

Specification Section 415

Subarticle 415-1

ORIGINATION

Date: 6-5-2025

Name: Alexander Lewis

Email:

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COMMENTARY

Referenced Spec section number in 932 changed. Due to limited guidance from governing industry standards such as ACI 440 risk of damage to FRP bars related to excessive UV exposure should be shifted to the producer & contractor. This will reduce confusion on projects. Lastly, it is unreasonable to restrict nonmetallic fasteners from use to tie FRP reinforcement. The intent is to open to alternative kinds without compromising quality. Thus an APL product category should be created as well. Additionally, APL office suggested adding the subsection of each material to the Materials section for document consistency.

INTERNAL COMMENTS AND RESPONSES

(Please note all comments and responses are verbatim as received. The Specifications Office does not alter typos or grammar.)

BLACK = Comment **BLUE** = Specifications Response **GREEN** = Change Made to Specification

Name: Scott Arnold

Date: 6-17-25

COMMENT: With the proposed revision to 415-5.3, what will prevent the Contractor from tying FRP reinforcing with carbon steel wire?

RESPONSE: State Materials Corrosion Division has no concern with allowing FRP reinforcing to be tied with carbon steel wire. Carbon steel wire will likely corrode, but that will have minimal impact either on the surrounding concrete or the FRP reinforcement.

ACTION TAKEN: No action.

Name: Hector Laureano

Date: 6-17-25

COMMENT: For Section 415-3 Protection of Material

1. Where does the limit of 4 months for UV exposure comes from? Is it based on some industry literature research or other source? Could that be excessive?
2. The way the sentence is written, it is not clear if the 4 months will control, the manufacturer's recommendation will control, or the most restrictive. Clarify.
3. Is the intent to provide flexibility only on UV exposure or the temperature as well? If temperature limit is intended to be set at 120°F, maybe divide in 2 sentences to avoid confusion. One limiting temperature and the other providing UV exposure flexibility.

RESPONSE:

1. Both limits (4 months UV exposure and 120°F) come from ACI 440.5R Section 1.6 Delivery, storage, and handling. These limits are likely conservative based on data obtained from FRP manufacturers, but we believe it is prudent to follow existing industry standards until specific research can be conducted.
2. The intent is for the manufacturer's recommendation to take precedent. If the manufacturer doesn't have a recommendation, the contractor shall adhere to the 4 month exposure limit.
3. The intent is to provide flexibility on both temperature and UV exposure.

ACTION TAKEN: Revised the following sentence *“Limit FRP UV exposure to 4 months and ambient temperature storage to 120°F, or as directed by the FRP manufacturer”*

Now reads: *“Protect FRP against UV exposure and extreme ambient storage temperatures as required by the FRP manufacturer. If the manufacturer does not provide any requirements, limit FRP sun exposure to 4 months and maximum ambient storage temperature to 120°F.*

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INDUSTRY COMMENTS AND RESPONSES

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Name: Keith Waugh

Date: 7-3-2025

COMMENT: Based on field issues I had requested that 415-4.1 receive revision similar to: 415-4.1 Steel Reinforcement: Fabricate reinforcing bars as prescribed in the CRSI Manual of Standard Practice. Shop bend the reinforcement cold to the shapes indicated in the Plans. Bending adjustments may be performed in the field to correct issues regarding fabrication and installation tolerances or when shop bending is not practical. Do not hot bend or straighten, weld, or thermal cut reinforcing steel.

RESPONSE:

Thank you for the response. The Department will need to research the proposed language and discuss it with stakeholders.

ACTION TAKEN:

The Department will evaluate the proposed language and determine whether to implement the changes in the next cycle if the proposal meets its needs.

Name: Danielle Kleinhans

Date: 7-29-25

COMMENT: As a manufacturer of FRP reinforcement, in 'section 415-3 Protection of Material' I would like to express concerns about the limit of 120F for the maximum storage temperature. I have reviewed this with our internal quality team and would like to propose that a limit of 180F is acceptable with the caveat that the bars are not under stress at the time of storage/before handling (i.e. adequately supported) which may require some additional text in the first sentence of the section.

RESPONSE:

Thank you for your suggestions. The Department is currently collecting data and conducting research on this topic. Once conclusions are reached and discussions with stakeholders have taken place, the Department will consider revising or increasing the temperature threshold in the future. Given the variety of materials used in FRP systems, any changes will be aligned with ACI guidelines to ensure the quality and performance of FRP reinforcement.

ACTION TAKEN: No changes will be made at this time. However, once further information and data have been finalized, the Department will consider updating the requirements.