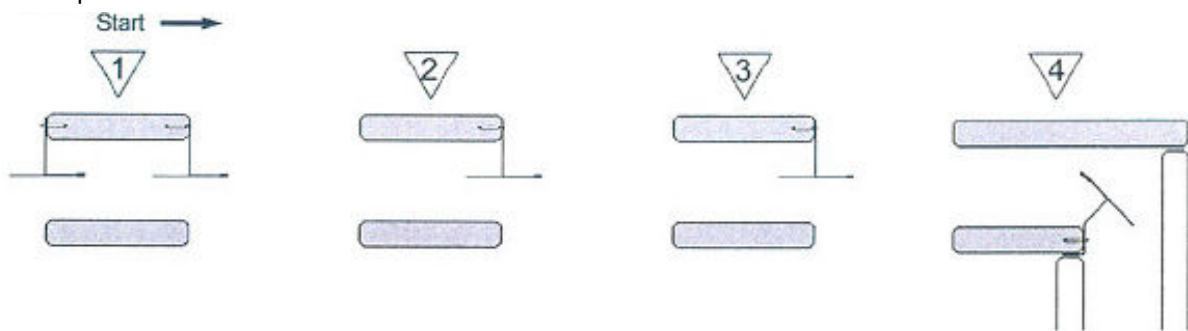


- ❹ When installing the prefabricated break-off FTS-corner please note:
 The break-off element has a different connection to the face side of the inside shell of the first prefabricated element to be positioned (prefabrication element 1) depending on the direction of assembly.

Pentaflex FTS – assembly sequence

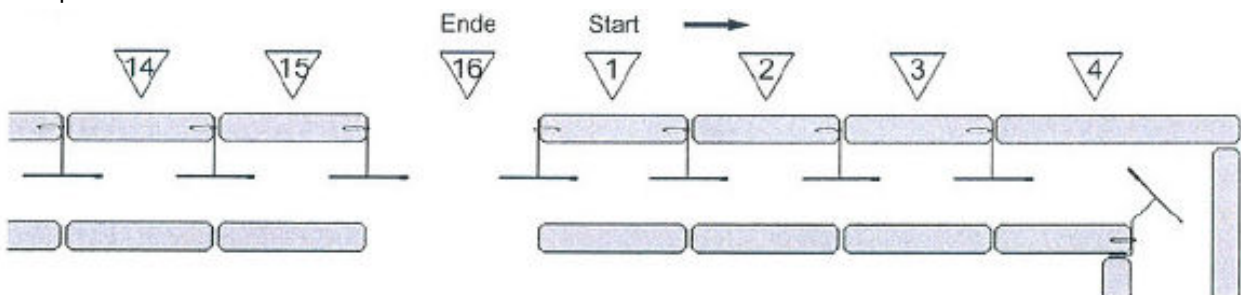
- 1 Determine the direction of assembly for the prefabricated elements.
- 2 When placing the first wall element, the Pentaflex prefabricated break-off elements are fixed to both face sides of the prefabrication and connected to the floor slab using the Pentaflex KB.
- 3 Relative to the direction of assembly, a Pentaflex FTS element is attached in each case to the free end of the newly-positioned prefabrication and connected to the floor slab using the Pentaflex KB.

Example:



- 4 The last wall element is lowered vertically between the prefabricated parts already provided with Pentaflex FTS and it is then attached:

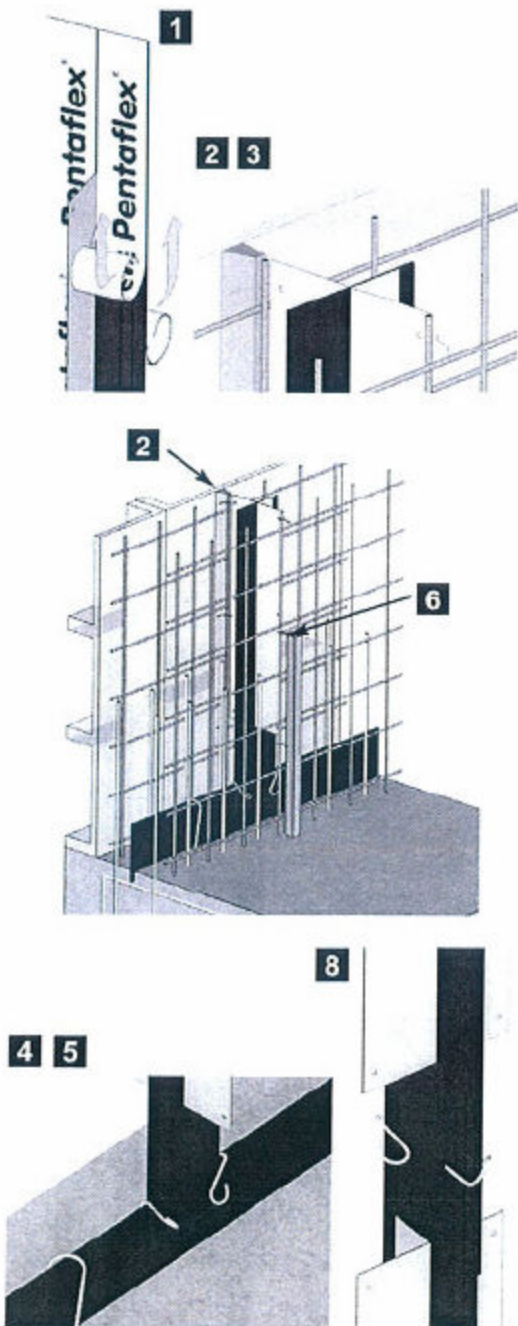
Example:



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Installation instructions: Pentaflex OBS



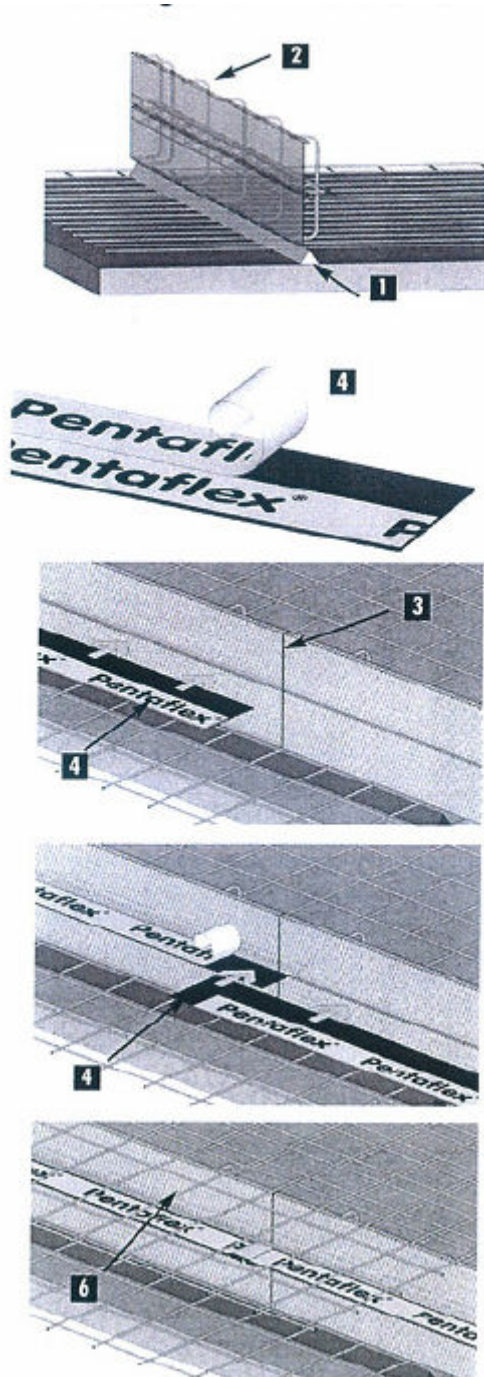
- ❶ Remove the protective films from the Pentaflex OBS.
- ❷ Install a trapezoidal strip into the shuttering where the break-off should be created (plane of the assembly plate)
- ❸ Position the OBS element in the wall shuttering between the outer and inner reinforcement layer. It is secured using tie-wire. This is guided through the existing holes in the assembly plates and lashed securely to the reinforcement. The OBS element must be fixed such that the assembly plate lies in the plane of the planned break-off position; the sealing level is then parallel to the shuttering surface and lies in the axis of sealing of the floor/wall joint (Pentaflex KB).
- ❹ Connection of the OBS element to the KB is made by making a 5 cm (minimum) overlap and firmly pressing them together. If the temperature is below + 5 °C, heat the connection area.
- ❺ Each connection point must be secured using 2 cross clips.
- ❻ Before closing the wall shuttering, a trapezoidal strip must also be placed in the axis of the assembly plate of the OBS element.
- ❼ During concreting take care that the OBS element is not subjected to one-sided pressure from the concrete. The pouring height must be kept at the same level on both sides.
- ❽ Joints and attachments must be manufactured and secured by connections as described in points 4 and 5 above.

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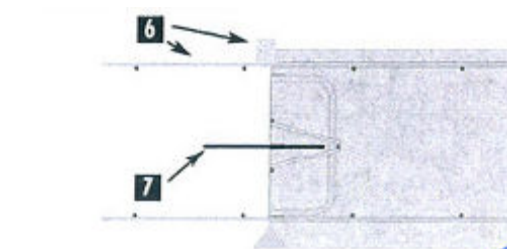
Installation instructions: Pentaflex ABS

Construction joint: Floor/floor



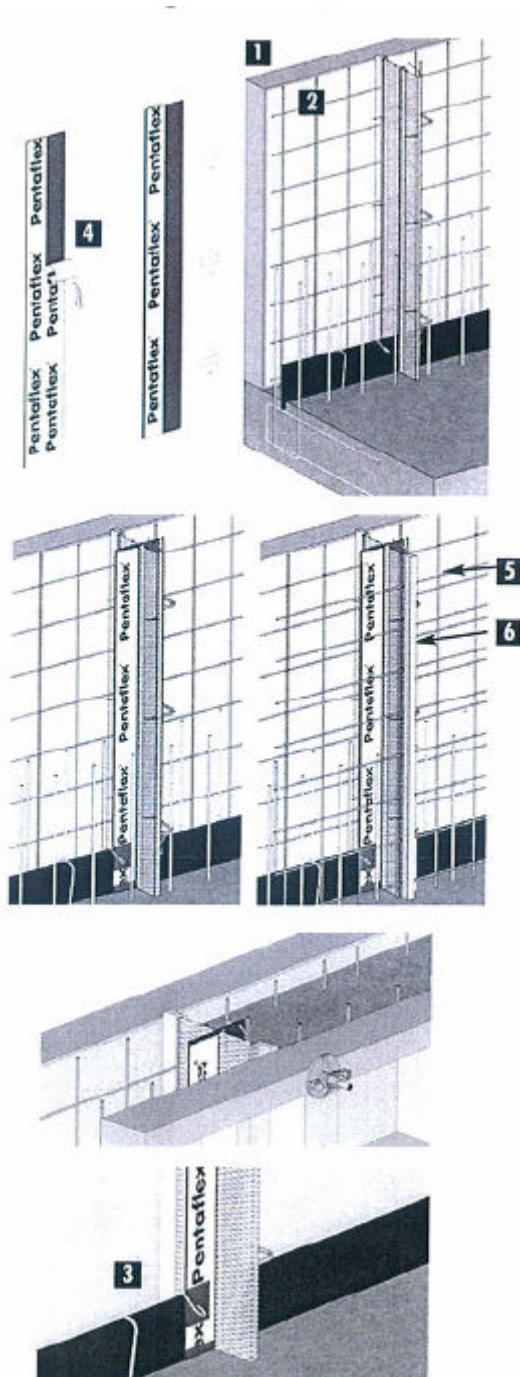
- ❶ Install a suitable distance piece, size nom c, into the blinding layer/shuttering at the location where the construction joint should be positioned (plane of the expanded metal sheet).
- ❷ Installation of the ABS elements on the lower reinforcement layer. The direction of installation must be selected such that the formwork girder protrudes into the first concreting section. Tie-wire is used to attach it to the lower reinforcement. Optionally, the element can also be welded to the reinforcement.
- ❸ The ABS elements are extended by butting two formworks.
- ❹ Peel off the film on one side of the Pentaflex KB above and below and insert into the formwork up to the stop position. The seam joint clips should overlap by 5 cm.
- ❺ The connection of the ABS element to the KB for the floor slab/wall joint is made using a corner addition. Connection is made by creating an overlap of at least 5 cm and pressing them firmly together. If the temperature is below +5°C, warm the connection area and secure with a cross clip.
- ❻ Install the upper reinforcement and shutter the upper concrete cover. Connect the ABS element with the upper reinforcement using tie-wire. Optionally, the element can also be welded to the reinforcement.
- ❼ The protective films should be removed from the upper and lower side of the seam joint before concreting the second section.

Cross-section of the installation situation

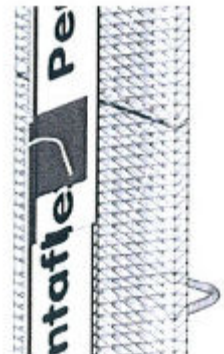


Installation instructions: Pentaflex ABS

Construction joint: Wall/wall



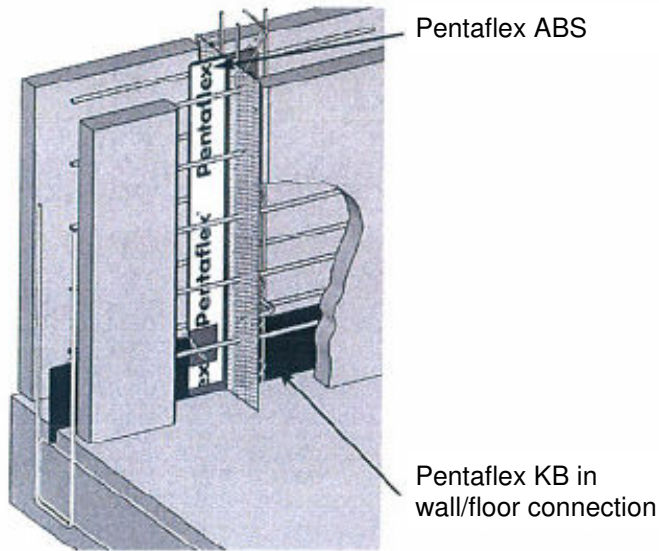
- ① Place the external shuttering and attach a trapezoidal strip to the construction joint.
- ② Insert the external reinforcement and bind to the connection reinforcement. Optionally, the element can also be welded to the reinforcement. Use a suitable water-impermeable distance piece.
- ③ Place the ABS element with the slotted side over the Pentaflex KB for the floor/wall joint and tie together with the external reinforcement in the desired position.
- ④ Pull off the external and internal protective paper from the Pentaflex KB and insert in the formwork up to the stop position. The seam joints should overlap by 5 cm and be pressed together. If the temperature is below +5°C, warm the connection area and secure with a cross clip.
- ⑤ Position the internal reinforcement and bind to the ABS element (tie-wire, welding).
- ⑥ Fix a trapezoidal strip to the internal formwork and close it. Use suitable water-impermeable tie points.
- ⑦ The remaining protective film should be removed from the Pentaflex KB before shuttering the second concrete section.
- ⑧ Joints and attachments must be manufactured and secured by connections as described in point 4.



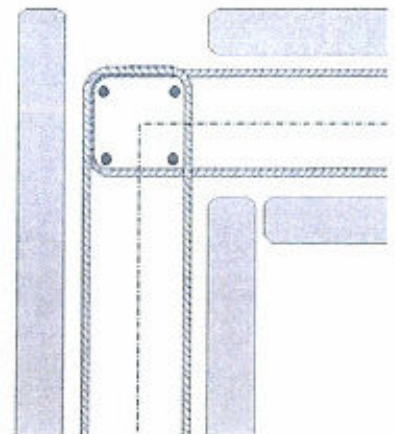
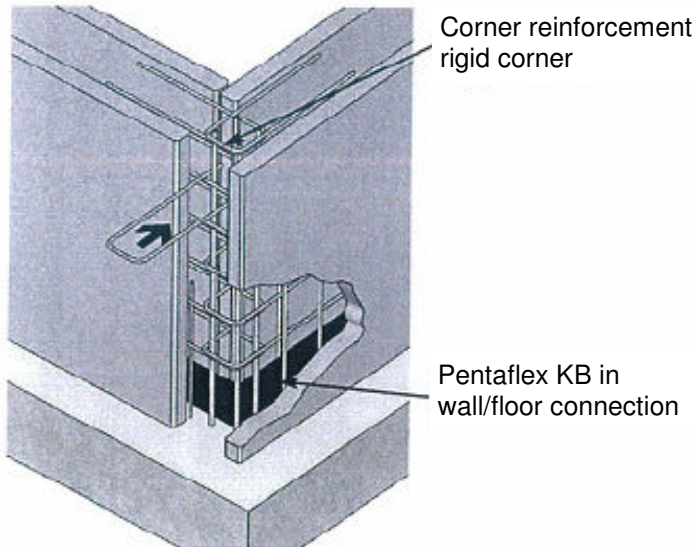
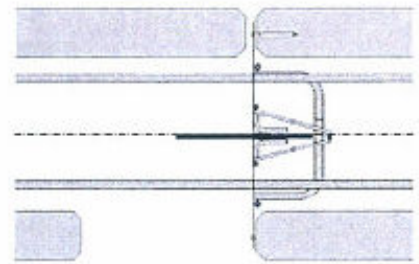
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Installation instructions: Pentaflex ABS with prefabricated walls



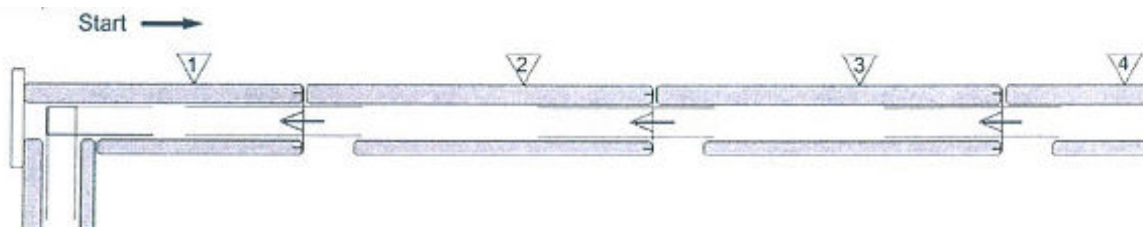
Plan view
Pentaflex ABS



Pentaflex ABS – Assembly sequence for prefabricated walls

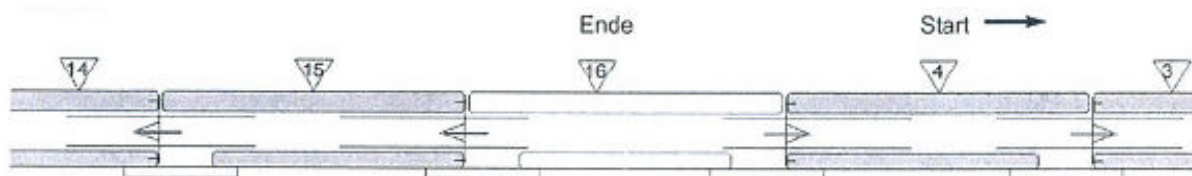
- ❶ Specification of the assembly direction for the prefabricated elements.
- ❷ When placing the first wall element the Pentaflex ABS is attached to the face sides of the prefabricated part and tied into the floor slab using the Pentaflex KB.
- ❸ In accordance with the assembly direction, a Pentaflex ABS element is attached to each free end of the newly erected slab and tied into the floor slab using the Pentaflex KB.

Example:



- ❹ The last wall element is lowered vertically between the prefabricated parts that already have the Pentaflex ABS and it is then assembled:

Example:

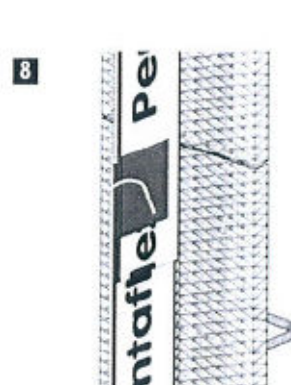
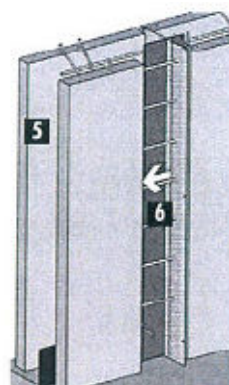
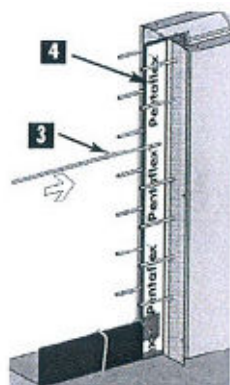
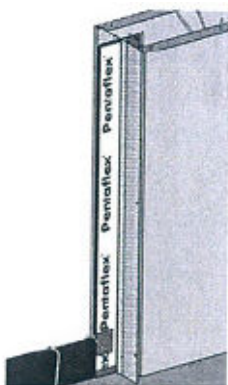
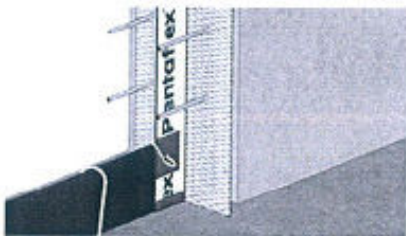
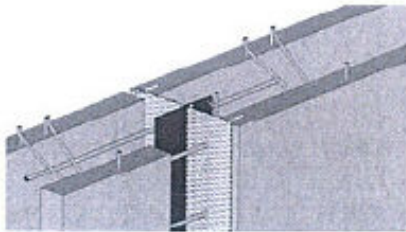
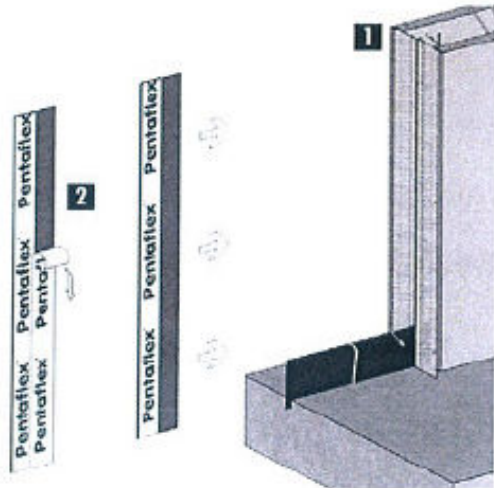


Status: 09.2009

We reserve the right to make technical changes to our products that do not affect our test principles and the "ABP".

Installation instructions: Pentaflex ABS with prefabricated walls

Construction joint: Wall/wall



- ❶ Position the first wall element and place the ABS element with the slotted side over the Pentaflex KB for the bottom/wall joint and attach to the face sides of the prefabricated formwork using shear dowels.
- ❷ Pull off the external and internal protective paper from the Pentaflex KB and insert in the formwork up to the stop position. The seam joints should overlap by 5 cm and be pressed together. If the temperature is below +5 °C, warm the connection area and secure with a cross clip.
- ❸ Push the supplementary reinforcement through the meshed-metal grid (drill, hammer through) until it protrudes approx. 30 cm.
- ❹ Before positioning the next wall element, remove the remaining protective film from the Pentaflex KB.
- ❺ Position the next wall element and proceed as for points 1-4.
- ❻ Pull the supplementary reinforcement through the access opening and centre it on the ABS element (optionally attach to the mesh supports with tie-wire).

- ❼ Shutter the access opening before concreting.
- ❽ Joints and connectors must be manufactured and secured by connections as described in point 2.