

703-B-179 REINFORCING BARS

(Adopted 08-21-08)

The Standard Specifications are revised as follows:

SECTION 703 BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

**SECTION 703 – REINFORCING BARS**

**703.01 Description**

This work shall consist of furnishing and placing reinforcing bars and threaded tie bar assemblies with reinforcing bars in accordance with 105.03.

**703.02 Materials**

Materials shall be in accordance with the following:

Reinforcing Bars, Plain or Epoxy Coated .....	910.01
Reinforcing Bar Splicing System.....	910.01(b)3
Support Devices .....	910.01(b)9
Threaded Tie Bar Assembly.....	910.01(b)2

All ~~uncoated reinforcing bars plain~~ and epoxy coated reinforcing bars shall be supplied from a source listed on the Department’s list of Certified Uncoated Reinforcing Bar Manufacturers and Certified Reinforcing Bar Epoxy Coaters respectively.

*The sizes and lengths of reinforcing bars shall be marked plainly to facilitate inspection and checking.*

**703.03 Bar List**

The *Contractor shall verify the quantity and size of the reinforcing bars shall be verified* against the structure drawings. ~~The necessary corrections, if any, shall be made before prior to ordering.~~ Errors in the bar list and bending schedule will not be cause for adjustment of the contract unit price.

**703.04 Protection of Materials**

~~Reinforcing bars shall be protected at all times from damage. When placed in the work, the reinforcing bars shall be free from dirt, harmful rust, detrimental scale, paint, oil, or other foreign substance. The various sizes and lengths shall be marked plainly to facilitate inspection and checking.~~

~~Epoxy coated reinforcing bars shall be handled and stored so as to prevent damage to the reinforcing bars and the coating. All systems for handling coated reinforcing bars shall have padded contact areas. All bundling bands shall be padded or banding shall be used which prevents damage to the coating. All bundles of coated bars shall be lifted with a spreader bar, multiple supports, or a platform bridge to prevent bar to bar abrasion from sags in the bundles of coated reinforcing bars. The reinforcing bars shall not be dropped or dragged. The bundled bars shall be stored above the ground on wooden or padded supports.~~

*Plain and epoxy coated reinforcing bars shall be protected from damage during storage, handling, installation and concrete placement. Plain and epoxy coated reinforcing bars shall not be stored in direct contact with the ground. Epoxy coated reinforcing bars shall be protected from exposure to ultraviolet light and moisture during storage. Once placed into the work, epoxy coated reinforcing bars shall not be exposed to ultraviolet light for a total of more than 21 days prior to placement of concrete. At the time of concrete placement, reinforcing bars shall be free of dirt, loose rust or scale, grease, oil, or other foreign substance. If the Engineer suspects the epoxy coating has been damaged by exposure to ultraviolet light, a sample will be obtained and will be tested in accordance with 910.01(b)9.*

*Damage to the epoxy coating of epoxy coated reinforcing bars shall be repaired or the bars shall be replaced. Repairs to the epoxy coating ~~on epoxy coated reinforcing bars~~ shall be performed on all damaged areas larger than 1/4 in. by 1/4 in. (5 mm by 5 mm). A bar will be rejected if the ~~total~~ accumulated area of damaged coating exceeds 2% of the nominal surface area of the bar or if the total area of repaired coating exceeds 5% of the nominal surface area of the bar. All damaged ~~within each~~ areas shall be cleaned and the repair shall be performed before visible oxidation appears. ~~The patching or Coating~~ repair material shall be in accordance with 910.01(b)9.*

## **CONSTRUCTION REQUIREMENTS**

### **703.05 Bending**

Reinforcing bars required to be bent shall be accurately cold bent in a bending machine to the shapes shown on the plans. All bars in which cracks or splits occur at bends will be rejected.

### **703.06 Placing and Fastening**

All dimensions shown on the plans for spacing of reinforcing bars apply to centers of bars unless otherwise noted. All bars shall be accurately placed and, during placing of the concrete, held firmly in the position as shown on the plans. Distances from the forms shall be maintained by means of chairs, ties, hangers, or other approved support devices. All reinforcing bars shall be wired rigidly or fastened securely at sufficient intervals to hold the bars in place. *Welding of reinforcing bars other than those used in precast members will not be permitted.* ~~Welding of reinforcing bars at intersections will not be permitted.~~ Chairs and supports holding upper layers of reinforcing bars shall support the transverse bars. The upper layer of reinforcing bars in bridge floors shall be tied or fastened at such intervals as necessary to prevent an upward or a lateral movement of a bar from the planned position.

Layers of reinforcing bars shall be separated by spacers. Reinforcing bars shall be separated from horizontal surfaces by being suspended or supported on approved chairs and spacers capable of supporting the designed loads. Supports and spacers shall be of such shape as to be easily encased in concrete. That portion which is in contact with the forms shall be non-corrosive and non-staining material. They shall be of an approved type. Vertical stirrups shall always pass around main tension members and shall be securely attached thereto. The use of pebbles, pieces of broken stone or bricks, metal

pipe, wooden blocks, and similar devices for holding bars in position will not be permitted.

After being placed, reinforcing bars will be inspected and approved before the concrete is deposited. The positions of the reinforcing bars shall not be disturbed both during and after depositing the concrete. All concrete placed in violation of this requirement may be rejected and its removal will be required. Where reinforcing bars project from construction joints, all mortar clinging to the reinforcing bars from previous pours shall be removed before the next enveloping pour is made.

All reinforcing bars shall be furnished in the full lengths shown on the plans unless splices are indicated. No other splicing will be allowed except with written permission. Unless otherwise shown on the plans, reinforcing bars shall be lapped 32 diameters to make a splice. Construction joints shall not be made within the limits of lapped bars. For lapped splices, reinforcing bars shall be placed in contact and rigidly clamped or wired in an approved manner. Insofar as possible, splices shall be staggered and well distributed or located at points of low tensile stress. Splices will not be permitted at points where the section does not provide a distance of at least 2 in. (50 mm) between the splice and the nearest adjacent bar or surface of the concrete.

When splicing is indicated or permitted, an appropriate splice system on the list of approved Reinforcing ~~Steel Bar~~ Splicing Systems may be used in lieu of lapped bars. The splicing system shall be installed in accordance with the manufacturer's recommendations.

Welded wire ~~fabric~~ reinforcement, when required, shall be placed as shown on the plans or as otherwise directed. The sheets shall overlap sufficiently to maintain uniform strength and shall be securely fastened at lapped ends and edges. The laps shall be no less than one mesh in width.

Spiral reinforcement, consisting of evenly spaced continuous spirals, shall be held firmly in place by attachment to vertical reinforcement. The spirals shall be held true to line by vertical spacers. Anchorage for spiral reinforcement shall be provided with 1 1/2 extra turns of the spiral rod or wire at each end of the spiral unit. Splices in spiral rods or wire shall be made with a lap of 1 1/2 turns.

Threaded tie bar assemblies may be used in lieu of spliced reinforcing bars shown on the plans. Threaded tie bar assemblies shall achieve the minimum load in accordance with 910.01(b)2. *The Contractor shall coat any exposed part of threaded bar assemblies in accordance with 910.01(b)2.*

*In lieu of tying, reinforcing bars used in precast and precast prestressed concrete structural members may be welded in accordance with the following:*

- (a) All welding procedures and welders to be employed shall be qualified to AWS D1.4. All welds shall either be QC inspected by an AWS Certified Welding Inspector or at a minimum signed off by an AWS Certified Welding Inspector. Welding will be permitted only at intersections of*

*reinforcing bars. Splicing of the reinforcing bars by welding will not be permitted. Welds shall have a satisfactory appearance. As low a current as possible shall be used so as to preclude notching and undercutting and still provide a weld of the intended strength. Notching, or undercutting of the bars, or bars with a loss of cross-section resulting from welding will be cause for rejection of the bars so damaged and the bars shall be replaced as directed.*

*(b) Reinforcing bars that are welded shall be in accordance with ASTM A 706. Epoxy-coated reinforcing that is welded shall have the epoxy coating removed in the vicinity of the weld. Once the welded area has cooled to below 90°F (32°C) and before visible oxidation appears, the weld and surrounding bare metal shall be cleaned and recoated in accordance with 910.01(b)9e.*

### **703.07 Method of Measurement**

Reinforcing bars will be measured by the pound (kilogram) based on the theoretical number of pounds (kilograms) complete in place as shown on the plans or placed as ordered. The quantities of materials furnished and placed shall be based upon the calculated weights (masses) of the reinforcing bars actually placed in accordance with these specifications. The weights (masses) calculated shall be based upon the following tables.

#### **English Table**

Bar Designation No.	Weight per linear foot, pounds	Bar Designation No.	Weight per linear foot, pounds
1/4 in.	0.167	8	2.670
3	0.376	9	3.400
4	0.668	10	4.303
5	1.043	11	5.313
6	1.502	14	7.65
7	2.044	18	13.60

#### **Metric Table**

Bar Designation No.	Mass per meter, kilograms	Bar Designation No.	Mass per meter, kilograms
10	0.560	29	5.060
13	0.994	32	6.404
16	1.552	36	7.907
19	2.235	43	11.38
22	3.042	57	20.24
25	3.973		

Threaded tie bar assemblies will be measured by the number of assemblies placed.

Welded wire ~~fabric~~ *reinforcement* will not be measured.

**703.08 Basis of Payment**

The accepted quantities of reinforcing bars will be paid for at the contract price per pound (kilogram), complete in place.

If the substitution of reinforcing bars larger than those specified is permitted, payment will be made for only that weight (mass) which would be required if the specified bars had been used.

If the use of reinforcing bar lengths shorter than those shown on the plans is permitted for convenience in transporting or placing the bars, payment will be based on the weight (mass) of the lengths shown on the plans.

Payment for threaded tie bar assemblies will be at the contract unit price per each, complete in place, If epoxy coating is specified, payment for the assemblies will be at the contract unit price per each for threaded tie bar assembly, epoxy coated.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit Symbol</b>
Reinforcing Bars .....	LBS (kg)
Reinforcing Bars, Epoxy Coated.....	LBS (kg)
Threaded Tie Bar Assembly.....	EACH
Threaded Tie Bar Assembly, Epoxy Coated.....	EACH

The cost of metal chairs, spacers, clips, wire, or other mechanical means used for fastening or holding reinforcement in place, and laps shall be included in the cost of reinforcing bars. The cost of coating materials and repair of damaged *or removed* coating materials on reinforcing bars and on metal chairs, spacers, clips, or other mechanical means used for fastening or holding reinforcement in place, and laps shall be included in the cost of epoxy coated reinforcing bars. If threaded tie bar assemblies are used in lieu of spliced reinforcing bars as shown on the plans, the cost of such assemblies shall be included in the cost of reinforcing bars.

If welded wire ~~fabric~~ *reinforcement* is required, the cost of furnishing and placing it shall be included in the cost of the concrete in which it is placed.