SUPPORT FOR WELDED-WIRE REINFORCEMENT

“Support Requirements for Welded-Wire Reinforcement in Slabs” by Joseph Neuber Jr. (September 2006, pp. 39-41) deals with support spacing needed to keep welded-wire reinforcement (WWR) in the top half of the slab. The Wire Reinforcement Institute, Inc., continues to receive a large number of inquiries about the types and spacings of supports used for WWR. Tech Fact 702, which is referenced in the article and is available on the WRI website (www.wirereinforcementinstitute.org), was published a number of years ago in response to such inquiries. The Tech Fact answers questions as to types of supports (many can be specified) that can be used to support WWR. Recommended spacings of supports can also be found in the Tech Fact. These types of supports and spacings have been specified and used by many engineers and contractors who have reported their success stories. It’s important to place the reinforcement in the correct location in the slab to provide the right amount of cover—and do it economically.

Recently, there has been a great amount of interest in the use of WWR with larger wires and wider wire spacings to make it easier, less costly, and quicker to place. Today, many contractors are using the wide-spaced WWR, sometimes referred to as Step Thru or Big Foot, with spacings of 12, 16, 18 in. (305, 406, 457 mm) and larger. Sheets with widely-spaced wires, having proportionately larger cross-sectional areas can provide accuracy of placement while still maintaining crack width control and flatness of the finished slabs. Spacing of supports at 3 ft (0.9 m) or more, depending on the wire size, can provide stiffness and strength to support concrete placing equipment and workers. Larger wires with larger spacings will also provide more spring back to achieve the proper location of the reinforcement within the slab. Many design professionals and contractors have reported increased quality for reinforced concrete structures when the reinforcement is accurately placed.

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In the UK, we have come across the same problem described by Neuber, but have taken the different approach of asking where the reinforcement is best placed. It is well known that the cross section of wire is insufficient to literally control cracking—its function is more to hold the two sides together to allow aggregate interlock to occur. It’s immaterial whether the reinforcement is near the top or near the bottom, so long as it is not too close to either surface. Most guidance recommends that saw cutting extend to a depth of at least 25% of the slab depth and deeper if needed (for example, if the concrete has hardened too much). So, clearly the reinforcement should be kept low enough to avoid any risk of being cut.

We’ve found that the solution is to place it near the bottom, say 25% of the slab thickness, a minimum 2 in. (50 mm) up. It’ll still need proper support—but is much easier to manage than when placed near the top.

Stuart Alexander
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Neuber’s results weren’t news to me—I had similar observations when inspecting concrete placements as a structural engineer in the 1970s. In fact, from cores taken to install equipment on an industrial floor, I found that even No. 5 and No. 6 top slab bars, properly supported, can end up in the middle of the slab under the abuse of a concrete placement. What I’d like to point out is that the conditions shown in Fig. 2 of the article are not even the real problem. Imagine a worker (who might weigh more than 180 lb [82 kg]) dragging a concrete pump hose during pumping—staggering and stumbling to keep balance and to control the hose while trying to find sound footing on reinforcement that can’t be seen because it’s covered with concrete. I’m sure the effective loads on individual bars or wires could be twice the worker’s weight. Consider the impact (pun intended) on the cost of doing it right.

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Author’s response

Because proper positioning of the WWR is essential to its performance, the maximum allowable distance between supports for each WWR gauge and spacing combination should be established definitively by collecting data from field tests, with the concrete placement method also being included as a variable. I would welcome the chance to participate in such a study from which a consensus standard could be developed and referenced by both ACI and the Portland Cement Association.

I don’t think it’s unreasonable to want to see substantiated data on how using larger gauge and spacing makes the material faster, easier, and less costly to install; or how larger gauge WWR provides more spring back to facilitate proper positioning. A formal support spacing standard that addresses larger WWR gauge and spacing would go a long way toward leveling the playing field for all bidders by establishing exactly what is required, reducing potential lawsuits that might arise from improper location of WWR, and raising overall confidence in the industry’s ability to build a slab as detailed. My livelihood as a contractor depends on it.

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