Leviat®
A CRH COMPANY

February 2021


# Biscuit Plate Dowels

## for slab-on-ground applications

Connolly

Leviat®
A CRH COMPANY

# We are one team.
# We are Leviat.

## Leviat is the new name of CRH's construction accessories companies worldwide.

**Under the Leviat brand, we are uniting the expertise, skills and resources of Connolly and its sister companies to create a world leader in fixing, connecting and anchoring technology.**

The products you know and trust will remain an integral part of Leviat's comprehensive brand and product portfolio. As Leviat, we can offer you an extended range of specialist products and services, greater technical expertise, a larger and more agile supply chain and better, faster innovation.

By bringing together CRH's construction accessories family as one global organisation, we are better equipped to meet the needs of our customers, and the demands of construction projects, of any scale, anywhere in the world.

**This is an exciting change. Join us on our journey.**

**Read more about Leviat at Leviat.com**

Our product brands include:

Ancon

Connolly

HALFEN

HELIFIX

ISEDIO

**60** locations

sales in **30+** countries

**3000** people worldwide

**Imagine. Model. Make.**

**Leviat.com**

# Biscuit Plate Dowels

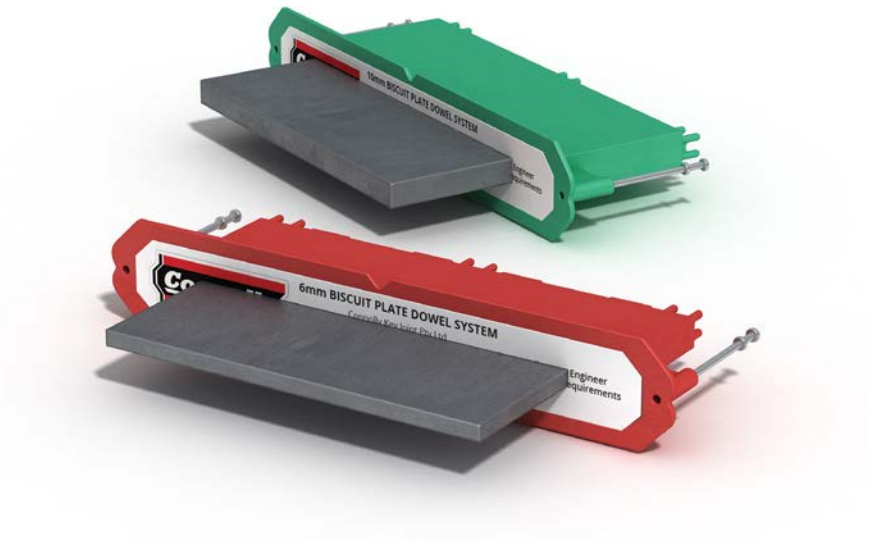
## A Plate Dowel and Sleeve system designed to transfer loads across construction joints in slab-on-ground applications.

Connolly Biscuit Plate Dowels and Sleeves are designed to transfer loads across construction joints in slab-on-ground applications. The plastic sleeve encases one half of the plate dowel to de-bond the dowel from the concrete. Connolly Biscuit Plate Dowels allow for expansion, contraction and lateral movement at the joint.

Connolly Biscuit Plate Dowels are available in 6mm and 10mm thickness in black, hot-dip galvanised and stainless steel finish.

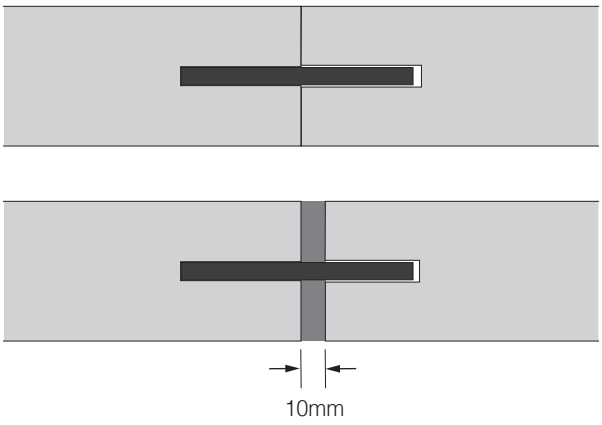
With pre-installed nails, and V-notches on all sides, Connolly Biscuit Dowel Sleeves can be easily and accurately installed on conventional formwork, ensuring perfect dowel alignment.

Injection moulded from polystyrene for accuracy and stiffness, the Biscuit Dowel Sleeve minimises the vertical movement across the joint. Biscuit Dowel Sleeves are colour coded to indicate the plate dowel thickness.




Connolly Biscuit Plate Dowels and Sleeves can be used:

- In Contraction Joints: - the second slab is poured against the first slab, after the formwork has been removed, leaving no gap between the two slabs at the time of pour but allowing contraction of the adjacent slabs.
- In Expansion Joints - using Connolly Biscuit Plate Dowels and a layer of compressible filler in the joint allows the adjacent slabs to expand and contract.



- Minimises differential deflection between slabs
- Allows for contraction, expansion and lateral movement
- V-notches and pre-installed nails for ease of installation
- Speeds up dowel installation
- Ability to fix to timber and steel formwork with ease
- Ideally suited for construction joints

Manufactured in an ISO accredited factory

Made in Australia

Cost-effective solution

Nationwide distribution network

Dedicated sales and technical support

Standard items available ex stock

# Biscuit Plate Dowel Components

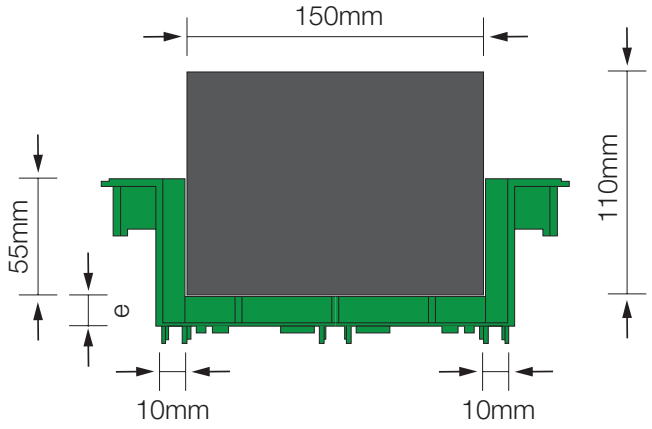
## The Connolly Biscuit Plate Dowel is available in standard sizes of 6mm and 10mm thick.

The system includes one polystyrene sleeve which comes fitted with duplex nails and one steel dowel which is available in black, hot-dip galvanised or stainless steel.

### Specifications



| Product | Connolly Biscuit Plate Dowel 6mm | Connolly Biscuit Plate Dowel 10mm |
|---|---|---|
| | Steel Plate Dimensions | |
| **Length x Width** | 110mm x 150mm | 110mm x 150mm |
| **Dowel Thickness** | 6mm | 10mm |
| **Steel Grade** | AS/NZS 3679.1-300 | AS/NZS 3679.1-300 |
| **Hot-dip Galvanised** | 35µm – AS/NZS 4680:2006 | 55µm – AS/NZS 4680:2006 |
| | Sleeve Properties | |
| **Colour** | Red | Green |
| **Material** | Polystyrene | Polystyrene |
| **End Expansion (e)** | 5mm | 12mm |
| **Lateral Expansion** | 10mm each side | 10mm each side |
| **Connection** | Duplex nails to timber formwork pre-installed | |
| | Ordering Information | |
| **Finish** | **Part no. for complete set including plate dowel, sleeve and nails** | |
| **HDG** | CBPS6-GAL | CBPS10-GAL |
| **Black** | CBPS6-BLK | CBPS10-BLK |
| **Stainless Steel** | CBPS6-S/S | CBPS10-S/S |



# Biscuit Plate Dowel Design Capacities

The use of the Connolly Biscuit Plate Dowels ensures that shear loads are safely transferred across the joint through dowels. We recommend referring to *TR34, Fourth Edition – Concrete Industrial Ground Floors* to determine the dowel capacity.

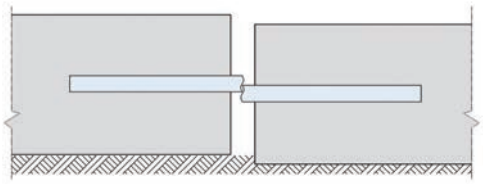
Section 6.5 of TR34 provides guidance on the calculation of dowel capacities for the following failure modes:

## Dowel Shear Capacity

The shear capacities for the plate dowels provided in the table below have been calculated using equation 18 of TR34.

**Dowel Shear Capacity**

| Sleeve Size | Thickness (t) (mm) | Finish | Shear Area (0.9 · A) ($mm^2$) | Capacity ($P_{sh\ plate}$) (kN) |
|---|---|---|---|---|
| **CBPS6** | 6 | Black/HDG | 810 | 135.2 |
| **CBPS10** | 10 | Black/HDG | 1,350 | 225.4 |
| **CBPS6** | 6 | Stainless | 810 | 86.6 |
| **CBPS10** | 10 | Stainless | 1,350 | 144.4 |

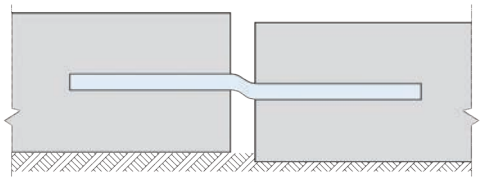


For the standard configurations of the plate dowel, the shear strength will never govern the capacity of the joint.

## Dowel Bearing/Bending Capacity

Bearing/Bending is a combined failure mode that checks the bending capacity of the dowel as well as the bearing capacity of the surrounding concrete. Equation 19 of TR34 defines the bearing/bending capacity of a dowel.

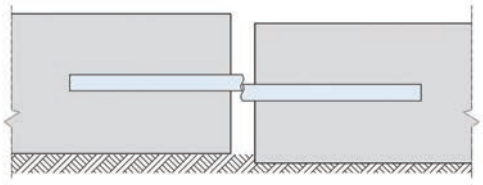
Please find the dowel bearing/bending capacities for different conditions in the combined capacity tables on page 8 and 9.



## Punching Shear (Bursting Force)

Section 6.5.3 of TR34 recommends calculating the bursting load of the concrete by adapting the EC2 approach for punching failure using an effective depth of 0.75 times the depth between the dowel and the surface of the concrete slab.

Please find the punching shear capacities for different conditions in the combined capacity tables on page 8 and 9.



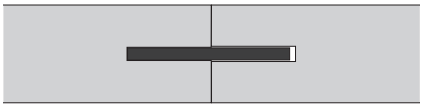
# Biscuit Plate Dowel Design Capacities

## Single Dowel Design Capacities

The following tables provide single dowel capacities for 6mm and 10mm Biscuit Plate Dowels calculated in accordance with TR34 for various joint widths and concrete compressive strengths. The capacities provided in the table are minimum values from the failure modes dowel shear, dowel bearing/bending and punching/bursting. Colour coding indicates the governing failure mode.

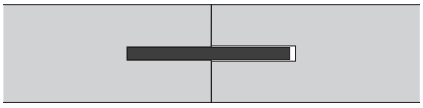
## Single Dowel Design Capacity - Contraction Joint

| Biscuit Plate Dowel - Single Dowel Design Capacity - 6mm mild steel dowel | | | | | |
|---|---|---|---|---|---|
| | | Concrete Strength (MPa) | | | |
| Slab Thickness (mm) | Joint Width (mm) | 25 | 32 | 40 | 45 |
| 125 | 5 | 11.7 | 13.3 | 14.8 | 15.7 |
| | 10 | 11.5 | 13.0 | 14.5 | 15.4 |
| | 15 | 11.3 | 12.8 | 14.3 | 15.1 |
| 150 | 5 | 15.8 | 17.8 | 19.9 | 21.1 |
| | 10 | 15.5 | 17.5 | 19.6 | 20.8 |
| | 15 | 15.2 | 17.2 | 19.2 | 20.4 |
| 200 | 5 | 25.5 | 28.8 | 32.2 | 34.2 |
| | 10 | 25.1 | 28.4 | 31.8 | 33.7 |
| | 15 | 24.7 | 28.0 | 31.3 | 33.2 |
| 250 | 5 | 37.4 | 42.3 | 47.3 | 50.1 |
| | 10 | 36.9 | 41.8 | 46.7 | 49.5 |
| | 15 | 36.5 | 39.3 | 40.8 | 41.6 |
| 300 | 5 | 51.4 | 58.2 | 65.1 | 69.0 |
| | 10 | 46.4 | 49.6 | 52.3 | 53.7 |
| | 15 | 37.6 | 39.3 | 40.8 | 41.6 |




## Single Dowel Design Capacity - Contraction Joint

| Biscuit Plate Dowel - Single Dowel Design Capacity - 10mm mild steel dowel | | | | | |
|---|---|---|---|---|---|
| | | Concrete Strength (MPa) | | | |
| Slab Thickness (mm) | Joint Width (mm) | 25 | 32 | 40 | 45 |
| 150 | 5 | 15.1 | 17.0 | 19.1 | 20.2 |
| | 10 | 14.8 | 16.8 | 18.7 | 19.9 |
| | 15 | 14.5 | 16.5 | 18.4 | 19.5 |
| 200 | 5 | 24.6 | 27.8 | 31.1 | 33.0 |
| | 10 | 24.3 | 27.4 | 30.7 | 32.5 |
| | 15 | 23.9 | 27.0 | 30.2 | 32.1 |
| 250 | 5 | 36.3 | 41.1 | 46.0 | 48.7 |
| | 10 | 35.9 | 40.6 | 45.4 | 48.1 |
| | 15 | 35.4 | 40.1 | 44.8 | 47.5 |
| 300 | 5 | 50.2 | 56.8 | 63.5 | 67.4 |
| | 10 | 49.7 | 56.2 | 62.9 | 66.7 |
| | 15 | 49.2 | 55.6 | 62.2 | 66.0 |
| 350 | 5 | 66.3 | 75.0 | 83.9 | 89.0 |
| | 10 | 65.7 | 74.3 | 83.1 | 88.2 |
| | 15 | 65.1 | 73.6 | 82.3 | 87.3 |

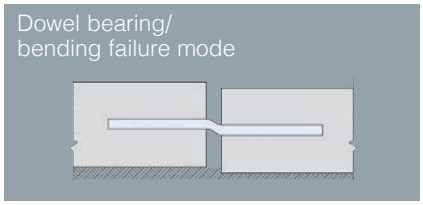


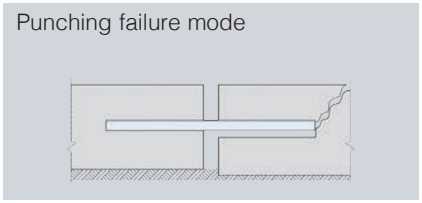

The tables show capacities for mild steel dowels (black and HDG) for standard conditions.
Please contact Leviat for custom applications and for stainless steel dowel capacities.
See Page 9 for colour coding of failure modes.

# Combined Design Capacities

## Single Dowel Design Capacities

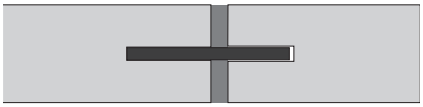
The table on the right shows the colour coding that is used in the capacity tables on pages 8 and 9 to indicate the governing failure mode.



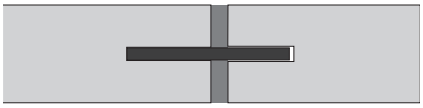

## Single Dowel Design Capacity - Expansion Joint

| Biscuit Plate Dowel - Single Dowel Design Capacity - 6mm mild steel dowel | | | | | |
|---|---|---|---|---|---|
| | | Concrete Strength (MPa) | | | |
| Slab Thickness (mm) | Joint Width (mm) | 25 | 32 | 40 | 45 |
| 125 | 10 | 11.5 | 13.0 | 14.5 | 15.4 |
| | 15 | 11.5 | 13.0 | 14.5 | 15.4 |
| | 20 | 11.5 | 13.0 | 14.5 | 15.4 |
| 150 | 10 | 15.5 | 17.5 | 19.6 | 20.8 |
| | 15 | 15.5 | 17.5 | 19.6 | 20.8 |
| | 20 | 15.5 | 17.5 | 19.6 | 20.8 |
| 200 | 10 | 25.1 | 28.4 | 31.8 | 33.7 |
| | 15 | 25.1 | 28.4 | 31.8 | 33.7 |
| | 20 | 24.1 | 28.4 | 31.8 | 33.4 |
| 250 | 10 | 36.9 | 41.8 | 46.7 | 49.5 |
| | 15 | 36.9 | 39.3 | 40.8 | 41.6 |
| | 20 | 31.1 | 32.2 | 33.0 | 33.4 |
| 300 | 10 | 46.4 | 49.6 | 52.3 | 53.7 |
| | 15 | 37.6 | 39.3 | 40.8 | 41.6 |
| | 20 | 31.1 | 32.2 | 33.0 | 33.4 |



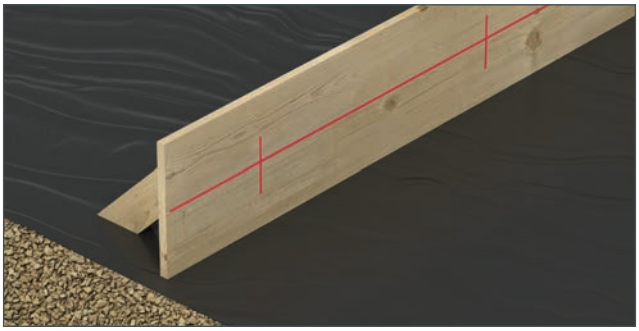

## Single Dowel Design Capacity - Expansion Joint

| Biscuit Plate Dowel - Single Dowel Design Capacity - 10mm mild steel dowel | | | | | |
|---|---|---|---|---|---|
| | | Concrete Strength (MPa) | | | |
| Slab Thickness (mm) | Joint Width (mm) | 25 | 32 | 40 | 45 |
| 150 | 10 | 14.8 | 16.8 | 18.7 | 19.9 |
| | 15 | 14.8 | 16.8 | 18.7 | 19.9 |
| | 20 | 14.8 | 16.8 | 18.7 | 19.9 |
| 200 | 10 | 24.3 | 27.4 | 30.7 | 32.5 |
| | 15 | 24.3 | 27.4 | 30.7 | 32.5 |
| | 20 | 24.3 | 27.4 | 30.7 | 32.5 |
| 250 | 10 | 35.9 | 40.6 | 45.4 | 48.1 |
| | 15 | 35.9 | 40.6 | 45.4 | 48.1 |
| | 20 | 35.9 | 40.6 | 45.4 | 48.1 |
| 300 | 10 | 49.7 | 56.2 | 62.9 | 66.7 |
| | 15 | 49.7 | 56.2 | 62.9 | 66.7 |
| | 20 | 49.7 | 56.2 | 62.9 | 66.7 |
| 350 | 10 | 65.7 | 74.3 | 83.1 | 88.2 |
| | 15 | 65.7 | 74.3 | 83.1 | 88.2 |
| | 20 | 65.7 | 74.3 | 78.6 | 80.4 |

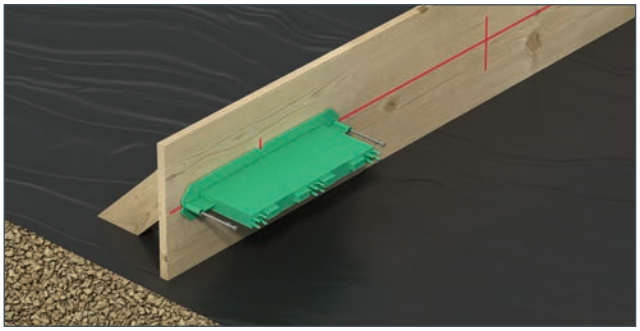



The tables show capacities for mild steel dowels (black and HDG) for 10mm expansion joints.
Please contact Leviat for custom applications and for stainless steel dowel capacities.
See Page 9 for colour coding of failure modes.

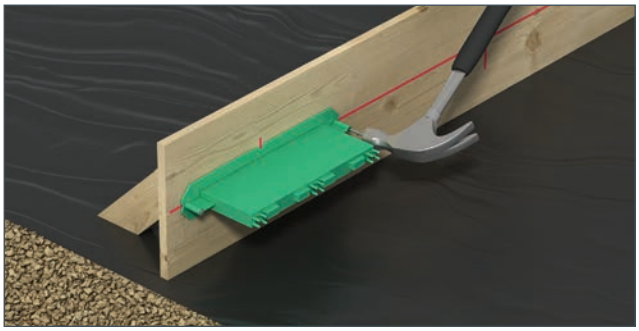
# Installation Guidance



**Step 1**
Mark centre line of the biscuit plate dowel and dowel spacing on the formwork.



**Step 2**
Place the Biscuit Dowel Sleeve at the marked location by using the V-notches at the top and bottom and both sides to ensure correct placement.



**Step 3**
Nail the Biscuit Dowel Sleeve to the formwork using the pre-installed nails.

**Step 4**
After pouring the first slab remove the formwork. After removal of formwork, the Biscuit Dowel Sleeve will be exposed as shown above.

**Step 5**
Firmly place the Biscuit Plate Dowel into the insertion hole in the sleeve by punching through the sticker as shown above.

**Step 6**
Once plates have been correctly positioned, install the specified reinforcement and carry out the next pour. (For expansion joints, install compressible material before second pour)

# Connolly Product Range

## Key Joint

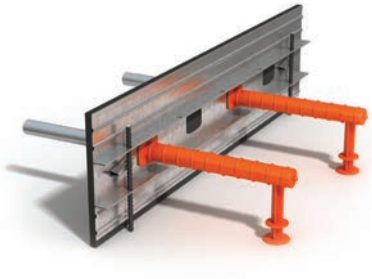
Connolly Key Joints are a continuous pour solution for contraction joints in slab on ground applications. Key Joints are a roll formed galvanised steel section used as a leave-in-place formwork to control shrinkage induced cracking. The profile is fixed in place using our patented peg and wedge system. Key Joints are available in 3 and 6m lengths for slab thicknesses from 100mm to 300mm.

## Dowel Cradles

Connolly Dowel Cradles are used for load transfer in saw cut contraction joints. They are a welded wire assembly that ensures the horizontal and vertical alignment of dowels at the correct spacing and height. Manufactured in 3m lengths from 6mm wire, dowel cradles are available in a wide range of configurations to suit a variety of slab thicknesses and load requirements.

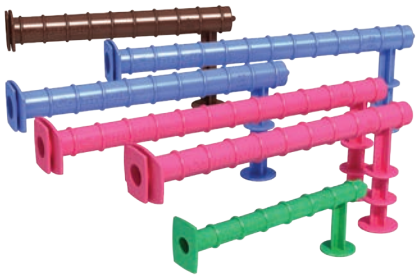
## Expansion Joint System

Connolly Expansion Joint System is a continuous pour solution for expansion joints in slab on ground applications. They are a roll formed galvanised steel section with 10mm cross linked foam to provide a leave-in-place formwork that allows for joint expansion. The profile has pre drilled holes that allows it to be used in conjunction with Connolly Universal Dowel Sleeves. The expansion joint profile is available in 3m lengths for slab thickness from 100mm to 200mm. Custom lengths and heights are available on request.



## Universal Dowel Sleeves

Connolly Universal Dowel Sleeves are available for round and square dowels allowing load transfer across joints in slab-on-ground applications. The sleeve encases one half of the dowel to de-bond the dowel from the concrete. All universal dowel sleeves allow for expansion and contraction at the joint with the square variety also allowing for lateral movement at the joint.



## Safety Caps

Connolly Safety Cushion Caps are designed to reduce the risk of injury on-site. Made from recyclable plastic, the safety caps are suitable for steel reinforcing bars N12–N32mm, as well as Star Pickets.

# Worldwide contacts for Leviat:


**Australia**
**Leviat**
98 Kurrajong Avenue,
Mount Druitt Sydney, NSW 2770
Tel: +61 - 2 8808 3100
Email: info.au@leviat.com

**Austria**
**Leviat**
Leonard-Bernstein-Str. 10
Saturn Tower, 1220 Wien
Tel: +43 - 1 - 259 6770
Email: info.at@leviat.com

**Belgium**
**Leviat**
Industrielaan 2
1740 Ternat
Tel: +32 - 2 - 582 29 45
Email: info.be@leviat.com

**China**
**Leviat**
Room 601 Tower D, Vantone Centre
No. A6 Chao Yang Men Wai Street
Chaoyang District
Beijing · P.R. China 100020
Tel: +86 - 10 5907 3200
Email: info.cn@leviat.com

**Czech Republic**
**Leviat**
Business Center Šafránkova
Šafránkova 1238/1
155 00 Praha 5
Tel: +420 - 311 - 690 060
Email: info.cz@leviat.com

**Finland**
**Leviat**
Vädursgatan 5
412 50 Göteborg / Sweden
Tel: +358 (0)10 6338781
Email: info.fi@leviat.com

**France**
**Leviat**
6, Rue de Cabanis
FR 31240 L'Union
Toulouse
Tel: +33 - 5 - 34 25 54 82
Email: info.fr@leviat.com

**Germany**
**Leviat**
Liebigstrasse 14
40764 Langenfeld
Tel: +49 - 2173 - 970 - 0
Email: info.de@leviat.com

**India**
**Leviat**
309, 3rd Floor, Orion Business Park
Ghodbunder Road, Kapurbawdi,
Thane West, Thane,
Maharashtra 400607
Tel: +91 - 22 2589 2032
Email: info.in@leviat.com

**Italy**
**Leviat**
Via F.lli Bronzetti 28
24124 Bergamo
Tel: +39 - 035 - 0760711
Email: info.it@leviat.com

**Malaysia**
**Leviat**
28 Jalan Anggerik Mokara 31/59
Kota Kemuning, 40460 Shah Alam
Selangor
Tel: +603 - 5122 4182
Email: info.my@leviat.com

**Netherlands**
**Leviat**
Oostermaat 3
7623 CS Borne
Tel: +31 - 74 - 267 14 49
Email: info.nl@leviat.com

**New Zealand**
**Leviat**
2/19 Nuttall Drive, Hillsborough,
Christchurch 8022
Tel: +64 - 3 376 5205
Email: info.nz@leviat.com

**Norway**
**Leviat**
Vestre Svanholmen 5
4313 Sandnes
Tel: +47 - 51 82 34 00
Email: info.no@leviat.com

**Philippines**
**Leviat**
2933 Regus, Joy Nostalg,
ADB Avenue
Ortigas Center
Pasig City
Tel: +63 - 2 7957 6381
Email: info.ph@leviat.com

**Poland**
**Leviat**
Ul. Obornicka 287
60-691 Poznan
Tel: +48 - 61 - 622 14 14
Email: info.pl@leviat.com

**Singapore**
**Leviat**
14 Benoi Crescent
Singapore 629977
Tel: +65 - 6266 6802
Email: info.sg@leviat.com

**Spain**
**Leviat**
Polígono Industrial Santa Ana
c/ Ignacio Zuloaga, 20
28522 Rivas-Vaciamadrid
Tel: +34 - 91 632 18 40
Email: info.es@leviat.com

**Sweden**
**Leviat**
Vädursgatan 5
412 50 Göteborg
Tel: +46 - 31 - 98 58 00
Email: info.se@leviat.com

**Switzerland**
**Leviat**
Grenzstrasse 24
3250 Lyss
Tel: +41 - 31 750 3030
Email: info.ch@leviat.com

**United Kingdom**
**Leviat**
President Way, President Park,
Sheffield, S4 7UR
Tel: +44 - 114 275 5224
Email: info.uk@leviat.com

**United States of America**
**Leviat**
6467 S Falkenburg Rd.
Riverview, FL 33578
Tel: (800) 423-9140
Email: info.us@leviat.us

**For countries not listed**
Email: info@leviat.com


## Leviat.com

**For more information on the following products, please contact:**

**Concrete Floor Jointing products:**

1800 335 215
info.connolly.au@leviat.com
Connollykeyjoint.com
info.isedio.au@leviat.com
Isedio.com.au

**Masonry, Structural and Precast Concrete products:**

1300 304 320
info.ancon.au@leviat.com
Ancon.com.au

**Remedial Masonry products:**

1300 667 071
info.helifix.au@leviat.com
Helifix.com.au

**General Enquiries**

1300 304 320
Leviat.com

**Sales Offices and Production**

**New South Wales, Sydney**

98 Kurrajong Avenue
Mount Druitt | Sydney
NSW 2770

**New South Wales, Casino**

10 Irving Drive
Casino
NSW 2470

**Victoria**

9/63-69 Pipe Road
Laverton North | Melbourne
VIC 3026

**Queensland**

4/15 Terrace Place
Murarrie | Brisbane
QLD 4172

**Western Australia**

18 Tennant Street
Welshpool | Perth
WA 6106

**Leviat.com**

Leviat®
A CRH COMPANY

Imagine. Model. Make.

Leviat.com