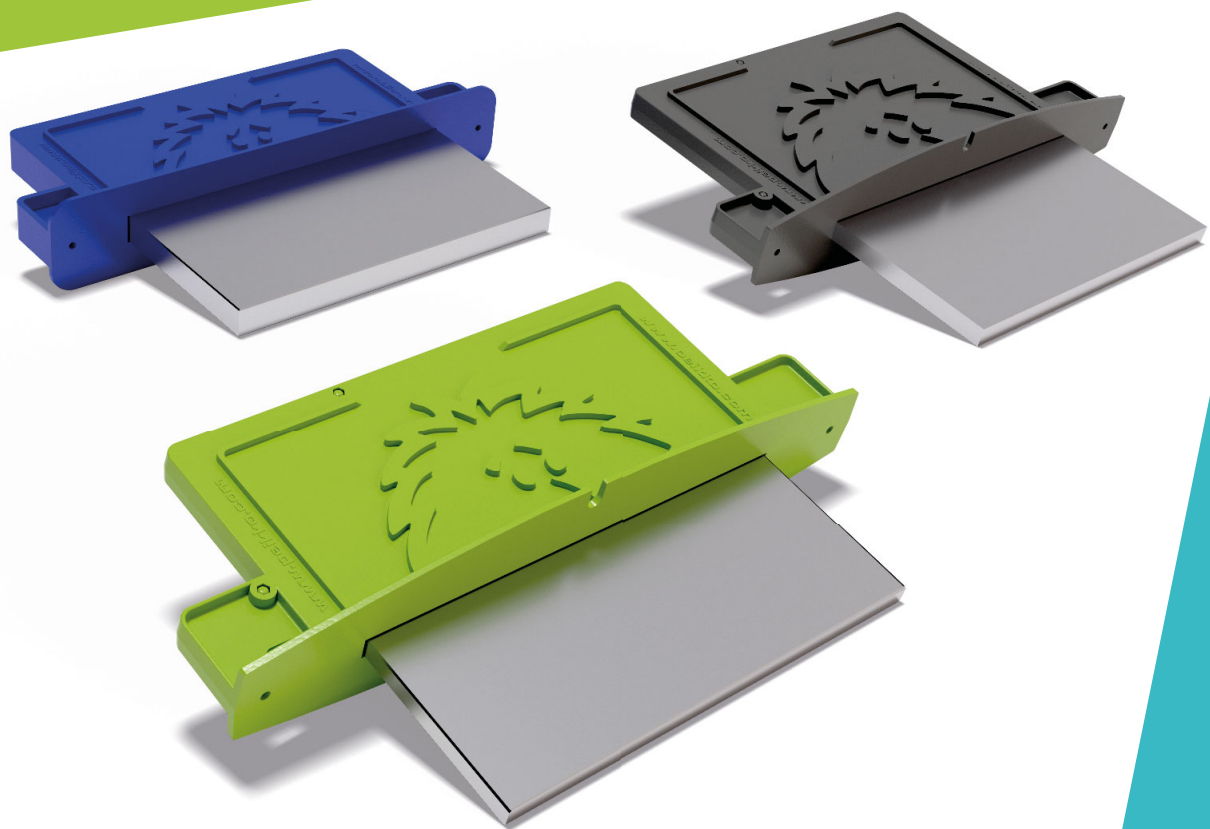


TECHNICAL MANUAL



TERADOWEL

Reliable Dowel System for Floor Joints

Version: APAC 11/2018

TERADOWEL

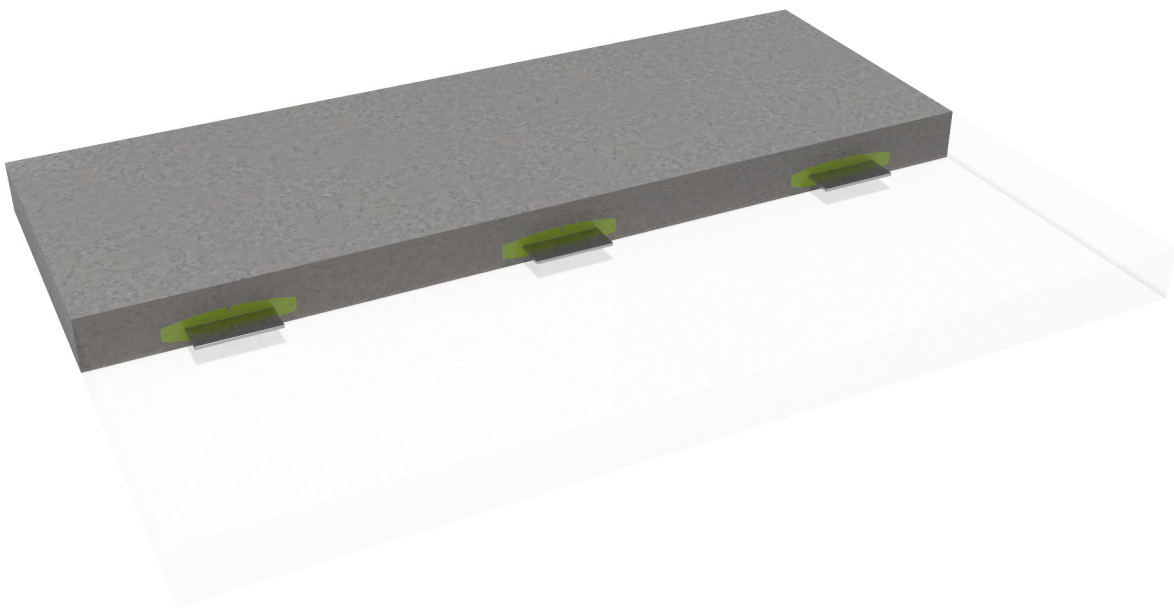
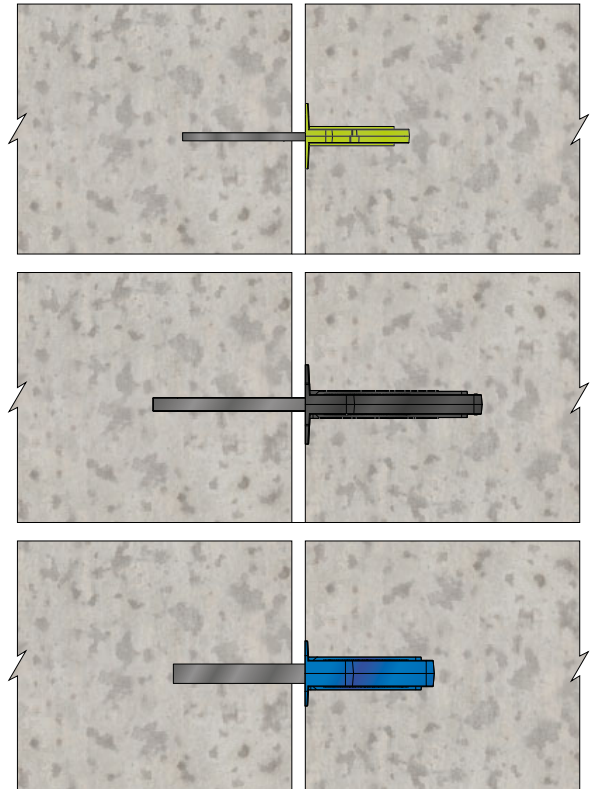
Reliable Dowel System for Floor Joints

- Dowels manufactured from high strength carbon structural steel.
- Combined with rigid high-density thin wall plastic release sleeves.
- Optimized shape of dowels for maximal bearing, bending and punching shear resistance.
- Allows all directional movement in the horizontal slab plane, minimizes vertical deflection of the slab edges.
- Easy and fast installation.

A range of efficient plate dowel load transfer systems for contraction free movement joints designed for use with traditional methods of formed joint construction with timber formwork (construction joint). Available in Plain Steel, Electro Zinc Plated or Hot Dip Galvanized finish, for use in interior and exterior applications.

A highly economical system with class leading load transfer capabilities. It eliminates completely the risk of slab interlock, as often seen with conventional bar dowel load transfer system applications.

TERADOWEL is recommended to be used for joint openings up to 20 mm wide and are suitable for construction of all types of ground level floor slabs such as jointed or jointless, ground bearing and pile supported concrete floors.



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About TERADOWEL

1. Product Properties

TERADOWEL is a discontinuous plate dowel load transfer system, dedicated to providing load transfer during the construction of formed free movement contraction joints. The system comprising of discrete steel plate dowel and plastic release sleeves. The sleeve contains nails for fixing to the timber formwork, and the dowel slot is covered by tape to prevent cement paste entering during pouring of the concrete. The inner bracings in the sleeve prevent deformation or collapse of the horizontal sleeve walls caused by the concrete pressure in deep slabs and allow problem free inserting of the dowel into the sleeve after formwork stripping.

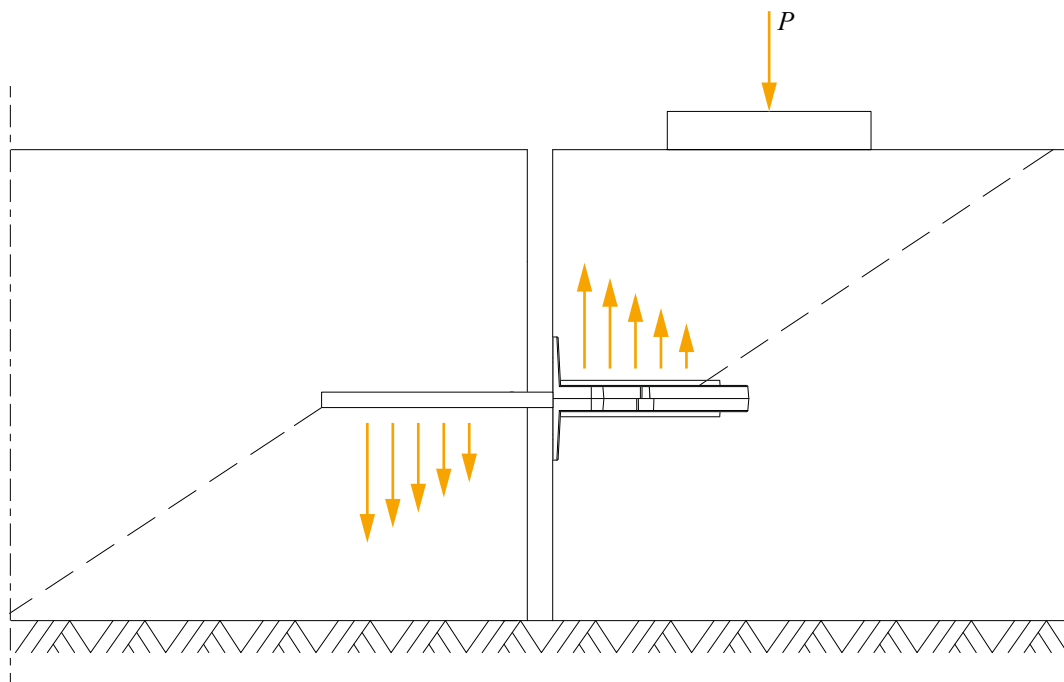
A focus has been taken, during the design of the systems, on the dowel shape optimization, to minimize significant cross section reduction at higher joint openings, and to optimize bearing surface. In addition, to ensure high bending resistance, the use of high strength carbon steel in three different thicknesses has been adopted, to minimize capacity loss at wide joint openings. TERADOWEL load transfer system is integrated into all Peikko prefabricated free movement joints

When used separately, TERADOWEL Sleeves are installed into position on the timber formwork at a specified distance apart, at a height of half of the slab depth, before the formwork is installed and the slab is cast. The slab containing the sleeves is poured, and after the concrete has hardened sufficiently, the timber formwork is stripped. TERADOWELS are then inserted to the slots of the cast in sleeves, and the second pour is performed.

TERADOWELS permit the free slab movements, caused by drying shrinkage and thermal variations in both longitudinal and perpendicular directions of the slab plane, thereby eliminating the principle cause of shrinkage cracks at the joint, and minimizing vertical displacement of the slabs. The sleeves permit 10 mm longitudinal movement of the dowels in either direction.

The limiting factor of load transfer in most cases, is the punching shear resistance of the concrete, these resistances can be found in section 2. It is recommended that no more than 50% of the applied load should be transferred by the load transfer system, the slab itself should be designed to carry the rest of the load.

Figure 1. Load transfer.



1.1 Materials and Dimensions

1.1.1 Materials

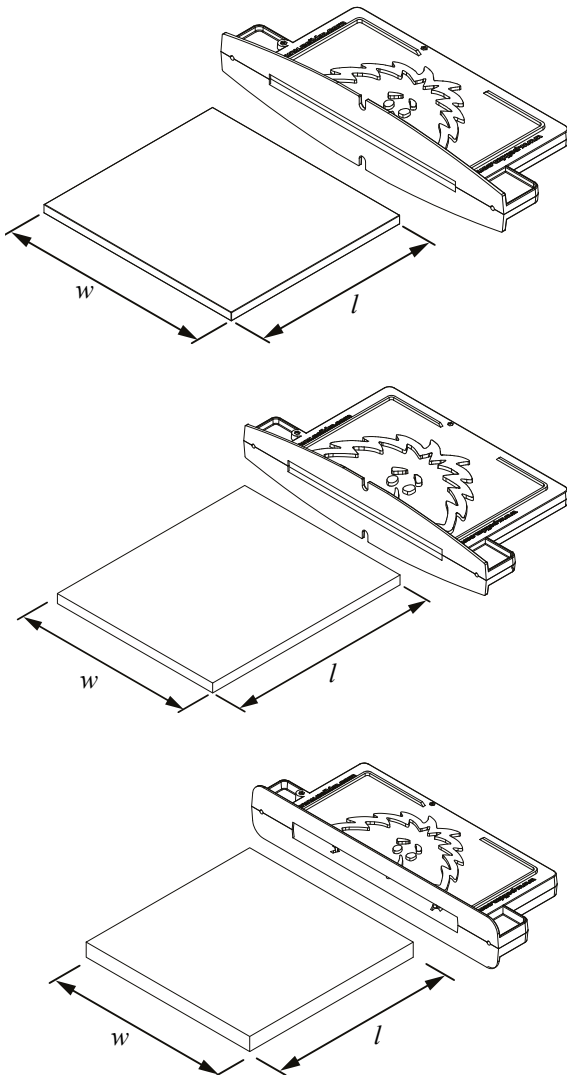
Table 1. Materials of TERADOWEL.

Dowel		Sleeve	
Version	Material	Version	Material, Color
TERADOWEL Rectangular TDR-6	Q345B	TERADOWEL Sleeve Rectangular TDS-R6	ABS, Green
TERADOWEL Rectangular TDR-6 EZP	Q345B EZP	TERADOWEL Sleeve Rectangular TDS-R6	ABS, Green
TERADOWEL Rectangular TDR-6 HDG	Q345B HDG	TERADOWEL Sleeve Rectangular TDS-R6	ABS, Green
TERADOWEL Rectangular TDR-8	Q345B	TERADOWEL Sleeve Rectangular TDS-R8	ABS, Grey
TERADOWEL Rectangular TDR-8 EZP	Q345B EZP	TERADOWEL Sleeve Rectangular TDS-R8	ABS, Grey
TERADOWEL Rectangular TDR-8 HDG	Q345B HDG	TERADOWEL Sleeve Rectangular TDS-R8	ABS, Grey
TERADOWEL Rectangular TDR-12	Q345B	TERADOWEL Sleeve Rectangular TDS-R12	ABS, Blue
TERADOWEL Rectangular TDR-12 EZP	Q345B EZP	TERADOWEL Sleeve Rectangular TDS-R12	ABS, Blue
TERADOWEL Rectangular TDR-12 HDG	Q345B HDG	TERADOWEL Sleeve Rectangular TDS-R12	ABS, Blue

HDG = Hot dip galvanized. Standard for black steel EN 10025.

1.1.2 Dimensions

Table 2. Dimensions [mm] of TERADOWEL.



Dowel Type	TERADOWEL Rectangular 6 mm TDR-6
Thickness	6 mm
Dimensions $w \times l$	150 mm x 135 mm
Sleeve Color	Green
Adjustable Joint Opening	0 ~ 15 mm

Dowel Type	TERADOWEL Rectangular 8 mm TDR-8
Thickness	8 mm
Dimensions $w \times l$	145 mm x 175 mm
Sleeve Color	Gray
Adjustable Joint Opening	15 ~ 20 mm

Dowel Type	TERADOWEL Rectangular 12 mm TDR-12
Thickness	12 mm
Dimensions $w \times l$	150 mm x 150 mm
Sleeve Color	Blue
Adjustable Joint Opening	15 ~ 20 mm

2. Resistances

Resistances of the TERADOWELS are determined according to UK Concrete Society TR34.4 published August 2013. All calculated design resistances are for single plate dowels.

Table 3. Design resistances of dowels in shear and bearing/bending [kN] according TR34.4 for C32/40.

Dowel Type	Joint Opening x	Shear Psh	P Max Plate
TDR-6	15 mm	145.8	41.8
TDR-8	20 mm	187.9	53.9
TDR-12	20 mm	291.6	104.8

Table 4. Design punching shear resistance [kN] of TDR-6 according TR34.4 for 15 mm joint opening.

Slab Thickness	Punching Pp C25/30	Punching Pp C28/35	Punching Pp C30/37	Punching Pp C32/40	Punching Pp C35/45
100 mm	11.2	11.8	12.2	12.6	13.2
150 mm	17.3	18.3	19.0	19.6	20.5
200 mm	24.5	25.9	26.8	27.7	29.0
250 mm	32.7	34.6	35.8	37.0	38.7

Table 5. Design punching shear resistance [kN] of TDR-8 according TR34.4 for 20 mm joint opening.

Slab Thickness	Punching Pp C25/30	Punching Pp C28/35	Punching Pp C30/37	Punching Pp C32/40	Punching Pp C35/45
150 mm	17.9	18.9	19.6	20.2	21.2
200 mm	25.2	26.6	27.6	28.5	29.8
250 mm	33.5	35.4	36.7	37.9	39.6

Table 6. Design punching shear resistance [kN] of TDR-12 according TR34.4 for 20 mm joint opening.

Slab Thickness	Punching Pp C25/30	Punching Pp C28/35	Punching Pp C30/37	Punching Pp C32/40	Punching Pp C35/45
150 mm	17.1	18.1	18.7	19.3	20.2
200 mm	24.2	25.6	26.5	27.4	28.6
250 mm	32.4	34.3	35.5	36.6	38.3

The punching shear resistances are calculated for plain concrete without any kind of additional reinforcement, and according TR34.4 should be used also for steel and macro-synthetic fiber reinforced concrete.

If resistances for other joint openings or concrete grades are needed, please contact Peikko Technical Support.

Selecting TERADOWEL

TERADOWELS are selected according to following criteria:

- **Designed joint opening.** For joint openings of up to 15 mm wide, we recommend TERADOWEL TDR-6. For joint openings from 15 to 20 mm wide TERADOWEL TDR-8 is recommended. Whereas for pile supported slabs, we would only recommend the use of TERADOWEL TDR-12.
- **Dowel spacing c/c.** The center to center dowel spacing should be as determined by the structural engineer for specific load conditions. For general conditions is recommended to use 500 ~ 600 mm spacing. Spacing can be reduced if necessary, but it is not recommended to use smaller spacing than listed in *Table 7* below, otherwise punching shear resistance of the dowels may be reduced.
- **Environment.** For internal floors we would suggest the basic plain steel dowels. For external applications and where corrosion resistance is required, it is recommended to use EZP (Electro Zinc Plated) or HDG (Hot Dipped Galvanised) dowels.
- **20 mm designed joint opening.** This refers generally to 50 x 50 m slab size limiting dimensions of jointed floors, and a 35 x 35 m of jointless floors. A wider joint opening is possible, but resistances must be reduced accordingly, however, this is not practical due to the increase of dynamical impact during joint transition. If there is a design requirement for wider joint openings, Peikko can offer suitable solution from its extensive flooring product range.
- **Joint aspect ratio.** Individual slabs should ideally have an aspect ratio of 1:1, this may not always be possible, but the ratio should never exceed 1:1.5.

A further recommendation is to assist prevention of restraint, by separation of the fixed elements from the slab, with the use of flexible compressible foam filler, with a thickness of at least 20 mm, also by avoiding re-entrant corners and avoiding point loads at joints.

Table 7. Minimal recommended dowel center to center spacing [mm].

Slab Depth [mm]	100 mm	150 mm	200 mm	250 mm	300 mm	350 mm	400 mm
Minimal dowel c/c spacing [mm]	300 mm	375 mm	450 mm	525 mm	600 mm	675 mm	750 mm

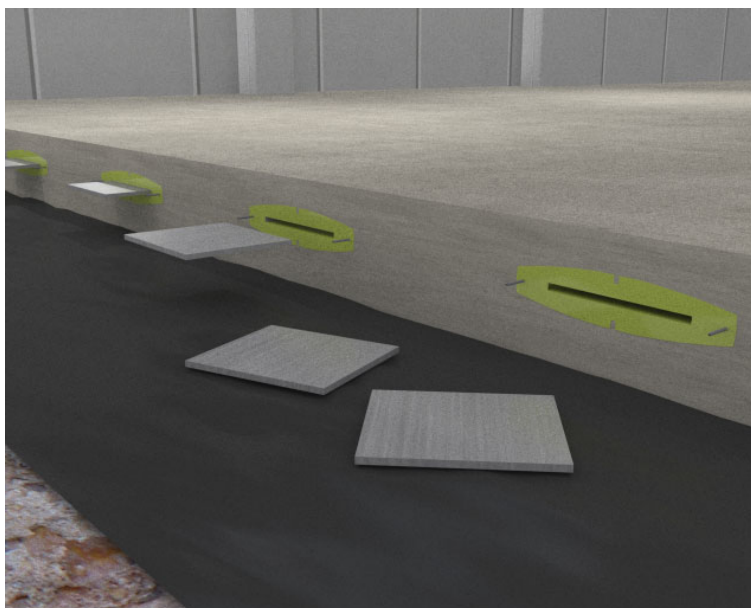
Installing TERADOWEL

1. Mark a horizontal line on the formwork at the level of half slab thickness ($h/2$) and mark the required center to center spacing of the sleeves along this line.
2. Nail the sleeves firmly through the nail holes at the marked locations on the formwork.
3. Pour concrete as normal around dowel sleeves paying attention to the fill around the sleeves. All plate type dowels require adequate compaction with a Poker Vibrator around them, to eliminate the possibility of air entrapment below the sleeve.
4. After concrete has hardened adequately and the formwork removed, the nails should be flattened and the dowels inserted into the sleeve pockets. The dowels should be inserted fully into the sleeves. The second slab can be then be poured, against the face of the first, and the exposed portion of the steel dowels.

Install the sleeves to the formwork.



Insert the dowels to the sleeves.





Technical Manual Revisions

Version: UK 11/2018. Revision: 002

- Resistance tables updated
- Illustration updates for clarity
- Updated layout to latest branding

Version: UK 06/2014. Revision: 001*

- New cover design for 2018 added

Resources

DESIGN TOOLS

Use our powerful software every day to make your work faster, easier and more reliable. Peikko design tools include design software, 3D components for modeling programs, installation instructions, technical manuals and product approvals of Peikko's products.

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Our technical support teams around the world are available to assist you with all of your questions regarding design, installation etc.

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APPROVALS

Approvals, certificates and documents related to CE-marking (DoP, DoC) can be found on our websites under each products' product page.

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EPDS AND MANAGEMENT SYSTEM CERTIFICATES

Environmental Product Declarations and management system certificates can be found at the quality section of our websites.

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