Diamond Dowel System for Construction Joints

(Under license from pna-inc, usa,)

INTRODUCTION

Norton's Diamond Dowel is a revolutionary new system for better shear load transfer between slabs.

FORWARD

- Allows unrestrained horizontal slab movement
- Is superior in Load Distribution
- Is easy, quick and foolproof to install (at 450mm spacings where you'd normally need 300mm)

WHY DIAMOND DOWELS

Good floor joints don't just happen. Traditionally, the treatment of joints in industrial and warehouse concrete floors has been either totally ignored or done by selecting the dowel system haphazardly. Yet incorrectly treated joints will cause premature deterioration of even the best industrial floor.

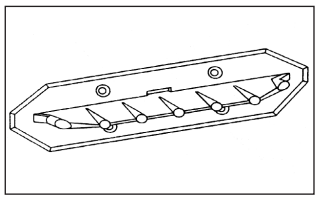
The C&CI report that joints are generally the major problem in industrial floors. In many cases when the problem is pointed out, one of the following responses is given:

"Don't worry about the joints; they are only minor"

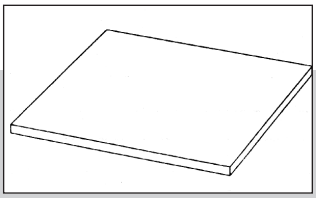
"Forget about the joints; there is no way to do them properly"

These responses indicate either a lack of knowledge of dowels or an unwillingness to expend a little effort

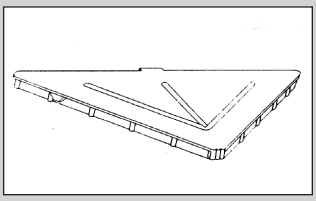
The Diamond Dowel™ System consists of three components



1. Base (reusable attach to form)



2. Steel Diamond Plate



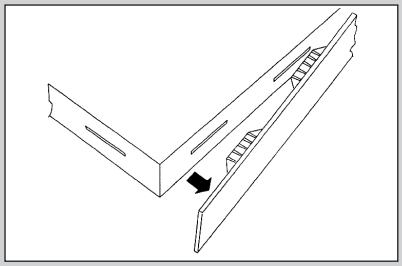
3. Sleeve

HOW TO USE

- Screw or rivet the plastic re-usable base plate to the formwork.
- Snap-fit the triangular sleeve to the nail-plate.
- Before the adjacent pour, insert steel load plate into the sleeve.

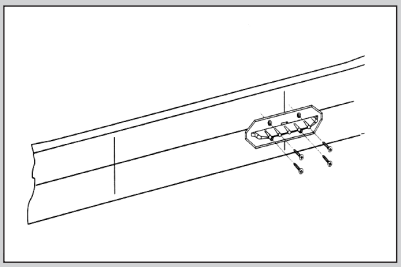
Step 1

Strip the form, this is best accomplished by starting at one end and working along the form. Forms with bases attached should be cleaned for reuse.



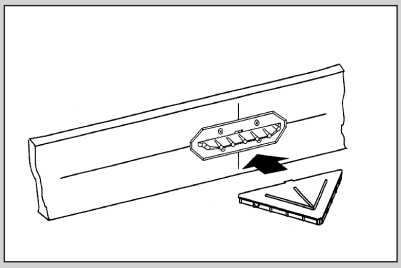
Step 2

Mark the form for slab centre and Diamond Dowel™ Spacing. Using the 4 screws, attach the base to the form



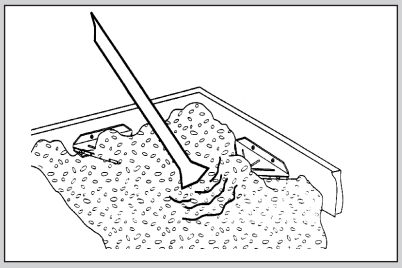
Step 3

Set the form to line and level as normal (base should face into the first pour). Slide the sleeve onto the base (make sure it clips into place).



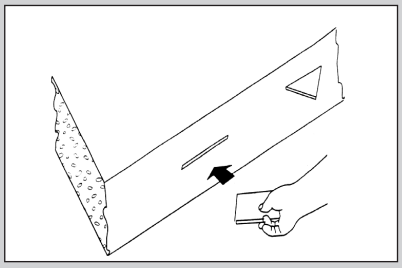
Step 4

Edge of slab must be vibrated to consolidate concrete around the Diamond Dowel™ (take care not to dislodge the sleeve). Any overspill should be removed at this stage.



Step 5

Insert the Diamond Dowel™ Plate into the sleeve. Second pour can now be made.



TRACK RECORD

Independent engineering research has proven that Diamond Dowel™ is superior to conventional round dowels and even other plate dowels.

"The Diamond Dowel is the optimum shape for a dowel – American Concrete International – July 1998."

WHERE TO SPECIFY

Construction Joints requiring positive load transfer.

PRODUCT INFORMATION

The Diamond Dowel system comprises of a plastic base plate and triangular pocket former (sleeve) and a square steel plate. The triangular pocket former clips onto the base and is cast into the first slab. After the formwork and re-usable plastic base are removed then the square steel plate simply slides into the open end of the triangular pocket former. The system is manufactured to tight tolerances according to the patented design from a material that will not compress under vertical load.
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CONCLUSION

The Diamond Dowel system allows for differential shrinkage movement and prevents stress accumulation in the adjacent slabs by both changing the shape and increasing the bearing surface.

SPECIFICATION

All formed construction joints will incorporate Norton's Diamond Dowel system for load transfer. The contractor will use Norton's Diamond Dowel base and sleeve to install the Diamond Dowel plate at the specified centres and at mid slab depth. The Diamond Dowel will be installed to Norton Construction Product's recommendations.

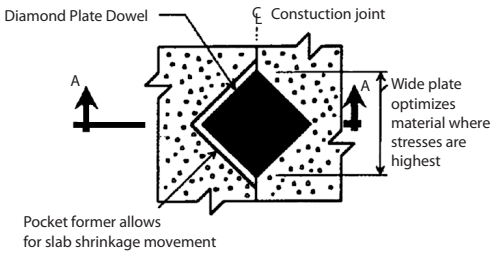
Steel plates will be saw cut from hot rolled plate per ASTMA36.

COMMERCIAL ACCEPTANCE

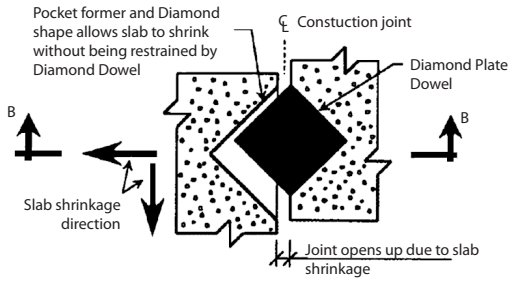
The Diamond Dowel is now firmly accepted worldwide as the best form of dowel system for slabs on grade. Widely specified due to its technical benefits and widely used by contractors owing to its ease of installation.
The use of the Diamond Dowel has gained significant momentum in the local South African market, since its introduction to in 1999.

Clients include Clicks, Shoprite Checkers, Anglo Skorpion Zinc Mine, AMKA, Nestle, Tibbett and Britten, Loreal and Lanseria Airport.

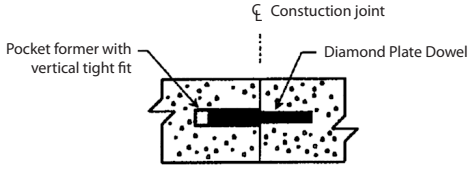
Contractors include Group Five, Neil Muller Construction, Giuricich Brothers, Grinaker/LTA, Abbeydale Building and Civils, Concor, M&R, WBHO and Gothic.



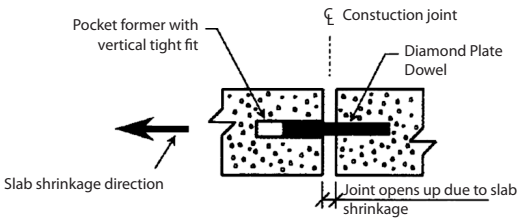
Plan – Before slab shrinkage



Plan – After slab shrinkage



Section "A" – before slab shinkage

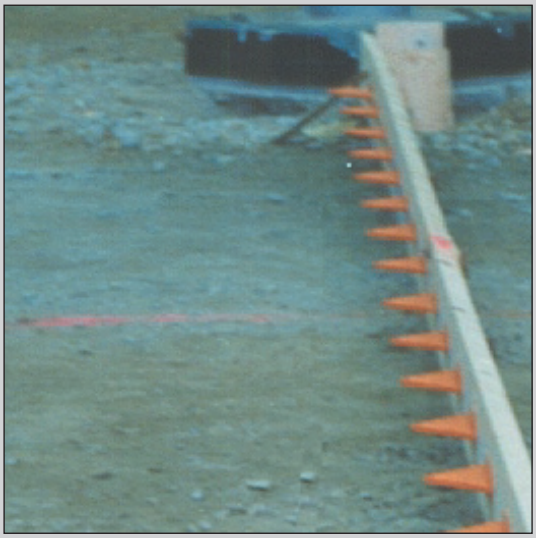


Section "B" – after slab shinkage

TECHNICAL ACCEPTANCE

Diamond Dowel Plate size Thickness x Length	Centre to Centre Spacing – Conventional vs Diamond Dowels					
	19mm Round Dowel Spacing		25mm Round Dowel Spacing		32mm Round Dowel Spacing	
	300mm	450mm	300mm	450mm	300mm	450mm
6.35mm x 114.3mm	**450mm**	**600mm**	**300mm**	**400mm**	**NO**	**300mm**

A conversion chart shown above developed by American Consultant civil engineers Wayne Walker and Jerry Holland, shown below, clearly demonstrates the technical capacity of the Diamond Dowel and the increase in spacings that are possible when replacing conventional round dowels. Diamond Dowel Spacing to Match Round Dowel Performance



INSTALLATION PROCEDURE FOR CONSTRUCTION JOINTS

1. Spacing of DIAMOND DOWELS is to be provided by design engineer.
2. Mark the form at the specified centres then screw/rivet or wire the base plate to the form. Use four number fixtures per base. Be careful to maintain proper alignment and ensure that the base is parallel with the top of the form. Wire can also be used to fasten the base against steel shutters instead of screws.
3. Stake forms to correct level and line as per normal.
4. Slip the sleeve over the base and ensure that it clips firmly into place.
5. Place, consolidate and finish the concrete in the first slab. Vibrate the concrete adjacent to the form to ensure proper compaction around the sleeve. No dowels penetrate the form and there is nothing to impede the edge finishing.
6. Strip the forms. The forms remove with ease if they are pulled from one end first. The base should remain attached to the form for re-use.
7. Slide the Steel Plate into the Sleeve (now cast into the first slab), The second slab can now be cast. Again vibrate the concrete adjacent to the form to ensure compaction around the DIAMOND DOWEL® Plate.

FEATURES / BENEFITS

Better engineering –

- A more efficient use of the steel dowel material.
- Increased bearing area of steel decreases bearing stress on concrete.
- Allows for horizontal slab movement, minimizing stress concentrations of both slab and dowel.
- Positive alignment insures free movement of joint.
- Improved load transfer reduces potential joint edge spalling.

Most cost effective aligned dowel system –

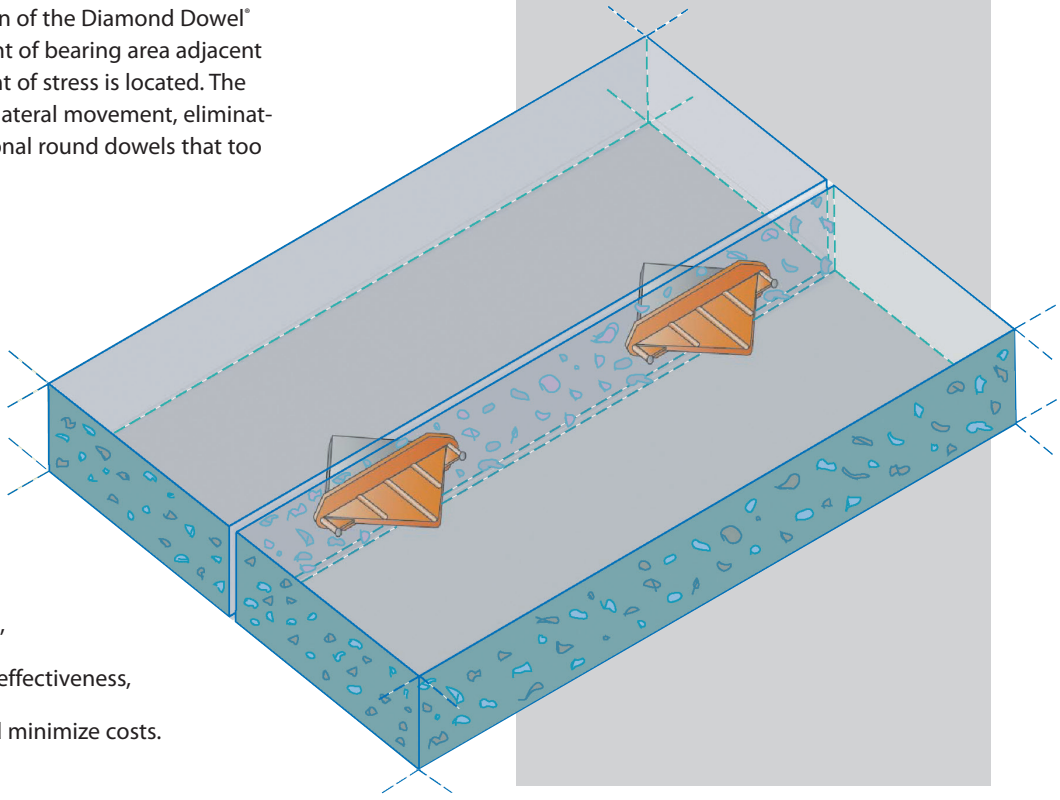
- Diamond Dowels® are spaced further apart, yet achieve equivalent or superior performance to round or square dowels.
- Reduced time and labour costs to install.
- Increased reuse of forms.

Faster, easier installation –

- Drilling of forms is eliminated
- Dowel alignment is maintained – no more constant re-straightening.
- No more turning and pulling of dowels for form removal.

The Diamond Dowel® System has revolutionised the design and construction of load transfer across construction joints for concrete pavements and slabs placed on ground. They replace conventional round dowels that are difficult to install properly aligned and too often contribute to the restrained shrinkage cracks found between the slab joints..

The use of a steel plate allows for an increased bearing area on the dowel, thus reducing the bearing stresses in the concrete below. The unique configuration of the Diamond Dowel® plate allows for the maximum amount of bearing area adjacent to the joint, were the greatest amount of stress is located. The Diamond Dowel® also allows for free lateral movement, eliminating the restraint caused by conventional round dowels that too often lead to cracks.



By simply substituting the Diamond Dowel® System for conventional round dowels in formed construction joints, designers can improve load transfer effectiveness, reduce restraint within the slabs, and minimize costs.

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