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Connections in construction: reinforced concrete frames

Posted on 11 Oct 2016

Concrete is the most commonly used construction material on earth. People have been using concrete to create pioneering buildings since Egyptian times. The Romans used it to create such enduring architectural wonders as the Pantheon in Rome.



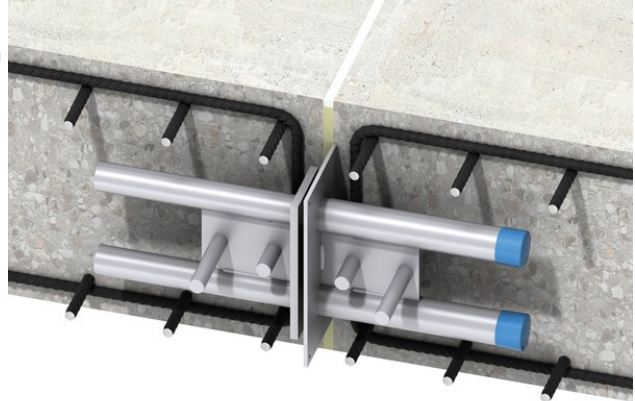
The properties of concrete make it an extremely versatile building material, being plastic and malleable when freshly mixed, yet strong and durable once hardened. Reinforced concrete construction is used to build a huge variety of structures, from skyscrapers and roads to bridges and dams.

Holding concrete structures together securely, connecting joints between slabs and transferring loads throughout the structure is the job of [steel rebar couplers](#), [reinforcement continuity systems](#), [stud rails](#) and [shear dowels](#). These essential yet hidden components play a vital role in any concrete structure, enabling architectural features to be achieved, reducing the weight of concrete required and improving the safety of both the construction process and the completed building.

Concrete Movement joints

To allow for movement in a finished building, concrete structures are designed with expansion and contraction joints between slabs. At these joints, steel dowels or keyed joints are used to transfer shear loads.

However, keyed joints require complicated formwork and if not formed correctly can cause cracking to take place in the concrete. Alternatively, single dowelled joints are effective at transferring shear but suffer from deformation which can result in subsequent spalling of the concrete. Single dowels also need to be accurately aligned in both directions to ensure movement can actually take place, otherwise cracking is likely to occur.



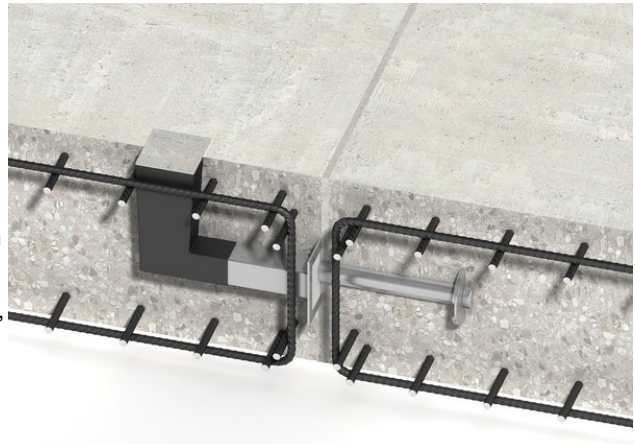
The innovative design of Ancon [shear load connectors](#) enables load to be transferred effectively while accommodating movement in the structure. Ancon [DSD shear connectors](#) have a two-part assembly, which makes them easier to install than plain dowels. Drilling of either formwork or concrete is also not required and the sleeve of Ancon [shear dowels](#) is simply nailed to the formwork ensuring subsequent alignment with the dowel, essential for effective movement.

Ancon DSD Shear Load Connector

Post-tensioned concrete construction

Post-tensioned concrete structures require temporary movement joints to allow for the initial shrinkage of the concrete. These joints traditionally take the form of metre-wide 'pour strips' between the slabs, which require the slabs to be temporarily propped from below until shrinkage has occurred and the pour strip filled with concrete.

To provide a safer, simpler, solution, Ancon has developed [lockable dowels](#). These remove the need for potentially hazardous wide pour strips and the associated complex support structures, which clutter the site. Instead, the dowels are inserted at the edge of concrete slabs, transferring load between the joints and allowing initial shrinkage to take place. The dowel is then locked in position with a mechanical plate and filled with epoxy resin. The [locked dowel](#) continues to transfer shear loads, but prevents any further movement.



Ancon Lockable Dowel

Joining reinforcing bars

There are two methods of connecting reinforcing steel bars – lapped joints or the use of rebar couplers. The use of laps can be time consuming in terms of design and installation and can lead to greater congestion within the concrete because of the increased amount of rebar used. By comparison [reinforcing bar couplers](#) can help to simplify the design and construction of reinforced concrete structures, as well as reducing the amount of reinforcement required.



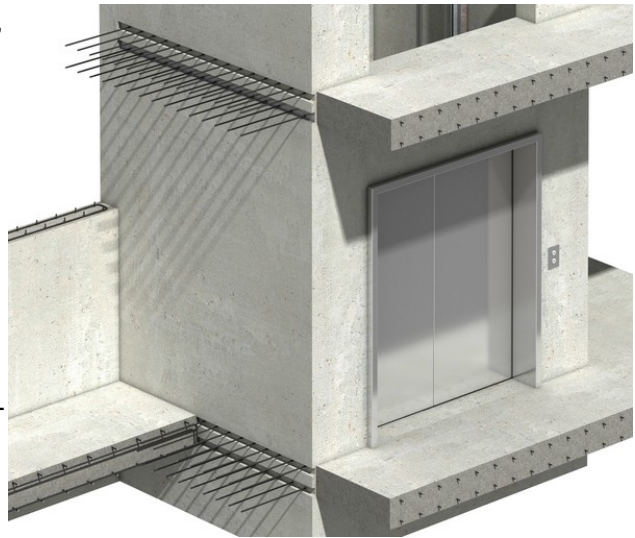
Tapered Thread Rebar Coupler

Reinforcement continuity at concrete joints

Where concrete slabs connect to walls, columns or floors, the reinforcement bars need to be connected securely so that reinforcement can be continued across the joint.

Ancon [KSN Anchors](#) are used in combination with Bartec parallel-threaded reinforcing bars, to simplify concrete construction joints. Together, they allow slab-to-wall connections to be designed with no restrictions on bar length and bar diameter.

[Eazistrip](#) Reinforcement Continuity Systems are also used to maintain reinforcement at construction joints. Pre-bent bars are housed within a galvanised steel casing, secured by a protective cover. When the cover is removed the bars can be straightened ready for lapping onto the main reinforcement.



Column reinforcement to prevent punching shear

Where a concrete slab is supported on a column, the weight of the slab creates considerable shear stresses. Without sufficient reinforcement, this could result in the column 'punching' through the slab.

One solution is to thicken the concrete slab above and below the columns, but this reduces headroom in the building and requires more concrete. A more efficient solution is to incorporate the [Ancon Shearfix stud rail system](#) within the slab reinforcement above and below the columns. This strengthens the reinforcement around slab-to-column connections, eliminating the problems associated with punching shear.



Shearfix Stud Rail

Related Products



Shear Load Connectors

Concrete structures are designed with expansion and contraction joints to allow movement to take place.



Reinforcing Bar Couplers

The use of Ancon Reinforcing Bar Couplers can simplify the design and construction of reinforced concrete and reduce the amount of reinforcement required.



Reinforcement Continuity Systems

Ancon manufactures six products which provide continuity of reinforcement at slab-to-wall construction joints in concrete.

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Arjoon 15 Jan 2019 at 12:34

A nicely written blog as it is quite helpful and informative. Keep it up