STATE OF OHIO

Department of Transportation

Construction Administration Manual of Procedures

Columbus, Ohio

2017

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509 Reinforcing Steel

Description (509.01)

This work consists of furnishing and placing supports, mechanical connectors, tie wires, steel dowels and reinforcing steel of the quality, type, size, and quantity at the locations designated in the plans for concrete reinforcement.

Materials (509.02)

The steel for the concrete reinforcement must conform to 709.01, 709.03, 709.05 for deformed bars, to 709.08 for cold drawn wire, to 709.09, 709.10, 709.12 for rod mats, welded wire fabric. Plastic supports for concrete reinforcement must conform to 709.15.

Care of Material (509.03)

The reinforcing steel must be cleaned of all dirt, oil, and grease. Oil or grease on the steel will seriously affect bond and must be removed with a solvent. Many times dirt cannot be removed with water alone, but must be loosened with the use of a rag or brush before rinsing it off the reinforcing steel. If steel requires cleaning before being placed, it should be cleaned outside the forms. Once reinforcing steel is placed in the forms, it is difficult to see the dirt, oil, or grease on the bottom side of the reinforcing steel.

Storage

All reinforcing steel received on the project must be stored off the ground and kept free from dirt, oil, and grease. Many times the Contractor will store the reinforcing steel on wood blocks or similar devices. If this is the method chosen by the Contractor to store the reinforcing steel off the ground, it is important that he use enough blocks to prevent the reinforcing steel from sagging and coming into contact with the ground. The reinforcing steel must not be stored in a place where it will be damaged or bent by equipment or be located in the path of drainage. If epoxy coated reinforcing steel is to be exposed to sunlight for more than 2 months, it needs be covered to protect the epoxy from UV breakdown. This requirement can be found in ASTM A775 which is incorporated by reference in section 709.00 of the C&MS.

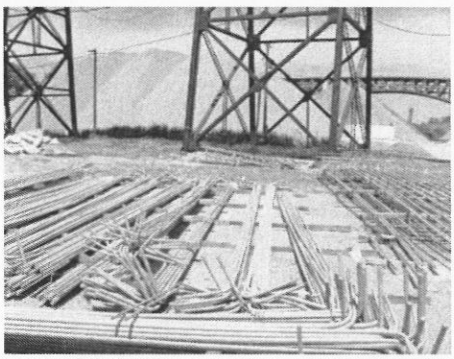

Figure 509.03.A - Unacceptable faded epoxy rebar, not protected from uV during storage

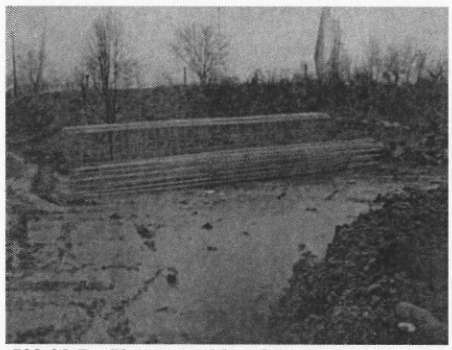

Figure 509.03.B - Unacceptable rebar storage in wet location

Method of Placing (509.04)

Reinforcing steel should have a TE- 24 with the shipment. If the reinforcing steel does arrive without a TE -24 either the District Engineer of Test or the Office of Material Management should be notified. Check conformance of the delivered bars' length to plan specified length. During placement compare the fit of the reinforcing steel in the measured forms. All steel required in any structure unit must be included in that unit. Advance separation of the steel by structure units from prepared lists can preclude omissions. Check the total number of bars of each bar mark placed for each concrete placement and spot-check the spacing of the reinforcing steel. For the reinforcing steel that comprises the mats in a deck,the total number of bars is more important than extreme accuracy in the space between adjacent bars.

Clearances

Reinforcing steel must be located at the specified distance from the surface in order for reinforced concrete members to have the proper clearance.

Reinforcement shall be placed in the position shown on the plans and kept in that position while the concrete is being placed. Attempting to position a reinforcing bar cage during or after the deposition of concrete is not permitted due to the fact that the consolidation of concrete around the perimeter of the reinforcing steel will be compromised.

Bolsters or chairs should be used, or the cage should be assembled and wired so that the proper clearances are obtained before encasement. The bolsters or chairs used to support reinforcing steel in slabs, beams, or girders must be spaced no more than 4 feet (1.2 m) apart both transversely and longitudinally. This spacing is a maximum. The Contractor needs to install enough supports to keep the reinforcing steel from experiencing substantial deflections induced from construction loads.

When placing reinforcing dowels extending out of a footing, they must be located accurately so they will lap properly with the reinforcement in adjoining concrete. This particularly applies to dowels for pier columns where the location of vertical column bars is specified.

Prior to placing concrete, it is important to check the clearance or cover over the surface of the reinforcing steel. The clearance between the reinforcing steel and the surface of the concrete shall not be less than:

1. 2-1/2 inches *[-0 inch, +0.25 inch] (65 mm [-0 mm, +6 mm]* to the top of sidewalks.
2. 3 inches *[-0 inch, +0.5 inch]* (75 mm *[-0 mm, +12 mm]*) at the face of footings placed against rock or earth.

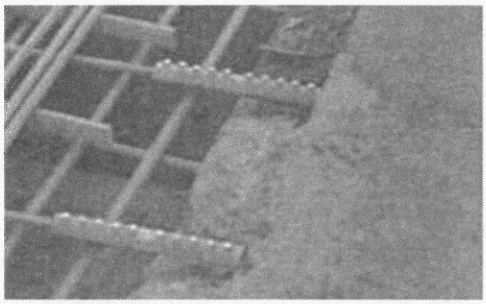

Figure 509.07.B - Rebar mechanical set screw splicer

Supports (509.08)

Reinforcement may be spaced by metal supports, plastic supports, or precast mortar blocks. Supports should be checked as soon as possible to determine that they will provide the proper clearance. The bolsters or chairs used to support reinforcing steel in slabs, beams, or girders must be spaced no more than 4 feet (1.2 m) apart both transversely and longitudinally. This spacing is a maximum. The Contractor needs to install enough supports to keep the reinforcing steel from experiencing substantial deflections induced from construction loads. If the Contractor uses plastic supports, they must conform to 709.15 and Supplement 1125. The concrete must be vibrated properly to ensure there are no voids in the concrete under these supports.

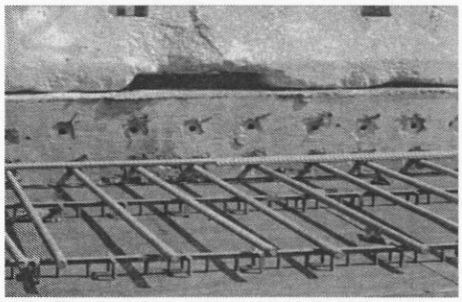

Figure 509.08 - Plastic rebar supports and threaded rebar connectors

Epoxy Coated Reinforcing Steel (509.09)

When epoxy-coated reinforcing steel is specified, plastic-coated or epoxy-coated bar supports and tie wires are required.

Bars shall be carefully handled and installed so patching at the job site will be kept to a minimum. It is not expected that the coated bars, when ready for concrete placement in final position, will be completely free of damaged areas. However, numerous nicks and scrapes that expose the steel will not be allowed, regardless of the stage when they occur subsequent to coating in the plant. All damage defined as significant damage must be patched.

Significant damage is defined as any opening in the coating that exposes the steel and exceeds the following sizes.

1. An area of 1/4 inch (6 mm) square or 1/4 inch (6 mm) diameter.
2. An area approximately 1/8 inch (3 mm) square or 1/8 inch (3 mm) diameter if the opening is within 1/4 inch (6 mm) of another opening of the same or larger size, or a length of 6 inches (152 mm) in length, regardless of area.