

Decisions Related to ACI Suitability and Implementation of WWR

Welded wire reinforcement is a versatile material for use in a broad spectrum of reinforced concrete applications. Specifiers must familiarize themselves not only with the material's suitability for certain applications, but also the method by which WWR can be most effectively implemented. Below are some considerations to be made related to WWR usage in ACI applications.

WWR as flexural reinforcement in footings, walls, and elevated slabs

1. For footings, walls, and slabs, consider using bi-directional mats where possible to maximize placement and labor economy. Where the distribution and extent of reinforcement requires close consideration related to avoidance of curtailment and splicing in regions of high stress, use uni-directional mats.
2. ACI 318-19 equations for flexure and shear design are identical to those for individual deformed bars.
3. Be aware of limitations on WWR usage as flexural reinforcement in special structural walls.
4. To avoid build-up and stacking of adjacent WWR mats in slabs and walls, consider welded deformed wire reinforcement and design development lengths and lap splices that are based on the absence of contribution from welded intersections.

WWR as transverse reinforcement in beams, girders, and columns

1. Recognize the suitability of WWR transverse reinforcement in both conventional and high seismic applications.
2. Leverage WWR's ability to utilize welded anchor wires in lieu of hooked terminations for U-stirrup applications. Take advantage of WWR fabrication flexibility and use hooked WWR stirrups, ties, and hoops as required in non-U-stirrup applications.
3. Gain familiarity with the WWR manufacturer's capabilities with regards to multiple bends and hooked curtailment on a common mat.

WWR as reinforcement in slabs-on-ground

1. It is critical to determine if the slab is relied upon for the transmission of vertical loads or lateral forces from other portions of the structure to the soil. If affirmative, then the slab must satisfy ACI 301 and ACI 318 requirements. If the slab is not relied upon for this loading/force transmission, then ACI 301 and ACI 360 guidance should be followed. In all cases, the specifier's sound engineering judgment is imperative.
2. Recognize certain triggers that can change the role of a slab-on-ground, and in turn the code provisions applicable to it. For example:
 - a. A SOG required to contribute to the resolution of a superstructure's horizontal frame reactions must consider ACI 318 requirements.
 - b. A SOG supporting post loading from storage racks that are not integral parts of the superstructure isn't necessarily required to consider ACI 318 provisions.
 - c. A SOG supporting storage rack posts that also function as superstructure column elements is required to consider ACI 318 provisions.
 - d. A SOG providing lateral restraint to the top of a foundation retaining wall feature should consider ACI 318 requirements.
 - e. A SOG providing direct support for the weight of isolated equipment isn't necessarily required to consider ACI 318 provisions, depending on loading and equipment isolation criteria.

WWR as a specialty reinforcement

1. Consider WWR's versatility in applications that may not be the first to come to mind but that are still permitted by ACI and capable of production by WWR manufacturers. These include:
 - a. Negative-bending reinforcement for composite slab on deck
 - b. Two-way slab punching shear reinforcement
 - c. Torsional reinforcement
 - d. Anchor reinforcement
 - e. Slab-on-ground control joint reinforcement to facilitate enhanced aggregate interlock

WWR on the drawing set

1. Consider simplifying the inclusion of WWR by specifying it as a pre-approved equal to the deformed reinforcing bar solution you are likely already designing and detailing.
2. Generate WWR template/typical content and details for ease of repetitive use on different projects. Examples include:
 - a. WWR lap splice detail and schedule
 - b. WWR mat tolerance detail
 - c. WWR clear cover detail
 - d. WWR pre-approved substitution list

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