Structural Connections

**Shear load connectors**

Leviat®
A CRH COMPANY

# Plaka Titan

Dowels for the transmission of shear forces in expansion joints

**CSTB**
**AT 3/09-615**

Imagine. Model. Make.

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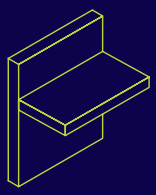
# We imagine, model and make engineered products and innovative construction solutions that help turn architectural visions into reality and enable our construction partners to build better, safer, stronger and faster.

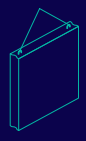


## Structural Connections

Systems to form robust, efficient connections, and continuity of concrete reinforcement as necessary, between walls, slabs, columns, beams and balconies, providing structural integrity as well as enhanced thermal and acoustic performance.

- Insulated balcony connectors
- Reinforcing bar couplers
- Concrete Connections
- Reinforcement continuity systems
- Punching shear reinforcement
- Shear load connectors
- Floor Joint Systems
- Precast / Reinforced Columns
- Infrastructure Products
- Precast Connections
- Acoustic dowels and bearings
- Prestress

## Other areas of expertise:

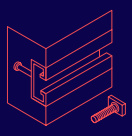


### Lifting & Bracing

Systems for the safe and efficient transportation, lifting and temporary bracing of cast concrete elements and tilt-up panels before permanent structural connections are made.

### Façade Support & Restraint

Systems for the safe and thermally-efficient fixing of the external building envelope, including brick and natural stone, insulated sandwich panels, curtain walling and suspended concrete façades, and also the repair and strengthening of existing masonry installations.

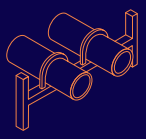


### Anchoring & Fixing

Systems for fixing secondary fixtures to concrete, including anchor channels, bolts and inserts; also tension rod systems for roofs and canopies.

### Formwork & Site Accessories

Non-structural accessories that complement our engineered solutions and help keep your construction environment operating safely and efficiently, including moulds for casting standard and special concrete elements and construction essentials such as reinforcing bar spacers.



### Industrial Technology

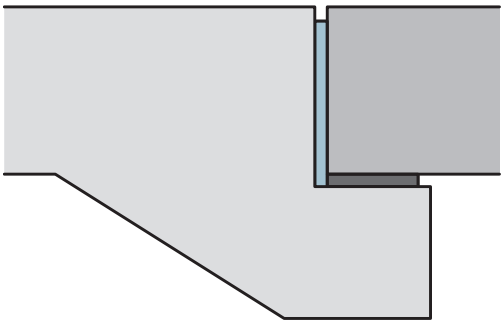
Mounting channels, pipe clamps and other versatile framing systems that provide safe fixing in a wide range of industrial applications.

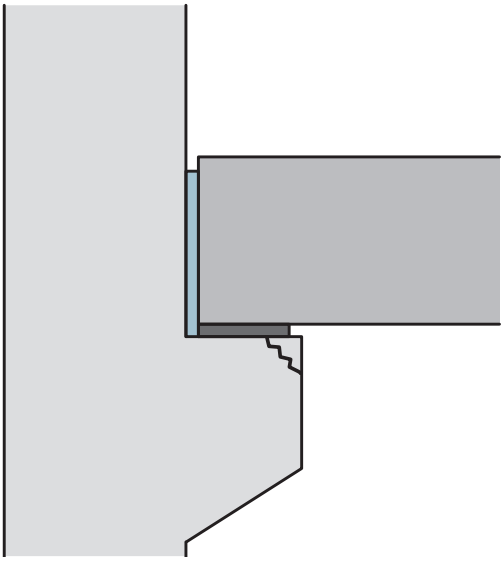
## Leviat product ranges:

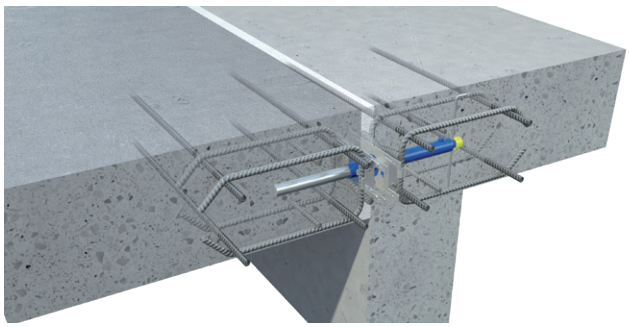
Ancon | Aschwanden | Connolly | Halfen | Helifix | Isedio | Meadow Burke | Modersohn | Moment | Plaka | Scaldex | Thermomass

# Plaka Titan

## Dowels for the transmission of shear forces in expansion joints







Expansion joints are installed in locations where large internal stress zones could occur in the concrete structure due to temperature variations, shrinkage, creepage or prestressing. The movement between two building components may of course only be in a horizontal direction. Traditional construction solutions such as support nibs or corbels are often expensive and difficult to cast. Most of the time they are very heavy constructions. These solutions are not often adequate because the shear forces cannot be transferred optimally. Cracks could develop in the concrete structure caused by the creation of new stress zones.

A better solution is the Titan shear force dowel. The design is simplified by the use of the Titan dowel system, materials and working time are saved and a better transfer of shear forces is achieved. The Titan dowel system provides an unsurpassed level of safety and easy installation.

### System advantages with Titan dowel

- Unique design with the certainty of good positioning for the contractor
- Perfect positioning guaranteed by Titan mounting flange and positioning clips
- Adjustable locating pin to ensure perfect horizontal positioning
- The Titan reinforcment cages are extremely stable
- Separate mounting components simplify the reinforcement
- Saving in reinforcement in respect to other dowel systems
- CSTB recognised

### General advantages of Titan dowel

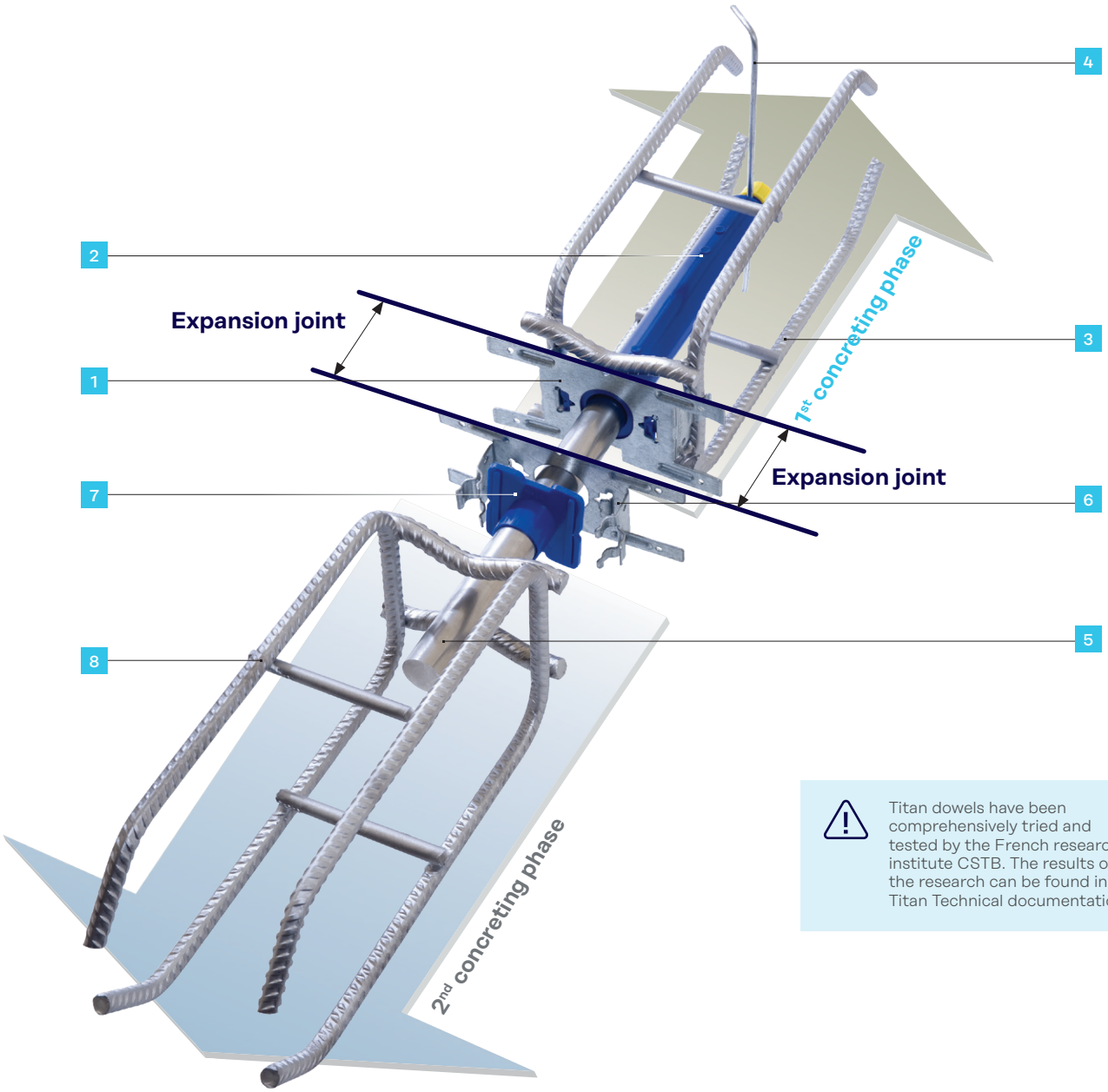
- Shear forces are distributed more efficiently in the structure by centering the loads
- Heavy loads possible without the risk of cracks
- Simplifies installation on site thus saving time and labour
- More efficient structures possible by eliminating the need for corbels or additional support walls
- Sufficient use of stainless steel eliminates any possible corrosion issues
- Adjustable locating pin to ensure perfect horizontal positioning
- Cost effective alternative solution to other shear connectors

# Plaka Titan

## Working principle

### Description of the Titan dowel system

1. A mounting flange allows the system to be placed on joint formwork. The reinforcement cages are also fixed to this flange.
2. The sleeve is located into the mounting flange. An expansion chamber is provided at the end.
3. A unique reinforcement cage is clipped onto the mounting flange. This allows greater transfer of shear forces.
4. An adjustable locating pin is used to ensure the sleeve is horizontal.
5. The Titan dowel is located into the sleeve in the second concreting phase.
6. A mounting flange enables a reinforcement cage to be fixed around the dowel.
7. The centre case ensures alignment of the reinforcement cage.
8. Titan reinforcement cage is placed around the dowel. The reinforcement cages ensures that greater shear forces can be transferred in the second concreting phase as well.



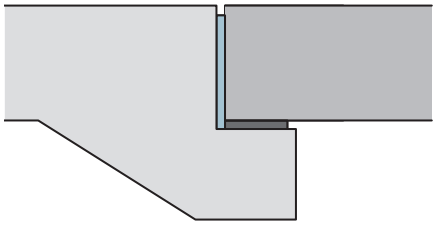

Titan dowels have been comprehensively tried and tested by the French research institute CSTB. The results of the research can be found in our Titan Technical documentation.

# Plaka Titan

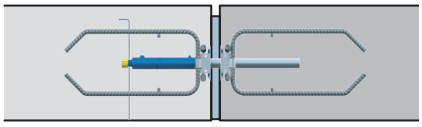
Application advantages

## Expansion joint in the floor

Traditional



Titan solution

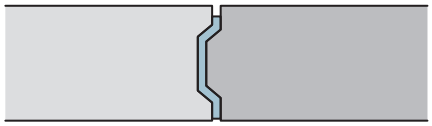


### Application advantages

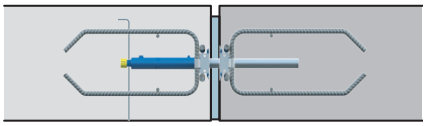
- Easy to construct
- Horizontality ensured by the use of the adjustabe pin
- Expensive and labour-intensive formwork and support nib reinforcement are not required
- Potential reductions in floor heights reduces material / labour costs

## Wall to wall connection

Traditional



Titan solution

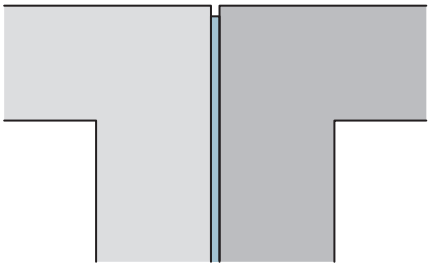


### Application advantages

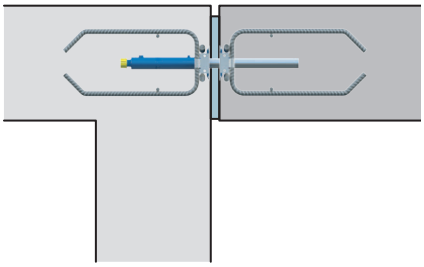
- Simplifies the formwork
- Reduction in the movement between the elements
- Reduces the risk of cracks

## Structural expansion joint

Traditional



Titan solution

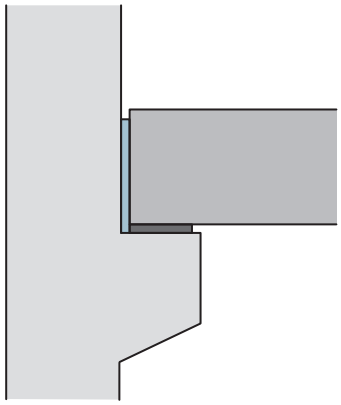


### Application advantages

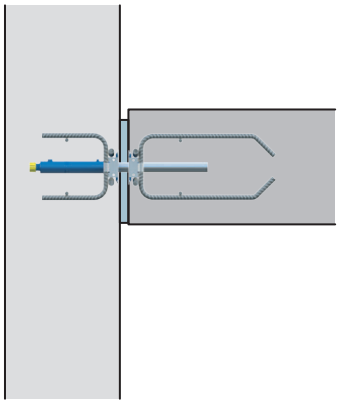
- Eliminates the requirement for double support walls
- Larger living space
- Time-savings
- Smaller area in the foundations
- Less use of materials

## Structure with corbel

Traditional



Titan solution

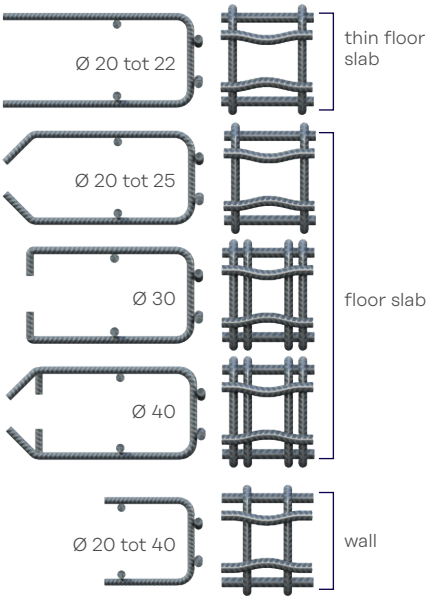


### Application advantages

- Centres the load
- Frees up the space under the slabs
- Eliminates a small corbel; smaller area in the foundations
- Time-gain due to labour time and material savings
- Risk of cracks reduced

# Plaka Titan

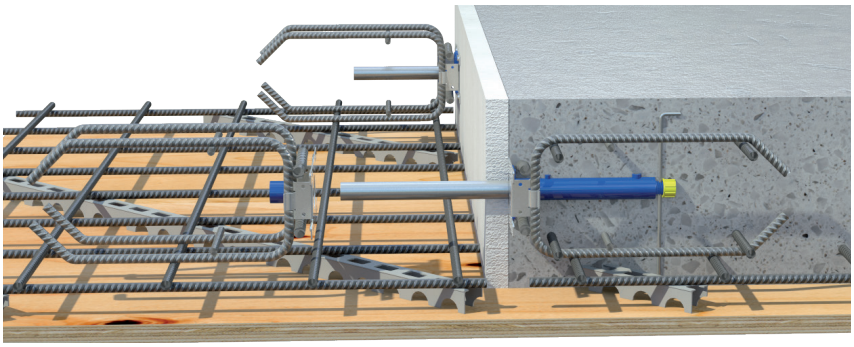
## Unique system components

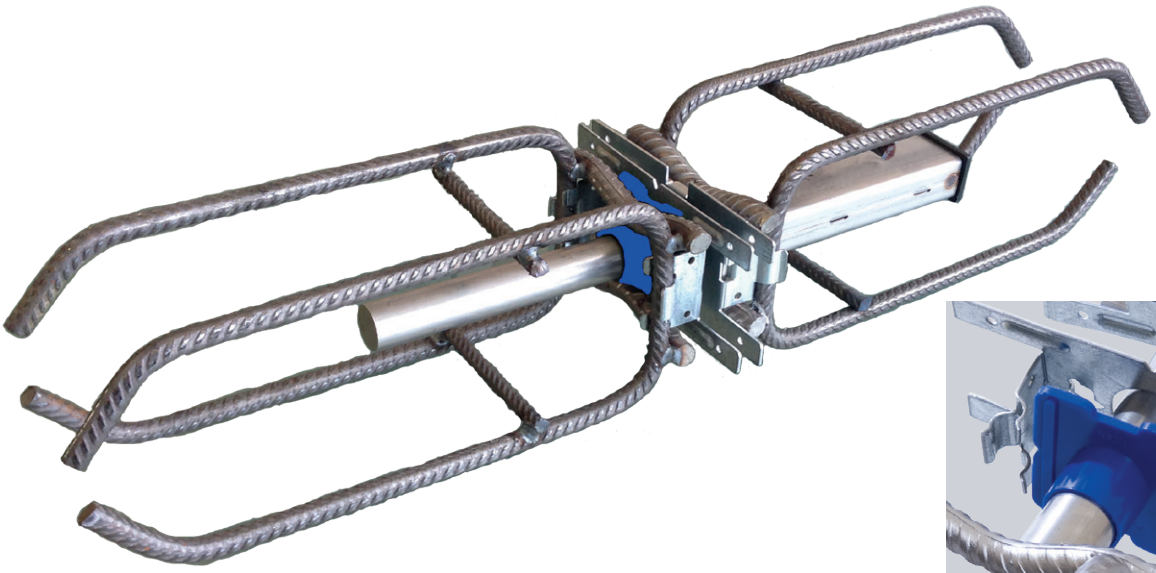



### Titan reinforcement cages

When using the available Titan reinforcement cages mounted firmly on the formwork of the slab with the help of a mounting flange, the uncertainty in the positioning of the reinforcement is so small that it need not be considered in the dimensioning.

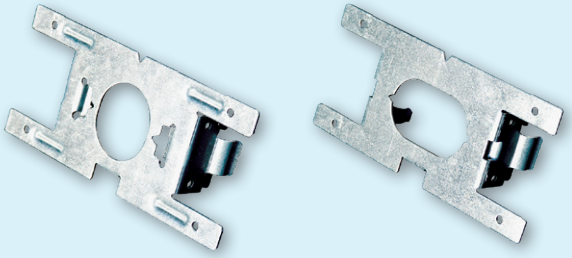
Titan reinforcement cages are very stable and are available in various versions for reinforcing floors and walls.







**The Titan dowel is the only dowel system on the market that has a mounting flange for the reinforcement cages which guarantees correct positioning**



# Plaka Titan

## Composition of the system

The Titan dowel system consists of various components. By working through the six steps below, you can ensure that you have assembled the Titan system together correctly.

### Dowels

### Step 1

**Galvanised dowel**

- Specially treated high resistance steel, type EN 42Cd4, hot dipped after fabrication.

| Code | Ø dowel (mm) | Length (mm) | Use with floor thickness in mm |
|---|---|---|---|
| TITG020 | 20 | 320 | > 150 |
| TITG022 | 22 | 340 | > 150 |
| TITG025 | 25 | 390 | > 180 |
| TITG030 | 30 | 470 | > 200 |
| TITG040 | 40 | 570 | > 250 |

**Stainless steel dowel**

- High resistance steel type EN 4462. In addition this steel has excellent resistance to corrosion, clearly better than the present stainless steel types 304 and 316.

| Code | Ø dowel (mm) | Length (mm) | Use with floor thickness in mm |
|---|---|---|---|
| TITI020 | 20 | 320 | > 150 |
| TITI022 | 22 | 340 | > 150 |
| TITI025 | 25 | 390 | > 180 |
| TITI030-TITI130 | 30 | 470 | > 200 |
| TITI040-TITI140 | 40 | 570 | > 250 |

### Sleeve

### Step 2

For the joint to work properly, the dowels must be horizontal and parallel to each other. The Titan PVC sleeve is equipped with a mounting on both ends for this purpose. The first is placed in the flange, the second consists of an adjustable pin that can be locked to ensure the dowel is maintained in a horizontal position.

Round PVC sleeve

| Code | Ø (mm) | Length (mm) |
|---|---|---|
| TITFR20 | 20 | 180 |
| TITFR22 | 22 | 200 |
| TITFR25 | 25 | 220 |
| TITFR30 | 30 | 270 |
| TITFR40 | 40 | 320 |

Robust, self lubricating round PVC sleeve.

Oval PVC sleeve

| | | |
|---|---|---|
| TITFO20 | 20 | 180 |
| TITFO22 | 22 | 200 |
| TITFO25 | 25 | 220 |
| TITFO30 | 30 | 270 |
| TITFO40 | 40 | 320 |

Oval self-lubricating PVC sleeve for free movement in a lateral direction, for example when the joint is corner-shaped. This sleeve is fixed on an oval flange.

Round sleeve made from stainless steel 304

| | | |
|---|---|---|
| TITFRI20 | 20 | 160 |
| TITFRI22 | 22 | 180 |
| TITFRI25 | 25 | 200 |
| TITFRI30 | 30 | 250 |
| TITFRI40 | 40 | 300 |

Round stainless steel sleeve with minimal play between sleeve and dowel. The round sleeve can be replaced by a rectangular case from stainless steel to allow lateral expansion.

Rectangular sleeve made from stainless steel

| | | |
|---|---|---|
| TITFOI20 | 20 | 163 |
| TITFOI22 | 22 | 178 |
| TITFOI25 | 25 | 208 |
| TITFOI30 | 30 | 248 |
| TITFOI40 | 40 | 298 |

Oval sleeve is also available in stainless steel.

# Plaka Titan

## Composition of the system

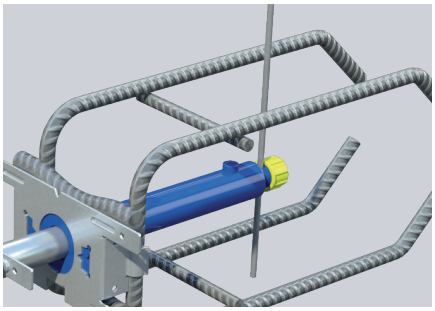
### Adjustable pin

#### Step 3

- The horizontality of the sleeve is guaranteed by the adjustable pin

| Code | Description |
|---|---|
| TITCR | adjustable pin for sleeve |

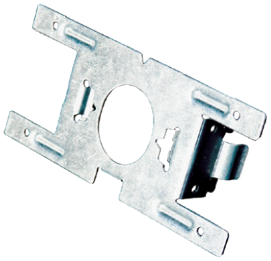
If the dowels are not parallel the movement will be restricted

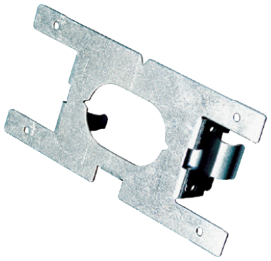


### Mounting flange

#### Step 4

- To place the system on the formwork
- Exact positioning
- Separate mounting components simplify the reinforcement
- Makes it possible to position the sleeve simply
- Guarantees a good position for the reinforcement cage





| Code | Description | For use with Ø dowel (mm) |
|---|---|---|
| TITFLR | mounting flange round/20-30 | 20 t/m 30 |
| TITFLO | mounting flange oval/20-30 | 20 t/m 30 |
| TITFLO40 | mounting flange round-oval/40 | 40 |

### Centring sleeve

#### Step 5

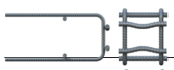
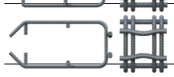
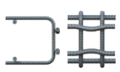
- To centre the system during the second concreting phase

| Code | For use with Ø dowel (mm) |
|---|---|
| TITCC20 | 20 |
| TITCC22 | 22 |
| TITCC25 | 25 |
| TITCC30 | 30 |
| TITCC40 | 40 |

### Reinforcement cage

#### Step 6

- The Titan reinforcement cage guarantees a perfectly positioned dowel and the correct joint construction

| Scheme | Code | Ø Brackets | Height (mm) | Length (mm) | Width (mm) | Dowel Ø (mm) | Type |
|---|---|---|---|---|---|---|---|
|  | TITRD22100 | 2 Ø 10 | 100 | 410 | 110 | 20 - 22 | Thin floor slab |
|  | TITRD22120 | 2 Ø 10 | 120 | 290 | 110 | 20 - 22 | Foor slab |
| | TITRD25140 | 2 Ø 10 | 140 | 290 | 110 | 25 | |
|  | TITRD30180 | 2 Ø 10 + 2 Ø 10 | 180 | 260 | 150 | 30 | Foor slab |
|  | TITRD40180 | 2 Ø 10 + 2 Ø 14 | 180 | 300 | 150 | 40 | Foor slab |
|  | TITRV22120 | 2 Ø 10 | 120 | 100 | 110 | 20 22 | Wall |
| | TITRV25120 | 2 Ø 10 | 120 | 100 | 110 | 25 | |
| | TITRV30140 | 2 Ø 10 | 140 | 100 | 110 | 30 | |
| | TITRV40140 | 2 Ø 10 | 140 | 100 | 110 | 40 | |

# Plaka Titan

## Special applications

Our engineers can provide efficient technical assistance for every special application

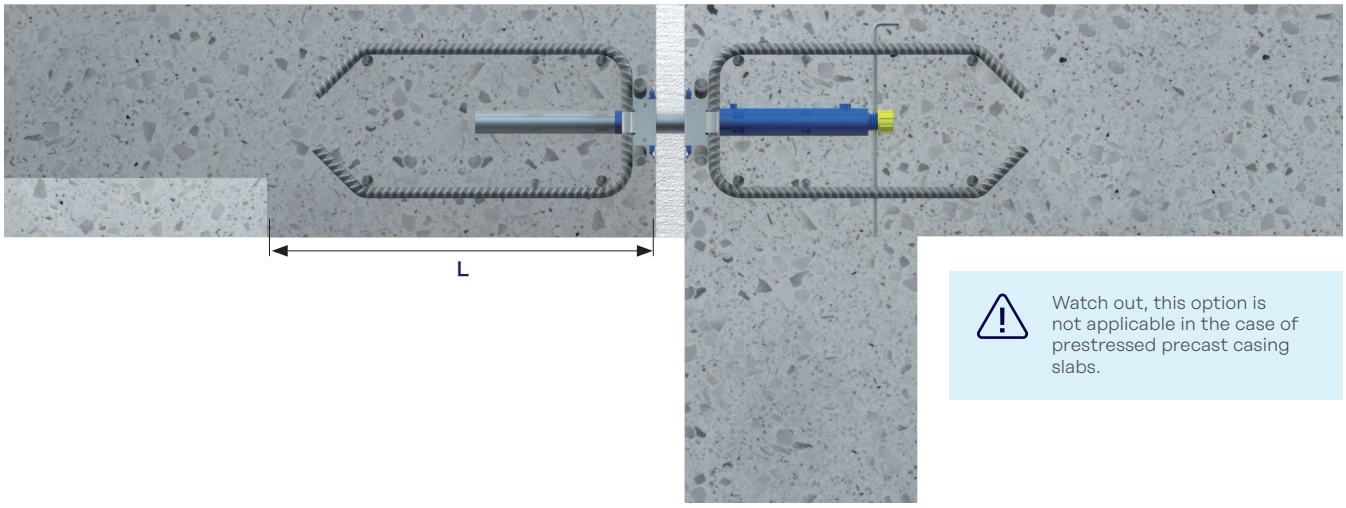
### Use with precast casing slabs

The Titan dowel is perfectly compatible with the use of precast casing slabs.

Suspension reinforcements must be provided in the precast casing slabs as anchoring so that they form one with the on site cast concrete. In this case there are two solutions.

### Solution 1

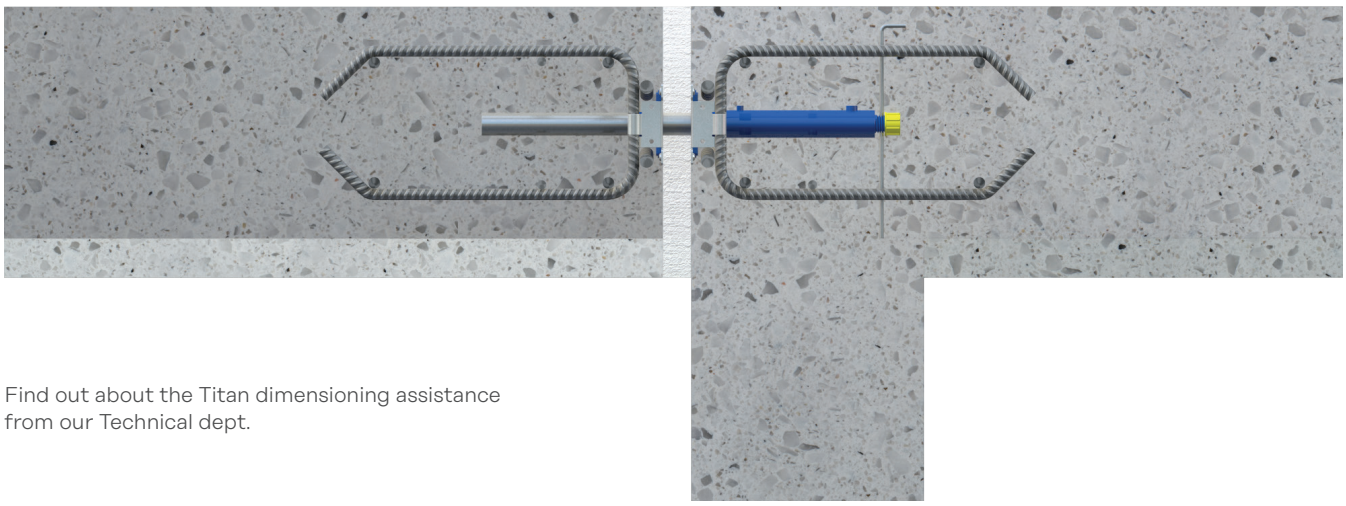
The precast casing slab stops at a distance L from the expansion joint and the edge zone is cast in situ.




Watch out, this option is not applicable in the case of prestressed precast casing slabs.

### Solution 2

The precast casing slab stops at the expansion joint. In that case the dimensioning of the dowel must take into account the actual position of the dowel in the floor slab (see technical documentation).



Find out about the Titan dimensioning assistance from our Technical dept.

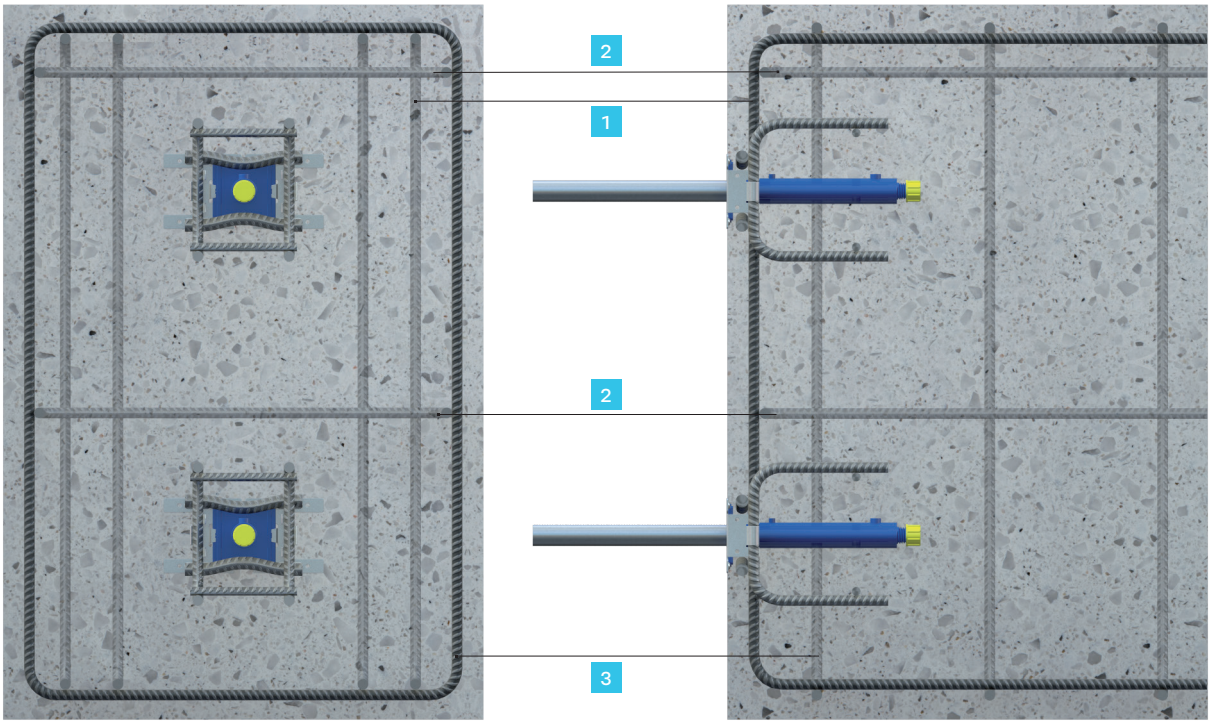
# Plaka Titan

## Special applications

### Use at the end of a beam or wall

All Titan dowels can be used at the end of a beam or wall. Usually they are placed on top of one another without obstructing the traditional reinforcements.

The reinforcement cages used are the “wall” type to avoid the concrete splitting. Logically the cage installed by the contractor must correspond with the principle described below:




1 Transversal armature, dimensioned to transfer the total shear force. It is concentrated at the end of the beam or wall and must be anchored

2 Spacers are placed above the dowels. The minimum section can be found in the technical documentation

3 Brackets must be provided over a length corresponding to the height of the beam

### Use with a cast wall

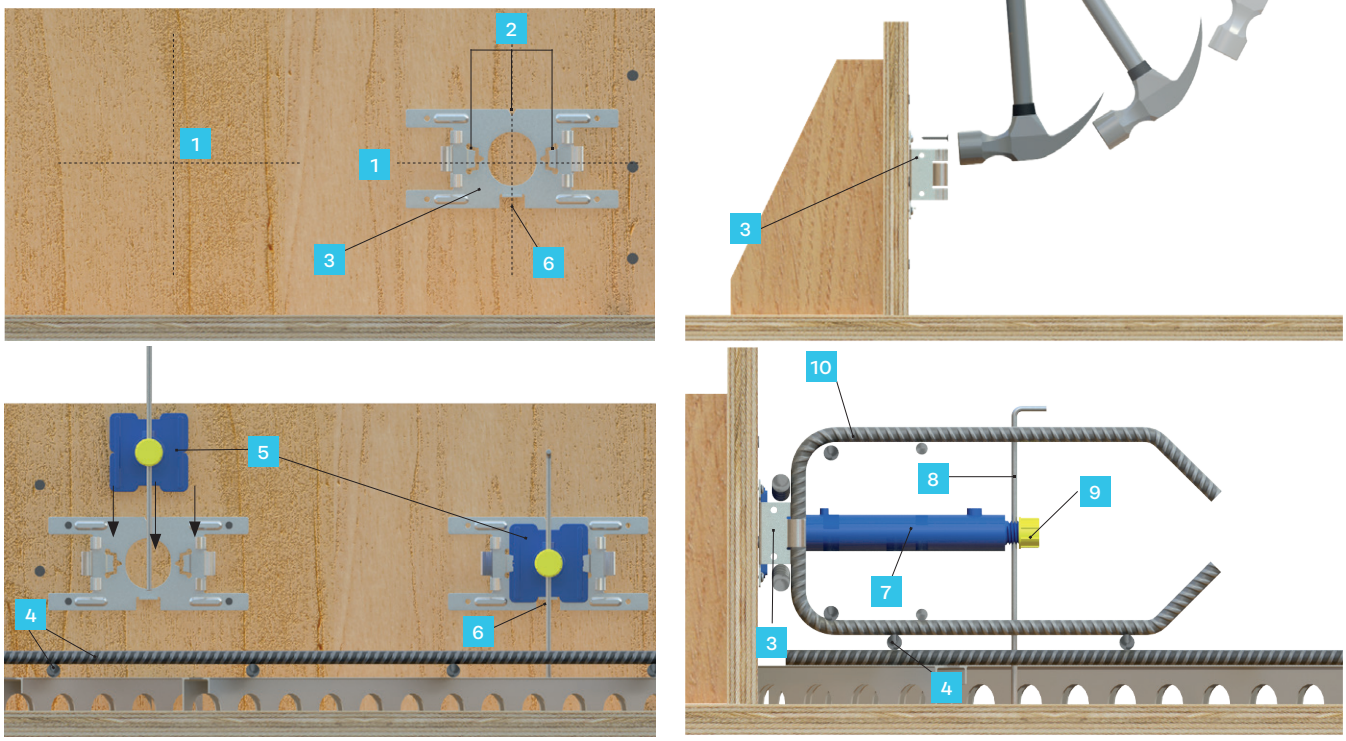
The connection between the intermediate slabs and cast walls requires the anchoring of many concrete rods. The use of high resistance Titan steel dowels in order to secure this connection allows a reduction in the amount of anchoring (by about 60%) and in the depth of the drill holes. Implementation is easy:

- Remove any damaged concrete leaving only sound concrete.
- Drill a hole with a diameter between 2 and 5 mm larger than that of the dowel and half a dowel deep
- Secure the dowel with Ankrochim SF-800 resin according to the instructions for the product. This resin is compatible with any water present
- Mount the centring sleeve and reinforcement cage to the mounting flange and slide the complete unit over the dowel
- Tie the Titan reinforcement cage to the reinforcement in the slab and cast the concrete

# Plaka Titan

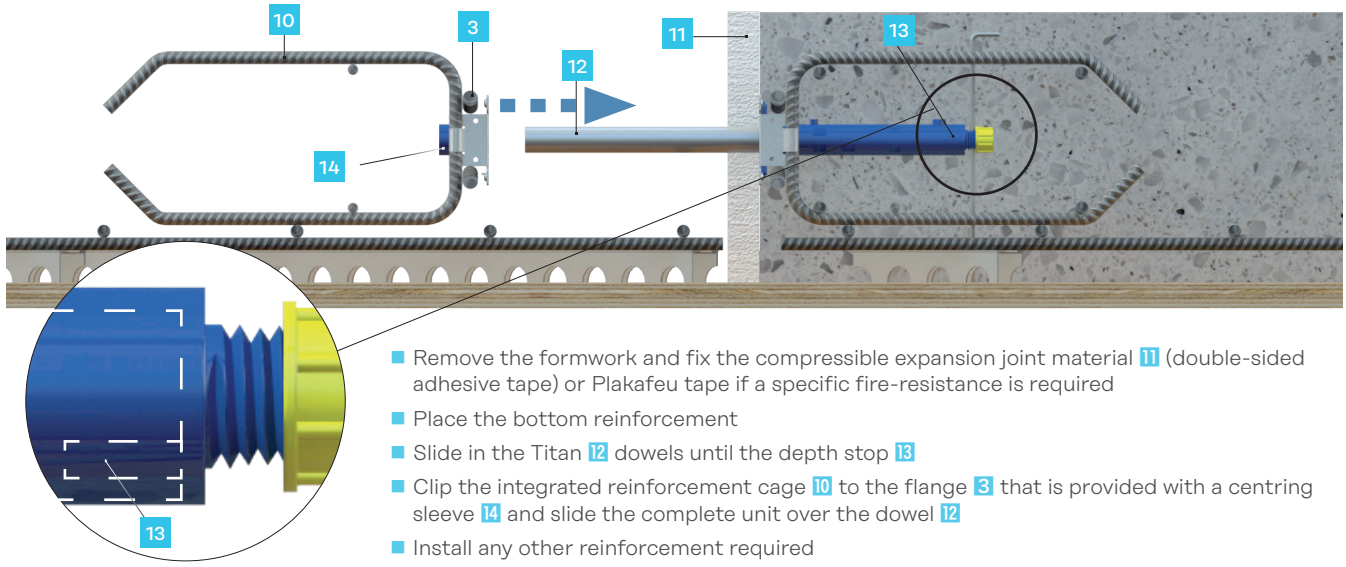
Installation instructions

## 1st concreting phase




- Adjust and fix the formwork at the correct height
- Trace out the reference axes 1 and nail down the flanges 3 in the right direction 2, with the stop 6 at the bottom
- Position the bottom reinforcement 4
- Slide the expansion sleeve 5 (without removing the label) into the flange rails up to the stop 6
- Slide the integrated reinforcement cage 10 over it and clip it onto the flange 3
- Check that the expansion sleeve 7 is horizontal and secure its position by locking the adjustable pin 8 with the threaded screw 9
- Install the other reinforcements and cast on the side of the expansion sleeve

## 2nd concreting phase

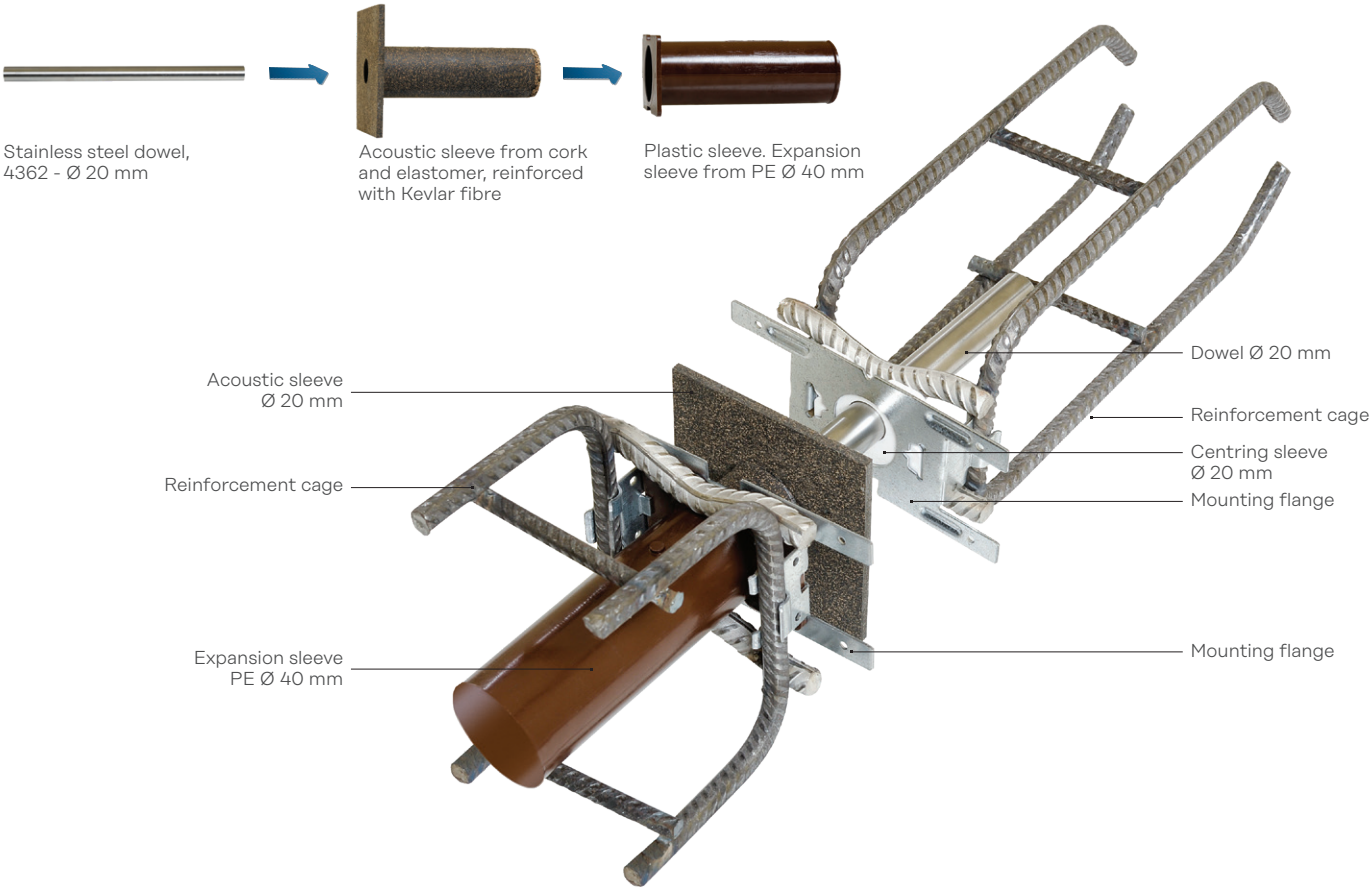



- Remove the formwork and fix the compressible expansion joint material 11 (double-sided adhesive tape) or Plakafeu tape if a specific fire-resistance is required
- Place the bottom reinforcement
- Slide in the Titan 12 dowels until the depth stop 13
- Clip the integrated reinforcement cage 10 to the flange 3 that is provided with a centring sleeve 14 and slide the complete unit over the dowel 12
- Install any other reinforcement required
- Fix the reinforcement to the armature and cast the 2nd concreting phase

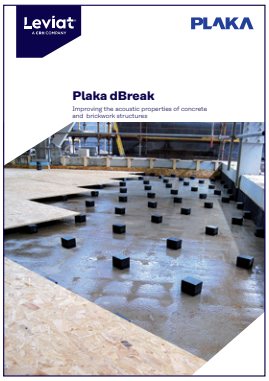
# Plaka Titan

Acoustic dowels

## Dowels for the transfer of shear force with acoustic insulation $\Delta L_w$ = 34 tot 36 dB




## Acoustic separation with Titan acoustic dowels




Titan acoustic dowels have been specially designed for transferring shear forces in combination with insulating from contact noise and vibration damping. Contact noise insulating connections could be necessary in stairways for example (joint between landing and wall, landing and stairs) or galleries (joint between balcony and wall or balcony and floor).

An acoustic insulation bushing can be found in the Titan PE expansion sleeve. This sleeve is manufactured from 10 mm thick vibration damping Kevlar-reinforced cork-rubber elastomer material. The sound waves transferred via the concrete of the stairways and lift shafts are systematically dampened. In this way an important reduction in the transfer of contact noise and vibrations is obtained. The forces absorbed by the Titan dowel are transferred to the concrete via the integrated reinforcement cage.

The shape of the reinforcement cage is modified according to the construction situation (floor slab-wall or floor slab-floor slab). More information about this special version of the Titan dowel can be found in the Plaka dBreak product information brochure.

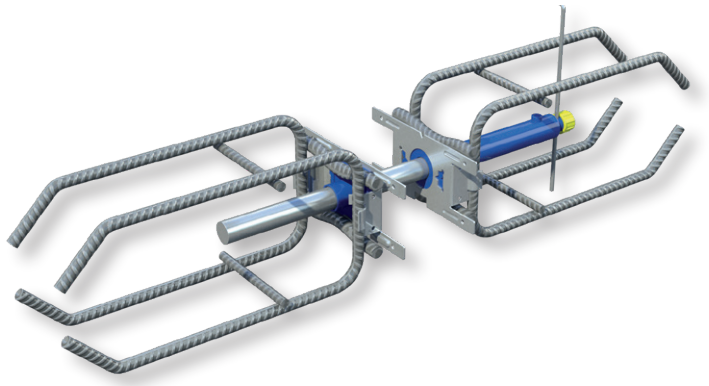
# Plaka Titan

Dowels for the transmission of shear forces
in expansion joints

### Titan dowel technology for more efficient construction

Titan shear force dowels are construction connectors which are cast in the floor or wall at the expansion joint. Lower safety coefficients in respect to play can be sustained by using specific reinforcement cages which are available with the Titan dowels.

- **Unique design with high load transfer**
- **Perfect positioning guaranteed by Titan mounting flange and positioning clips**
- **Adjustable locating pin to ensure horizontal positioning of the dowel**
- **Titan reinforcement cages are extremely stable**
- **Separate mounting components simplify the reinforcement**
- **Less reinforcement required than with other dowel systems**



See our Plakasteel documentation for combinations of Titan dowels and Plakasteel elements.

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