WIRE REINFORCEMENT INSTITUTE®

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Technical Blog

Welded Wire What?

There is a long history of use of electric resistance-welded wire in the North American reinforced concrete construction industry. On that timeline, the terminology used to describe the product has evolved and/or expanded considerably.

Fabric

The term "fabric" has been associated with wire reinforcing dating back to the early 1900s. In fact, when the WRI was originally founded in 1930 the organization was actually called the "Wire Fabric Institute".

The word "fabric" in and of itself suggests a woven composition, which is appropriate for the era considering that woven wire fabrics were manufactured by The American Steel & Wire Company (ASW) in both "triangular" and "square" wire arrangements that were taken up primarily in roll form and then "rolled out" on site for use in various fireproofing and structural concrete applications. It is notable that these early variations of pre-assembled sheets of wire were not actually welded, but instead were mechanically intertwined much like would be expected in the production of textile-based fabric. Woven wire offerings (whether triangular or square-patterned) included solid longitudinal type (where longitudinal wires were continuous through the pattern and transversely-positioned wires were woven around them) and stranded longitudinal type (where both longitudinal and transverse wires were each interwoven).

ASW further diversified its roster of wire fabric products by manufacturing what was referred to as electrical welded fabric, a product comprised of cross wires "rigidly secured" by welding to the longitudinal wires to prevent the reinforcement from slipping in place. It is this product that most closely resembles modern welded wire reinforcement.

The term *welded wire fabric* is still commonly used today, though it is largely considered an antiquated reference by the WRI and is often assumed to refer to welded wire reinforcement styles comprised of small wire sizes used in non-structural application. It is notable that the AASHTO LRFD Specification still included this terminology as recently as 2012, though has consistently replaced it with the current and preferred term *welded wire reinforcement*.

Mesh

There is no known historical start date for the use of the term *welded wire mesh*. Reference to welded wire reinforcement as "mesh" continues to be very commonplace, and it serves as a convenient differentiator when talking about loose individual pieces of reinforcement (commonly "rebar") versus a mat or roll-form reinforcement.

References to welded wire mesh can also still be found in various design standards, including the AASHTO LRFD Bridge Design Specifications (9th Edition, 2020). Similarly, it is not uncommon for manufacturers themselves to refer to welded wire reinforcement configurations that are used in larger commercial applications as Engineered Structural Mesh (ESM) or welded wire reinforcement mesh.

Bar Mats

In recent years there has been an increase in the use of the term *welded bar mats* when describing WWR mats used in commercial construction applications. This term isn't formally used in any design standard as an appropriate name for electric resistance-welded wire mats, nor is it terminology that the Wire Reinforcement Institute itself uses or actively promotes.

Those who invoke the term "bar" are likely intending to achieve a perception of contrast between the more historically longstanding "fabric" term, as the former suggests a more robust size of reinforcement piece to a layperson than does the latter. "Bar" just sounds bigger and stronger than "wire".

There is some merit to this strategy considering WWR is commonly produced in large sizes up to and including 5/8" diameter wires. There are numerous instances in which the "fabric" or "mesh" descriptor has undersold WWR as a legitimate, code-accepted, large-diameter structural reinforcement, and contractors and engineers alike continue to be surprised by the availability of structural-type wire sizes despite the WRI's significant efforts to educate the construction community on this front.

The WRI doesn't make any formal effort to prohibit the use of the term "bar mat" among WWR producers and industry agents. However, it does caution those who prefer to continue to use this terminology that there is a distinct difference between ASTM A1064 compliant WWR using the "bar mat" moniker and "welded deformed steel bar mats" that are covered by ASTM A184. The latter is actually comprised of manually-welded reinforcing bars (rebar), the permitted design of which is – ironically - significantly more restricted in ACI 318 than that which exists for ASTM A1064 WWR.

Those who prefer to use this promotional nomenclature should be aware that in trying to draw a parallel to the "sturdiness" and familiarity of bar, there is still an obligation to differentiate between applicable material standards (ASTM A1064 vs. ASTM A184) and the constituent material used therein (large-diameter wire vs. reinforcing bar).

The Way Forward

The WRI uses the term *welded wire reinforcement* to describe electric-resistance welded mats and rolls comprised of cold-worked steel wire, as this is the formal nomenclature used by ASTM to describe the material. Fortunately, this nomenclature has become more consistently used in industry design standards as well, with AASHTO, ACI, and AREMA all using the correct citation. As such, the WRI suggests that the term *welded wire reinforcement* be used as frequently and consistently as possible.

With that said, it is inevitable that naming variations will continue to be used that, while not categorically "wrong", are driven by user convenience and habit alone. This alternative nomenclature isn't necessarily harmful, though it should also be understood that it doesn't reflect industry standard language found in the manufacturing and engineering environments.

At the end of the day, it's hard to argue that the term *welded wire reinforcement* rolls off the tongue like the terms "mesh" or "bar mats" do. As long as there exists a fundamental understanding of the material itself, as well as its levels of code-acceptance, the WRI doesn't perceive this variability to be of any real detriment.
