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July 2022

FDB Flange Dowel Box

for slab-on-ground applications

Connolly

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FDB Flange Dowel Box

An effective solution to allow for end expansion and large lateral movements in normal and heavy-duty industrial slabs.

Connolly FDB Flange Dowel Boxes are high quality galvanised steel sleeves which provide large lateral movement allowance as well as end expansion capabilities. They are designed to be used in post-tensioned concrete slabs or wide joint opening specifications with Connolly square dowels which can transfer high loads across construction joints in slab-on-ground applications. The box encases one half of the dowel to de-bond it from the concrete. Connolly FDB Flange Dowel Boxes allow for expansion, contraction and lateral movement at the joint.

Connolly Flange Dowel Boxes are available in four standard sizes - 16mm, 20mm, 25mm and 32mm. Custom sizes are also available on request.

With V-notches on all sides, they can be easily and accurately installed on formwork, ensuring perfect dowel alignment. The wide flange design ensures the dowel remains square to the formwork during the concrete pour.

Connolly FDB Flange Dowel Boxes can be used in contraction and expansion joints. The closed cell foam insert in the sleeve allows for lateral movement and end expansion.

As the slab panels shrink towards their centres, with potential differential shrinkage rates, the adjacent slab panels will move laterally as well as horizontally. Free lateral movement minimises the cracking risks related to concrete shrinkage.

The system utilises square dowels to accommodate larger joint openings in post-tensioned slabs or any other application with large shrinkage.

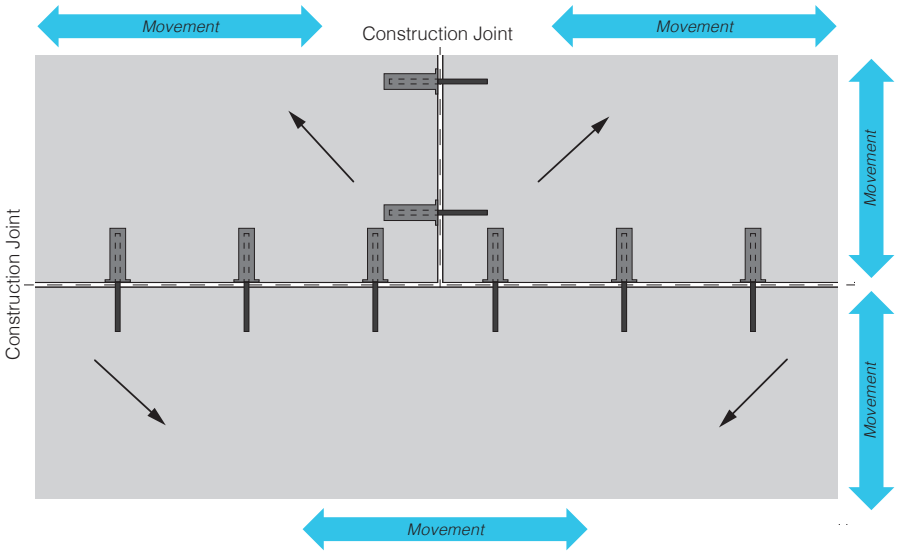


Diagram showing movement of slab in both directions. Each panel shrinks toward its centre with differential shrinkage resulting in dowel lateral movement.

Features

- Large lateral movement capacity (+/- 20mm)
- Large expansion joint capacity (20mm)
- V-notches simplify installation
- Quicker dowel installation
- Ability to fix to timber and steel formwork with ease
- Suitable for construction, contraction and expansion joints

Manufactured in an ISO accredited factory

Made in Australia

Cost-effective solution

Nationwide distribution network

Dedicated sales and technical support

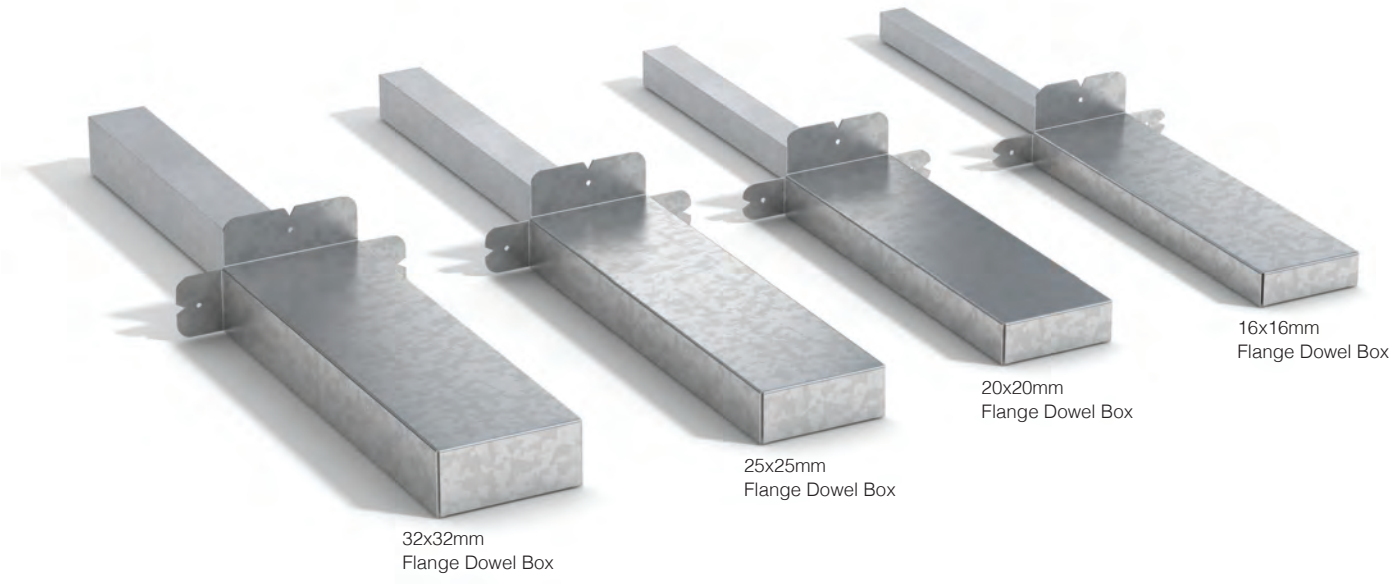
Standard items available ex stock

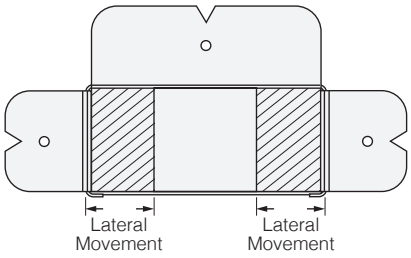
Product Specifications

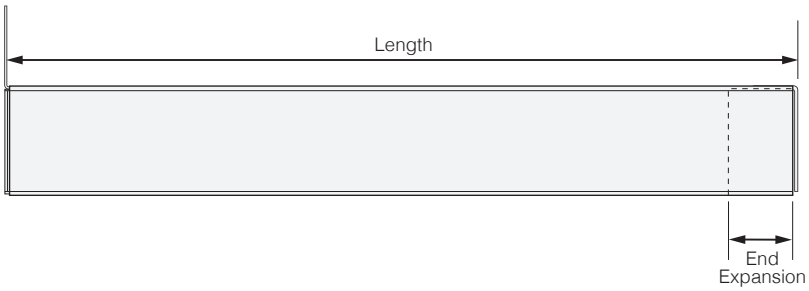
The Connolly Flange Dowel Box is available in four standard sizes. Each system includes a galvanised friction cut square dowel and one high quality galvanised steel sleeve.

Item Code	Dowel		Sleeve		
	Size (mm)	Length (mm)	Length (mm)	Lateral Movement (mm)	End Expansion (mm)
FLB16S200L20E20	16 x 16 sq	400	220	+/-20	20
FLB20S200L20E20	20 x 20 sq	400	220	+/-20	20
FLB25S225L20E20	25 x 25 sq	450	245	+/-20	20
FLB32S225L20E20	32 x 32 sq	450	245	+/-20	20
Material	Grade 300 mild steel to AS/NZS 3679.1 Galvanised mild steel to AS/NZS 4680		0.7mm galvanised sheet metal to AS/NZS 1365 and AS/NZS 1397		

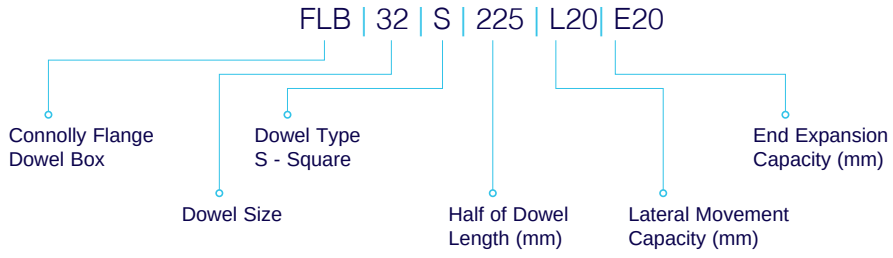
Note: Contact the Leviat sales team for custom sizes.







Part Number Identification (to order custom sizes)



Design Capacities

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

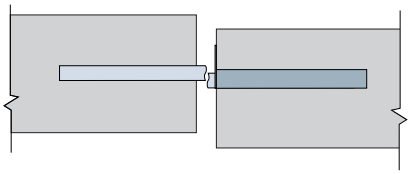
Section 6.5 of TR34 provides guidance on the calculation of dowel capacities for the following failure modes.

Dowel Shear Capacity

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

Dowel	Thickness (t) (mm)	Finish	Shear Area (0.9·A) (mm^2)	Capacity (P_{sh}) (kN)
16x16 sq	16	HDG	230	36.1
20x20 sq	20	HDG	360	56.3
25x25 sq	25	HDG	563	88.0
32x32 sq	32	HDG	922	144.2

Dowel shear capacity



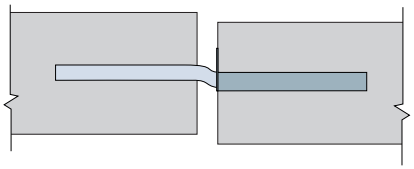
For the standard configuration of the flange dowel box, the shear strength will never govern the capacity of the joint.

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.

Dowel bearing/bending failure mode

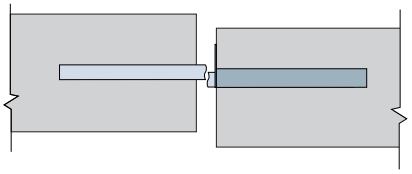


Punching Shear (Bursting Forces)

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.

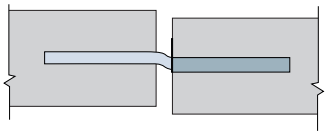
Please find the punching shear capacities for different conditions in the combined capacity tables on page 8.

Punching Shear (Bursting Forces)

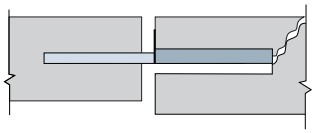


Design Capacities

The following tables provide single dowel capacities of standard Connolly Flange Dowel Boxes, calculated in accordance with TR34 for various joint widths in 32MPa concrete. The capacities provided in the tables are minimum values from the failure modes: dowel shear, dowel bearing/bending and punching/bursting. Colour coding indicates the governing failure mode. For any other configuration please contact the Leviat technical team.



Dowel bearing/bending failure mode



Punching failure mode

Single Dowel Capacity of Flange Dowel Box in 32MPa Concrete with 10mm Joint Opening										
Item Code	Dowel Size	Slab Height								
		150	175	200	225	250	275	300	350	400
FLB16S200L20E20	16x16 SQ-400	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
FLB20S200L20E20	20x20 SQ-400	17.6	22.9	24.1	24.1	24.1	24.1	24.1	24.1	24.1
FLB25S225L20E20	25x25 SQ-450	18.9	24.5	30.8	37.6	39.3	39.3	39.3	39.3	39.3
FLB32S225L20E20	32x32 SQ-450	18.3	24.0	30.3	37.2	44.7	52.8	61.5	66.9	66.9

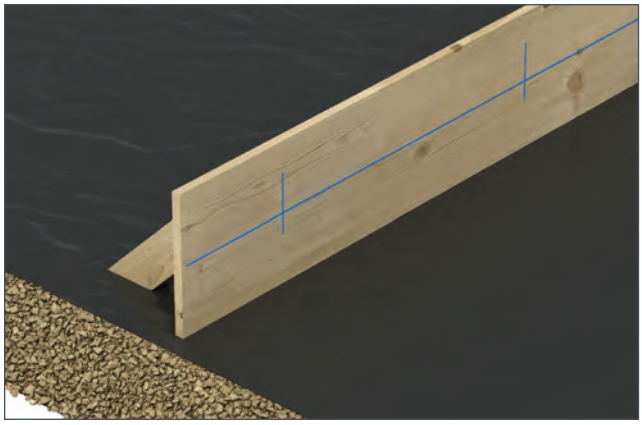
Single Dowel Capacity of Flange Dowel Box in 32MPa Concrete with 20mm Joint Opening										
Item Code	Dowel Size	Slab Height								
		150	175	200	225	250	275	300	350	400
FLB16S200L20E20	16x16 SQ-400	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4
FLB20S200L20E20	20x20 SQ-400	17.6	19.7	19.7	19.7	19.7	19.7	19.7	19.7	19.7
FLB25S225L20E20	25x25 SQ-450	18.9	24.5	30.8	37.6	33.3	33.3	33.3	33.3	33.3
FLB32S225L20E20	32x32 SQ-450	17.8	23.4	29.6	36.3	43.7	51.8	58.6	58.6	58.6

Single Dowel Capacity of Flange Dowel Box in 32MPa Concrete with 30mm Joint Opening										
Item Code	Dowel Size	Slab Height								
		150	175	200	225	250	275	300	350	400
FLB16S200L20E20	16x16 SQ-400	9.15	9.15	9.15	9.15	9.15	9.15	9.15	9.15	9.15
FLB20S200L20E20	20x20 SQ-400	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2
FLB25S225L20E20	25x25 SQ-450	18.6	24.2	28.4	28.4	28.4	28.4	28.4	28.4	28.4
FLB32S225L20E20	32x32 SQ-450	17.3	22.8	28.9	35.5	42.8	50.7	51.6	51.6	51.6

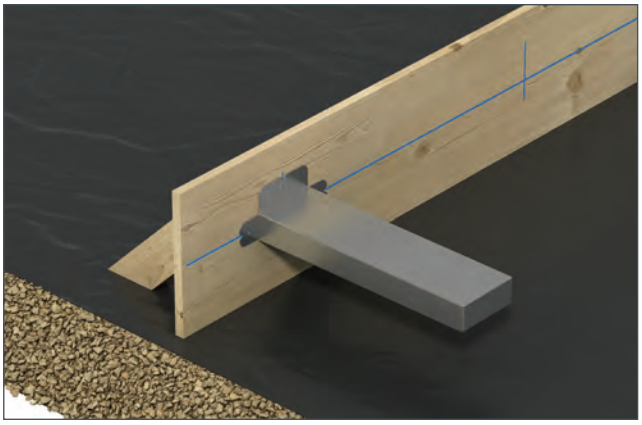
Single Dowel Capacity of Flange Dowel Box in 32MPa Concrete with 40mm Joint Opening										
Item Code	Dowel Size	Slab Height								
		150	175	200	225	250	275	300	350	400
FLB16S200L20E20	16x16 SQ-400	–	–	–	–	–	–	–	–	–
FLB20S200L20E20	20x20 SQ-400	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7
FLB25S225L20E20	25x25 SQ-450	18.1	23.6	24.5	24.5	24.5	24.5	24.5	24.5	24.5
FLB32S225L20E20	32x32 SQ-450	16.9	22.2	28.1	34.7	41.9	45.7	45.7	45.7	45.7

Single Dowel Capacity of Flange Dowel Box in 32MPa Concrete with 50mm Joint Opening										
Item Code	Dowel Size	Slab Height								
		150	175	200	225	250	275	300	350	400
FLB16S200L20E20	16x16 SQ-400	–	–	–	–	–	–	–	–	–
FLB20S200L20E20	20x20 SQ-400	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
FLB25S225L20E20	25x25 SQ-450	17.6	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4
FLB32S225L20E20	32x32 SQ-450	16.4	21.6	27.4	33.9	40.8	40.8	40.8	40.8	40.8

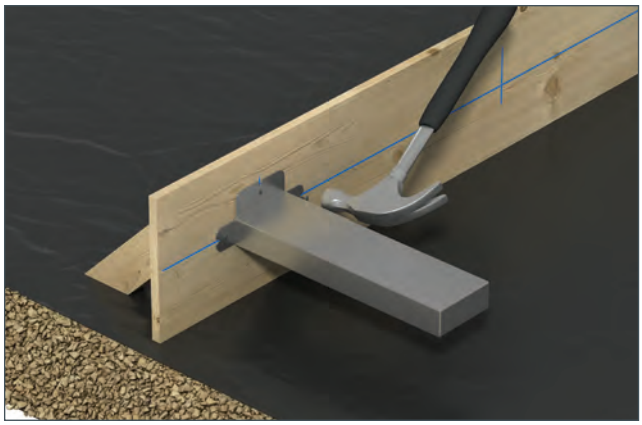
Installation Guidance



Step 1
Mark centre line of the Connolly Flange Dowel Box and dowel spacing on the formwork. Flange Dowel Box is normally installed at the mid-height of the slab.

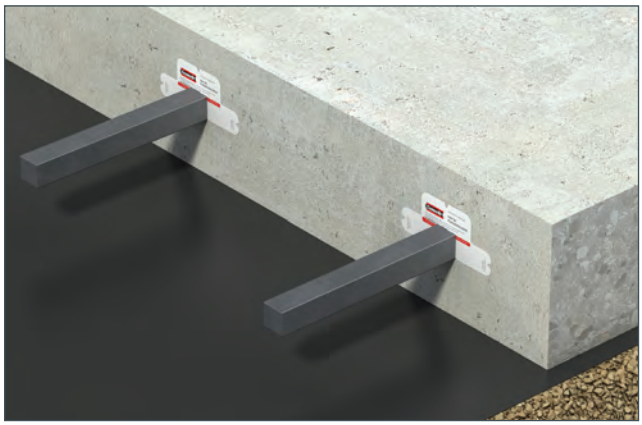


Step 2
Place the Connolly Flange Dowel Box at the marked location by using the V-Notches at the top and both sides to ensure correct placement.



Step 3
Nail the Connolly Flange Dowel Box to the formwork using three nails.

Step 4
After pouring the first slab remove the formwork. After removal of formwork, Connolly Flange Dowel Box will be exposed as shown above.



Step 5
Firmly place the square dowel into the insertion hole in the flange dowel box by punching through the sticker as shown above.

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

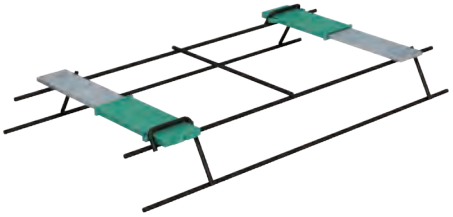
Connolly Product Range

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 3m and 6m lengths for slab thickness 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, Connolly Dowel Cradles are available in a wide range of configurations to suit a variety of slab thicknesses and load requirements.

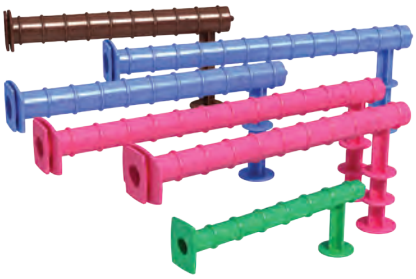


Expansion Joint System

The 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 ensuring it can 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. Our 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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