



Structural Connections  
Floor Joint Systems

**Leviat**<sup>®</sup>  
A CRH COMPANY

## Connolly Expansion Joint Systems



Imagine. Model. Make.

# Leviat®

A CRH COMPANY

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.

**Leviat is a world leader in connecting, fixing, lifting and anchoring technology.**

From the build of new schools, hospitals, homes and infrastructure, to the repair and maintenance of heritage structures, our engineering skills are making a difference around the world.

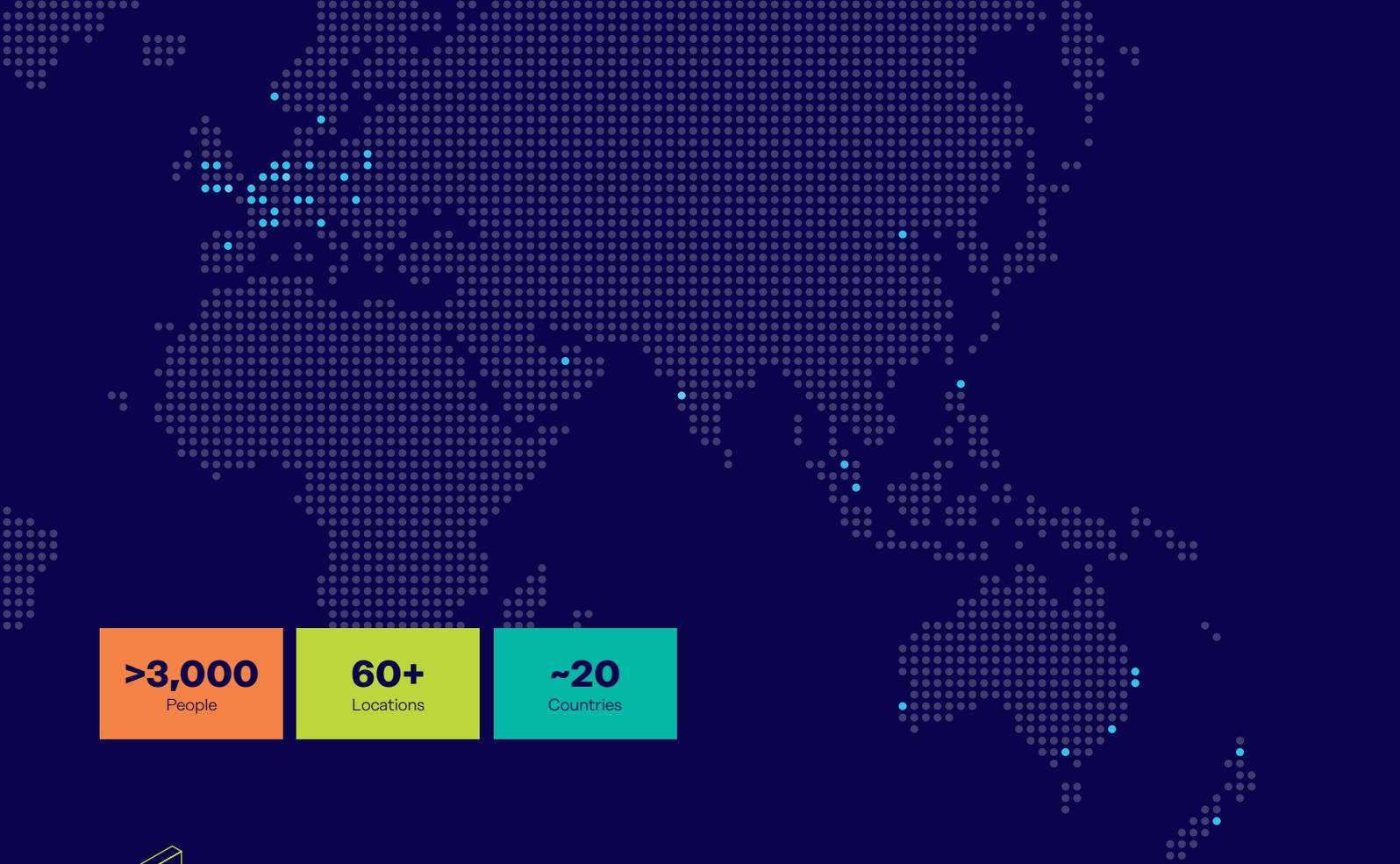
We provide technical design assistance at every stage of a project, from initial planning to installation and beyond.

Our technical support services range from simple product selection through to the development of a fully customised project-specific design solution.

Every promise we make locally, has the commitment and dedication of our global team behind it. We employ almost 3,000 people at 60 locations across North America, Europe and Asia-Pacific, providing an agile and responsive service worldwide.

**Leviat, a CRH company, is part of the world's leading building materials business.**

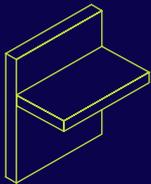




**>3,000**  
People

**60+**  
Locations

**~20**  
Countries



### 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.



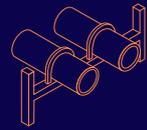
#### Anchoring & Fixing

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

# Expansion Joint System

A steel backed expansion joint with an integrated dowel system used for forming expansion joints in continuous pours.

Slab on ground pavements come in various forms, from a council footpath right through to a container handling facility, however the fundamental challenge of controlling expansion, while guaranteeing load transfer, is the same in both situations.

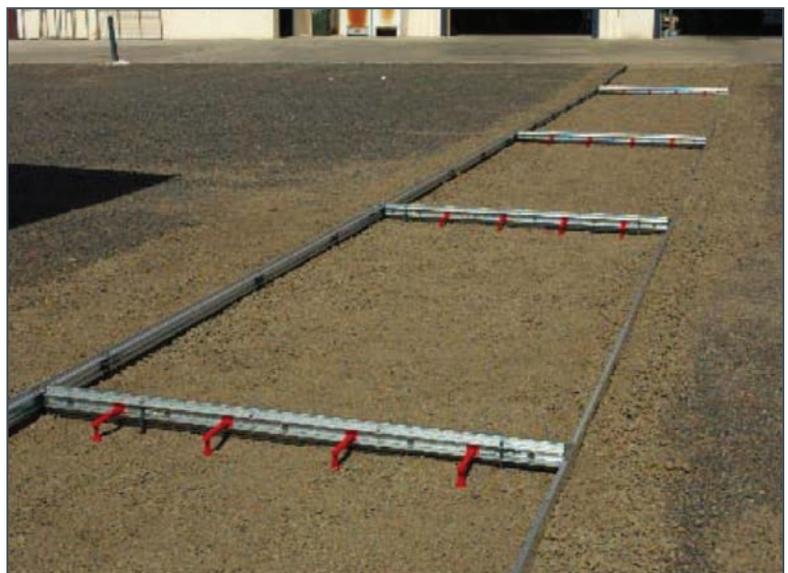
The Connolly Expansion Joint System is a continuous pour solution for expansion joints in slab on ground applications.

Connolly Expansion Joints 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 is fixed using our patented peg and wedge system.

The steel profile has pre-formed holes which allow it to be used in conjunction with Connolly Universal Dowel Sleeves. Universal Dowel Sleeves are installed in the steel section using our patented twist-fix feature.

The expansion joint profile is available in 3m lengths for slab thicknesses from 100mm to 200mm. Custom heights and lengths are available on request.

A range of permanent capping and rebate moulds are also available to be used with Connolly Expansion Joints (see page 10 for further information).



*Connolly Expansion Joint System in use on a concrete footpath*

In some situations, the Expansion Joint System can also be used vertically.



*Underpass in VIC, using shotcrete stabilisation*



- Enables continuous pours
- Allows up to 10mm expansion
- 4 different profile heights
- Provides expansion capacity over the full depth of the slab
- Strong connection between Expansion Joint and Connolly Universal Dowel Sleeves through patented twist-fix feature
- Patented wedge fixing mechanism allows fast and accurate height adjustment
- Additional stiffening ribs (EXJ125, EXJ150 and EXJ200) to ensure straighter joints
- Galvanised coating for corrosion protection
- Can be used to screed off which makes getting the right level quick and easy
- Permanent capping and rebate moulds available



Manufactured in an ISO accredited factory



Made in Australia



Cost-effective solution



Nationwide distribution network



Dedicated sales and technical support

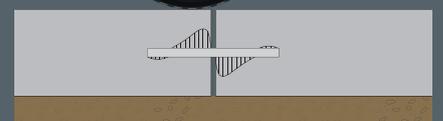


Standard items available ex stock

## Transferring loads through expansion joints

### The Expansion Joint System:

- Transfers shear loads through integrated dowels
- Allows for expansion and contraction in the joint
- Minimises differential deflection between adjoining slabs
- Allows for lateral movement when used with Square Universal Dowel Sleeves
- Capping acts as seal to prevent ingress of debris in the joint



# Expansion Joint System Components

The Connolly Expansion Joint System is available in four standard sizes to suit slab thicknesses from 100 to 200mm.

All systems include one galvanised steel profile with a length of 3000mm, 4 pegs, 4 wedges and Connolly Universal Dowel Sleeves complete with hot-dip galvanised dowels as specified in the 'System Dimensions' table.

Systems are packed in boxes of 10 for EXJ100/125/150 and boxes of 6 for EXJ200.

Custom lengths (up to 3 metres), heights and dowel configurations are available on request.



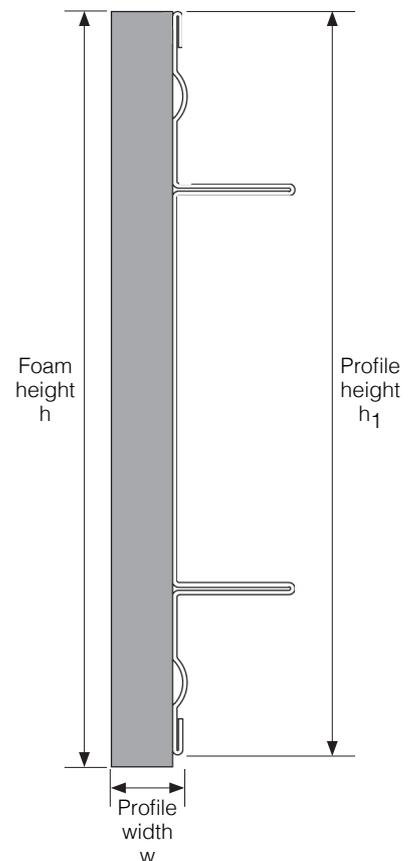
## System Dimensions

System	For Slab Thickness (mm)	Dowel Diameter (mm)	Dowel Length (mm)	Number of Dowels / Centres (mm)	Foam Height h (mm)	Profile Height $h_1$ (mm)	Profile Width w (mm)
EXJ100	100	12	300	9/335	100	87.5	11
EXJ125	125	16	450	7/450	125	123	11.4
EXJ150	150	16	450	7/450	150	142	11.4
EXJ200	200	24	450	7/450	200	190	11.4

## Steel Profile

The galvanised steel profile is available in four standard heights. All standard profiles are 3 metres long and feature a 10mm layer of closed cell PE foam on one side. Profiles have pre-punched holes that allow the installation of 12mm Universal Dowel Sleeves (100mm slab thickness), or Universal Dowel Sleeves with Connolly's patented twist-fix system (125 – 200mm slab thickness).

Joiners are available to connect multiple profiles in situations where the joint is longer than 3 metres.



Part No.	Slab Thickness h (mm)	Pre-Punched Holes
EXJ10030-BOX	100	Round holes to fit 12mm dowel every 335mm
EXJ12530-BOX	125	Connolly pre-punched holes every 150mm
EXJ15030-BOX	150	
EXJ20030-BOX	200	



## Universal Dowel Sleeves

The system is compatible with the full range of Connolly Universal Dowel Sleeves (UDS), which feature a unique, patented twist-fix flange ensuring quick and easy installation. As standard, each system is supplied with round sleeves as shown in the table below. For variations on this, please contact us.

Part No.	Dowel Diameter (mm)	Colour
<b>EXJDS12Rx150</b>	12	Green
<b>EXJDS16Rx225</b>	16	Purple
<b>EXJDS24Rx225</b>	24	Orange



## Dowels

Hot-dip galvanised dowels are supplied with each system as standard. Dowels in black steel, stainless steel and custom length dowels are available on request.

Part No.	Dowel Diameter (mm)	Dowel Length (mm)
<b>DBHDG12Rx300</b>	12	300
<b>DBHDG16Rx450</b>	16	450
<b>DBHDG24Rx450</b>	24	450



## Pegs and Wedges

Each system includes a set of 4 pegs and wedges. The finish of the peg is black steel.

Part No.	Description	Diameter (mm)	Peg Length (mm)
<b>PW1004</b>	Set of 4 pegs and wedges for EXJ100, EXJ125, EXJ150	8.5	350
<b>PW1504</b>	Set of 4 pegs and wedges for EXJ200	8.5	390



# Expansion Joint Design Capacities

Use of the Connolly Expansion Joint System 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:

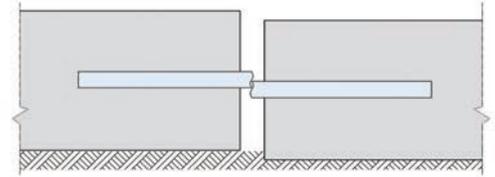
## Dowel Shear Capacity

The shear capacity of the steel profile for round dowels included in the Expansion Joint System is as follows:

### Round and Square Dowels - Dowel Shear Capacity

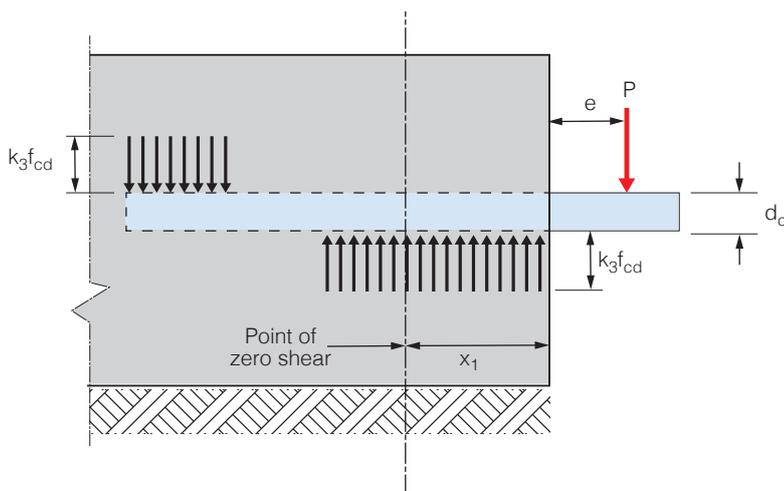
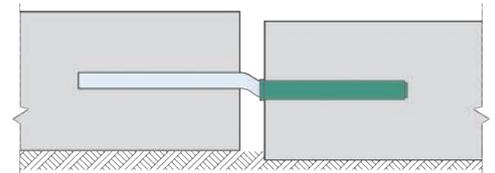
Expansion Joint	Dowel Diameter $d_d$ (mm)	Finish	Shear Area $(0.9 \cdot A)$ (mm <sup>2</sup> )	Capacity $(P_{sh \text{ plate}})$ (kN)
EXJ100	12	Black/HDG	101.8	15.93
EXJ125, EXJ150	16	Black/HDG	181.0	28.32
EXJ200	24	Black/HDG	407.2	63.73

For the standard configurations of the Expansion Joint System, the dowel shear strength will never govern the capacity of the joint.



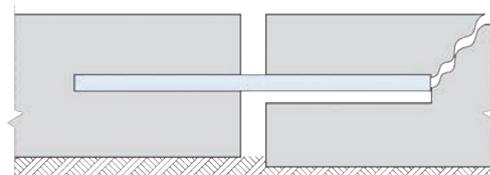
## Dowel Bearing/Bending Capacity

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 17 of TR34 defines the bearing/bending capacity of a dowel connection. The formula is based on the load distribution as shown in the image below.



## Punching Shear (Bursting Forces)

TR34 section 6.5.3 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.



## Combined Design Capacities

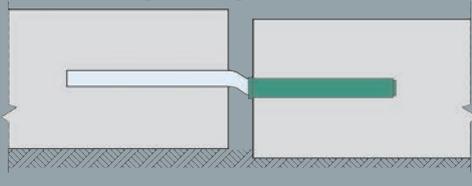
The following table provides single dowel capacities calculated in accordance with TR34, along with system capacities per linear metre for various joint widths and concrete compressive strengths. The capacities provided in the table are minimum values from dowel shear, dowel bearing/bending and punching/bursting capacity.

Colour coding indicates which capacities are based on dowel bearing/bending and which on punching shear.

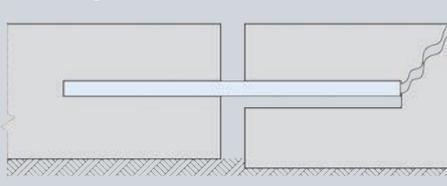
## Design Capacity

System	Slab Thickness (mm)	Dowel Dia. (mm)	Dowel Spacing (mm)	Joint Width (mm)	25 MPa		32 MPa		40 MPa	
					$V_{Rd}/Dowel$ (kN)	$V_{Rd}/Metre$ (kN)	$V_{Rd}/Dowel$ (kN)	$V_{Rd}/Metre$ (kN)	$V_{Rd}/Dowel$ (kN)	$V_{Rd}/Metre$ (kN)
EXJ100	100	12	335	10	6.72	20.06	7.57	22.59	8.13	24.28
				15	6.01	17.93	6.43	19.19	6.80	20.31
				20	5.23	15.62	5.53	16.49	5.78	17.24
EXJ125	125	16	450	10	10.70	23.78	12.10	26.90	13.53	30.07
				15	10.70	23.78	12.10	26.90	13.53	30.07
				20	10.68	23.73	11.43	25.40	12.09	26.88
EXJ150	150	16	450	10	13.35	29.66	14.65	32.56	15.89	35.31
				15	11.91	26.48	12.90	28.68	13.81	30.69
				20	10.68	23.73	11.43	25.40	12.09	26.88
EXJ200	200	24	450	10	26.88	59.72	30.41	67.57	34.00	75.55
				15	26.88	59.72	30.41	67.57	34.00	75.55
				20	26.88	59.72	30.27	67.27	32.54	72.30

Dowel bearing/bending failure mode



Punching failure mode



## Dowel Properties

Steel Grade: 300

Material Standard: AS/NZS 3679.1 2010

Material Finish: Hot-dip galvanised (AS/NZS 4680:2006). Black steel and stainless steel dowels also available on request.

# Capping and Rebate Moulds

A range of permanent capping and rebate moulds for use with the Connolly Expansion Joint System are available to provide a clean, sealed finish for the joint.



EXJ-PERM-CAP-BLK-3M



EXJ-PERM-CAP-GREY-3M



EXJRBM-16x10mm

## Permanent Capping

Permanent Capping consists of a white rigid plastic cap that clips on top of the profile. Above the rigid plastic is a soft PVC capping that maintains its flexibility and moves with the slab, protecting the joint from debris ingress. The PVC capping is available in black and grey. All permanent caps are supplied in 3 metre lengths.

## Rebate Mould

The rebate mould consists of a white rigid plastic cap that clips on top of the profile. A second plastic cap clips on to the white plastic and forms a rebate above the expansion joint during the pour.

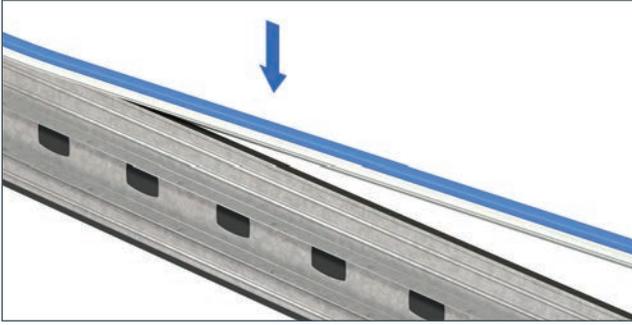
After removal of the top profile, a 16mm wide x 10mm high rebate above the expansion joint is ready to be filled with flexible joint sealant. The rebate mould is supplied in 3 metre lengths.

## Product Range

Part No.	Description	Colour	Set Down (mm)
<b>EXJ-PERM-CAP-BLK-3M</b>	Permanent Cap Black	Black	4
<b>EXJ-PERM-CAP-GREY-3M</b>	Permanent Cap Grey	Grey	4
<b>EXJRBM-16x10mm</b>	Rebate Mould	Blue	12

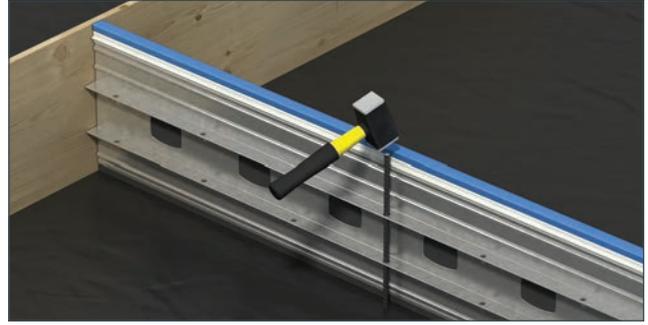
*Notes: Caps and rebate moulds to suit EXJ125 – EXJ200 only. When permanent caps or rebate moulds are used, the joint capacity is reduced. Please contact the technical team for revised design loads.*

# Installation Guidance



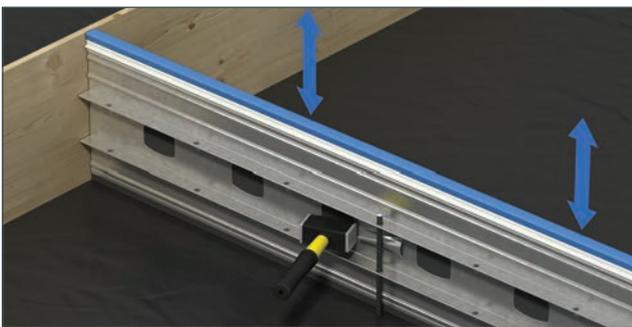
## Step 1

In the case where permanent capping or a rebate mould is used, ensure it is pushed firmly onto the top of the system prior to placement.



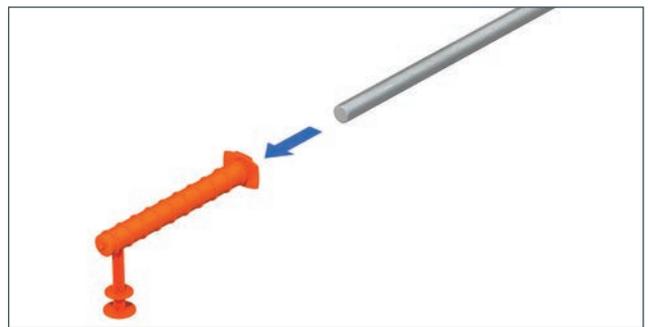
## Step 2

Position the expansion joint profile in the desired location and drive in the supplied pegs. Ensure the top of the peg is at least 20mm below the intended level of the finished concrete.



## Step 3

Adjust the profile to the correct height and secure by tapping in the supplied wedges.



## Step 4

Insert dowels into the Universal Dowel Sleeves by pressing all the way to the end of the sleeve.



## Step 5

Install the Universal Dowel Sleeve in the profile by pushing the dowel through the foam at the centre of the pre-punched holes and twist the sleeve 90 degrees to fix in place.



## Step 6

Place reinforcement and pour concrete evenly to both sides of the expansion joint at the same time. Finish surface and ensure top of joint is clear of any concrete.



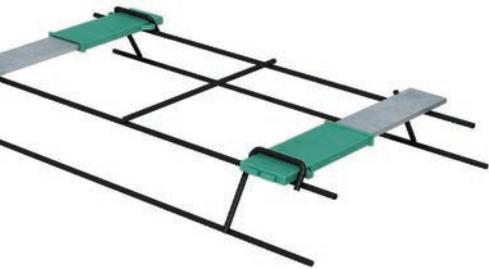
## Step 7

Pull out the top profile and apply sealant to manufacturer's specifications.

*Note: This step is only applicable when a rebate mould is used.*



# 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

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.

## Biscuit Dowel Plates

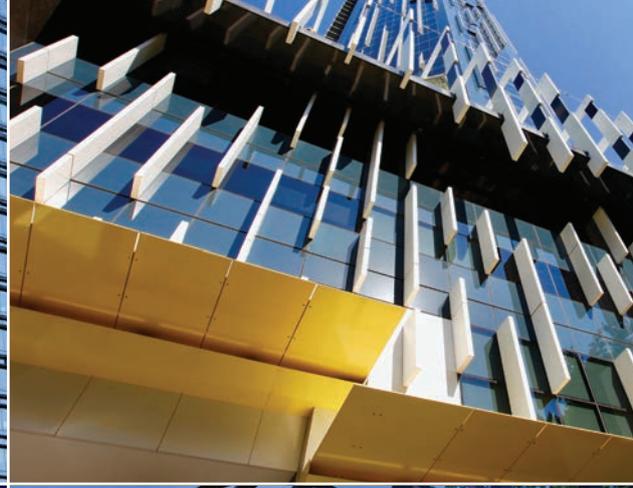
Biscuit Plate Dowels are designed to transfer loads across construction joints in slab on ground applications, allowing for expansion, contraction and lateral movement at the joint. The plastic sleeve encases one half of the plate dowel to de-bond the dowel from the concrete. Biscuit Plate Dowels are available in 6mm and 10mm thickness in black, hot-dip galvanised or stainless steel finish.

## 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.

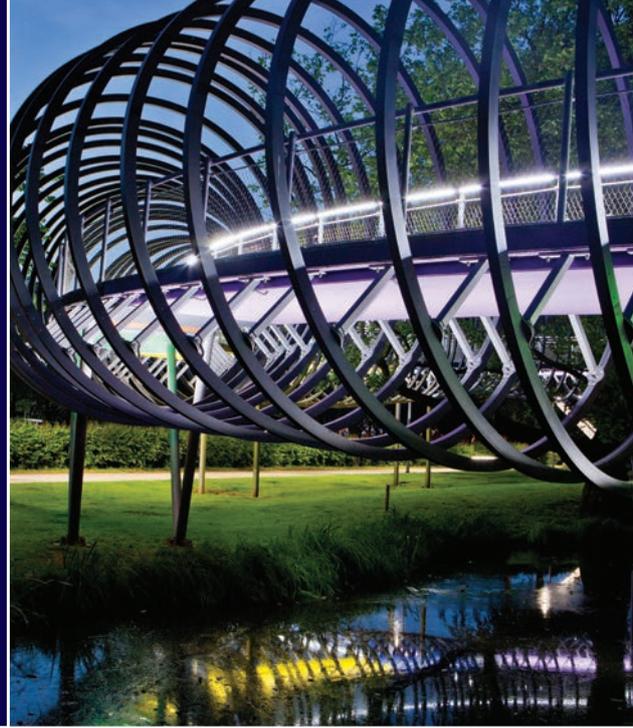
## Safety Caps

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.



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## 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 Šafránková  
Šafránková 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

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

**Concrete Floor Jointing products:**

1800 335 215  
info.connolly.au@leviat.com  
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1300 667 071  
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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**

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