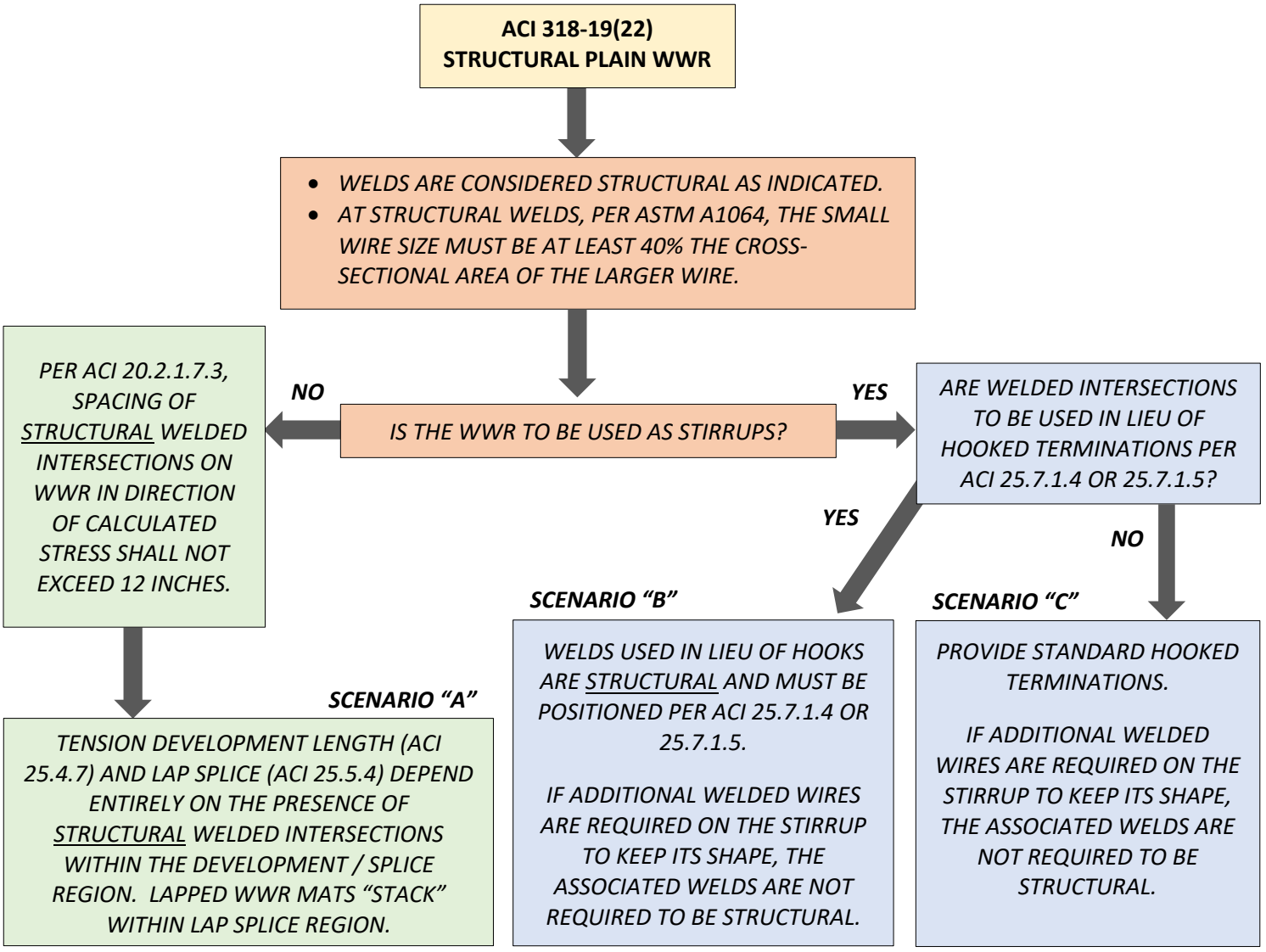
A Specifier's Guide to WWR Weld Requirements With ACI 318

In specifying welded wire reinforcement (WWR), it is crucial for the designer to have a basic understanding of the role played by the welded intersections that help to define the product. What may come as a surprise to many designers is the fact that, depending on the application, the structural importance of the welded intersections themselves can vary significantly.

The WRI has created the following visual aids to break this topic down into simple terms for quick and easy guidance to the designer using ACI 318.

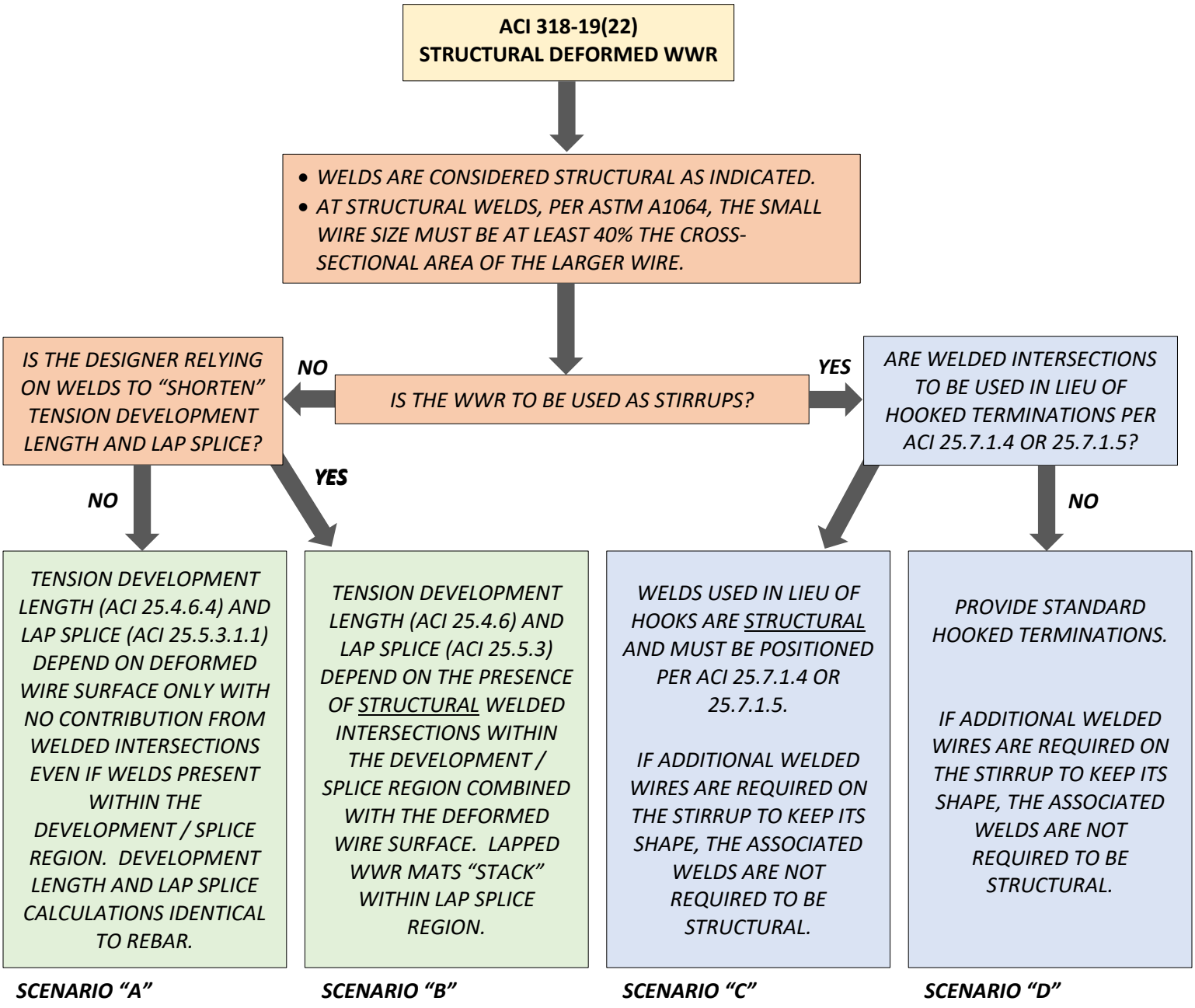


STRUCTURAL PLAIN WWR COMMENTARY

For Scenario "A", all welds on the WWR mats are considered structural.

For Scenario "B", only those welds used to replace hooked terminations must be considered structural. If additional welded wires are required to help keep the shape of the stirrup, these additional wires would be determined and configured by the WWR detailer.

For Scenario "C", none of the welds are required to be considered structural. Welded wires required to keep the shape of the stirrup would be determined and configured by the WWR detailer.



STRUCTURAL DEFORMED WWR COMMENTARY

Scenario "A" is usage of WWR in a manner identical to that for rebar and is the most efficient approach for flexural and shrinkage & temperature reinforcement. For this usage, the WWR mats are best configured such that welded crosswires are omitted from the lap splice region to allow the reinforcement to be placed co-planar. Note, too, that even though the lap splice lengths calculated in this scenario are longer than in Scenario "B", the overall steel utilization on the project is still lower than Scenario "B" given that additional "stacking" crosswires within the lap splice region are absent.

Scenario "B" relies on a combination of structural welded intersections and deformed wire surface. While shorter development lengths and lap splices are possible in comparison to Scenario "A", because of the presence of structural welded crosswires on overlapping mats within the lap splice region, the WWR mats must stack (i.e., they are not coplanar where they overlap).

For Scenario "C", only those welds used to replace hooked terminations must be considered structural. If additional welded wires are required to help keep the shape of the stirrup, these additional wires would be determined and configured by the WWR detailer.

For Scenario "D", none of the welds are required to be considered structural. Welded wires required to keep the shape of the stirrup would be determined and configured by the WWR detailer.

It is worth noting that ACI 318 Section 20.2.1.7.3, cited above in the flowchart for Structural Plain WWR, is intentionally not cited in the flowchart for Structural Deformed WWR, despite the fact that this ACI section contains a provision for deformed WWR stating the need for welded intersections at 16 inches on center, maximum, in the direction of calculated stress. The citation is omitted here because the WRI has long held the following viewpoints:

1. This requirement for deformed WWR is in direct conflict with other ACI 318 overriding provisions, most specifically the fact that for deformed WWR, the contribution of a welded crosswire in the determination of tension development length and lap splice can be procedurally ignored/disregarded in favor of reliance on the deformed wire surface only.
2. The equations used for determination of deformed wire (i.e., loose pieces not in WWR form) development length and lap splice length are the same equations used for reinforcing bars, indicating that the presence of welded crosswires on a WWR mat is unnecessary when the deformed wire surface is relied upon for anchorage and bond purposes.

For more information on WRI's position on the matter of prescriptive maximum welded crosswire spacing on deformed WWR, refer to our December 2021 Technical Blog.

https://wirereinforcementinstitute.org/technical-resources/technical-blog-and-case-studies/aci-318-19-section-202173-prescriptive-maximum-wire-spacing

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For more information visit www.wirereinforcementinstitute.org.

References:

1. *ACI Committee 318, "Building Code Requirements for Structural Concrete (ACI 318-19) and Commentary (ACI 318R-19)", American Concrete Institute, Farmington Hills, MI, 2019 (Reapproved 2022)*

2. *"Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete (ASTM A1064/A1064M-22)", ASTM International, West Conshohocken, PA, 2022.*