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Technical Blog

Specifying Welded Plain Wire Reinforcement Lap Splices in Slabs

Here at the Wire Reinforcement Institute we have seen a variety of descriptions used in construction documents to define how tension lap splices are to be executed for welded plain wire reinforcement (WPWR).

The table below is intended to serve as a guide for selection of applicable WPWR lap splicing provisions for slabs.

WPWR Application	Relevant ACI 301-20 Provision	Relevant ACI 318-19 Provision	WRI Suggestions
Slab-on-ground that transmits vertical loads or lateral forces from other portions of the structure to the soil and Slab on composite steel decking: flexural / axial application	3.3.2.5(a)	25.5.4	Use ACI 318 provisions
Slab-on-ground that does not transmit vertical loads or lateral forces from other portions of the structure to the soil and Slab on composite steel decking: non-flexural/axial applications	3.3.2.5(a)	Not Applicable	Use ACI 301 provision unless project-specific considerations dictate more stringent requirement. Requirements more stringent than ACI 301 must be defined by the EOR.
All other slabs, including elevated formed slabs and slabs on non-composite steel decking	3.3.2.5(b)	25.5.4	Use ACI 318 provisions

Because plain wires have smooth surfaces absent of deformation, they are unable to achieve bond resistance to slippage where they are in contact with the surrounding hardened concrete along their circumferential length. As such, the crosswires positioned in the splice region are relied upon entirely to achieve an anchorage effect at the welded wire intersections. Hardened concrete bears directly against the crosswire surfaces that are positioned perpendicular to the direction of the tensile force, and this bearing is ultimately resolved in the form of shear strength that develops at the welded wire intersections, preventing the wires from pulling / shearing apart at the welded joint.

A critical attribute of the noted behavior is the soundness and composition of the hardened concrete in front of the crosswire where bearing is relied upon to occur. Any compromise to the concrete in this area resulting from poor consolidation can be detrimental to the intended performance of the splice. The positioning of spliced mats such that crosswires directly stack can increase the likelihood of unsatisfactory consolidation, especially for larger, closely spaced wires. As such, for usage in which ACI 318 is applicable, this stacking must be avoided.

For more information on WPWR lap splices, refer to ACI 301 and ACI 318, AASHTO LRFD Bridge Design Specifications, and AREMA Manual for Railway Engineering, in conjunction with WRI resources found at www.wirereinforcementinstitute.org.