



STATE HIGHWAY
ADMINISTRATION

Maryland Department of Transportation
State Highway Administration

STANDARD SPECIFICATIONS
for
CONSTRUCTION
and
MATERIALS

July, 2018

421 REINFORCING STEEL

421.01 DESCRIPTION

Furnish and place uncoated and epoxy coated reinforcing steel.

421.02 MATERIALS

Grout	902.11(c)
Deformed Steel Bars	908.01
Plain Round Steel Bars for Column Spirals	908.02
Wire Mesh	908.05 and .06
Fusion Bonded Epoxy Powder Coating for Steel and Touch Up System	Section 465 and 917.02
Galvanizing	
Reinforcing Steel	A 123
Hardware	A 153

421.02.01 Supports. Use approved coated metal, plastic, plastic tipped, or galvanized material. Aluminum is unacceptable. All materials are subject to approval.

For epoxy coated steel, use wire supports completely covered with 1.5 to 9.0 mils of adherent epoxy coating except for minimum necessary contact marks. Hold the reinforcing steel in place with plastic coated tie wires fabricated for this purpose.

Steel bars used as supports for epoxy coated steel shall be coated in the same manner as reinforcing steel.

421.03 CONSTRUCTION

421.03.01 Working Drawings. Submit working drawings for approval prior to the start of any fabrication, unless otherwise specified. Refer to Section 499.

421.03.02 Plan Dimensions. All dimensions related to reinforcing steel are out to out measurement except the spacing is measured center to center.

421.03.03 Cutting and Bending. Cut and bend reinforcing bars at the mill or shop to the shapes specified before shipment to the job site. Bending shall not be performed in the field except to correct errors, damage by handling and shipping, or minor omissions in shop bending.

Saw or shear epoxy coated reinforcing bars on skewed bridges and in other locations that are specified to be cut in the field; flame cutting is prohibited.

Ensure that all bending conforms to the tolerances specified in the Contract Documents.

421.03.04 Shipping, Handling, and Protection of Material. Ship reinforcing steel bars in standard bundles; tagged and marked in accordance with the provisions of the Code of Standard Practice of the Concrete Reinforcing Steel Institute. Keep bundles intact, undamaged, and properly identified until ready for use.

Bundle coated steel together for shipment using excelsior or other approved materials, and banded using plastic or padded metal bands. Perform all lifting with a lifting beam and multiple supports consisting of a sufficient quantity of straps or slings to prevent abrasion within the bundle from excessive bending or distortion.

Store bundles at the site on suitable blocking or platforms at least 4 in. above any type of surface and vegetation. Keep free from vegetation growth, accumulations of dirt, oil, or other foreign material. Keep blocking sufficiently close to avoid bending and distortion of the bars. Correct any distortion of the bars or damage to epoxy coating as directed. Touch up any damage to the epoxy coating as specified in 465.03. Adequately cover epoxy coated bars for protection from ultraviolet rays from the time of delivery when they are to be stored outside for more than 90 days.

421.03.05 Placing and Fastening. Accurately place all reinforcing steel, including dowel bars, in the position specified in the Contract Documents or working drawings, and hold firmly during the depositing and setting of the concrete. Do not insert into the plastic concrete.

Tie all intersections, except alternate intersections need not be tied where spacing is less than 1 ft in each direction. On bridge decks and the top slabs of box culverts, tie all intersections in the top mat of reinforcing. Do not bend reinforcing steel bars after embedment in concrete.

Before placing concrete, clean all mortar from the reinforcing. Do not place concrete until the reinforcing bars are inspected and approved. Approval shall not relieve the Contractor of the responsibility for correcting problems caused by any shifting of the bars during the placement of concrete.

Support reinforcing bars and maintain their distances from faces of forms by using approved templates, blocks, ties, hangers, or other supports. Support bars in the bottom of

footings on approved precast concrete blocks with embedded tie wires or suspend in place. Support bars in the tops of footings by using approved supports.

Do not use metal, metal with plastic tipped legs, or plastic chairs against formed surfaces that will be exposed in the finished structure.

The Engineer will perform a final visual inspection of epoxy coated steel at the construction site after the steel is in place and immediately prior to placing the concrete. Patch designated repair areas using epoxy as specified in 465.03. Do not place concrete on a patched area until the patching material has cured for one hour. Allow four hours of normal working time after the reinforcing and forms are in place for the inspection.

421.03.06 Splicing. Furnish bars in the lengths and have been spliced as specified and as approved in the working drawings. Do not perform additional splicing without approval. Make lap splices with the bars in contact and wired together. Do not weld reinforcing steel or weld attachments to reinforcing steel without approval. Perform welding according to AWS D1.4.

421.03.07 Tying New Concrete into Existing Concrete. On all projects where portions of existing structures are to be used in the finished structure and existing concrete is to be removed, straighten, clean, and protect the existing reinforcing steel to be incorporated in the final structure.

For exposed existing reinforcing steel that is to be incorporated into the final structure:

- (a) Cut out any that has lost 20 percent or more of its original cross sectional area as determined by the Engineer. Provide and place a new bar of the same diameter so as to have the minimum required lap at each end of the new bar, or modified as per (c).
- (b) Where the required bar lap length is available, use it as a dowel.
- (c) Where the required bar lap is not available or limits of concrete removal to achieve bar lap are too great, make a welded or approved mechanical splice.

When existing reinforcing steel extends into an area in which epoxy coated reinforcing steel is required, abrasive blast clean and epoxy coat using the touch up system. Refer to Section 465.

If expected reinforcing steel is missing, or a pattern differing from that shown on the existing Contract Documents is uncovered, contact the Office of Structures for evaluation.

Where dowel bars are required to tie new concrete into an existing structure, install as specified in 406.03.