

**C. Placing and Fastening:** Reinforcing steel shall be accurately placed and firmly held in the positions specified using steel chairs or other approved methods. Bars shall be tied at all intersections except where spacing is less than one foot (300 mm) in each direction, in which case alternate intersections shall be tied.

- 1. General:** Distances from the forms shall be maintained by stays, blocks, ties, chairs, or hangers. Devices for holding reinforcement from contact with the forms shall be of approved shape and dimensions. Layers of bars shall be separated by approved metal devices. The use of pebbles, stone, brick, metal pipe, and wooden blocks will not be permitted.

Wire bar supports, such as ferrous metal chairs and bolsters, shall conform to industry practice as described in the manual of Standard Practice of the Concrete Reinforcing Steel Institute. Chairs or bolsters which bear against the forms for exposed surfaces shall be either Class 1 - Maximum Protection (plastic protected) or Class 2 - Moderate Protection, Type B (stainless steel tipped) for which the stainless steel conforms to ASTM A493, Type 430. Chairs or bolsters which are earth bearing shall be Class 3 - No Protection (bright basic bar supports). For epoxy coated reinforcement, all wire bar supports and bar clips shall be plastic or epoxy coated.

Chair spacing shall not exceed four feet (one meter) in either direction. The Engineer may require a closer chair spacing for mat rigidity. Plastic chairs shall not be used.

Tie wires shall be black-annealed 16 1/2 gauge (1.65 mm) or heavier. Ties will be plastic coated when used in conjunction with epoxy coated reinforcing steel.

Welding of reinforcing steel will not be permitted.

Reinforcement shall be inspected and approved, before the placing of concrete begins. The placing of any reinforcement except mesh during the process of placing the concrete will not be permitted. Concrete placed in violation of this provision may be rejected and ordered removed.

- a. Structures:** When placing bridge deck and box culvert reinforcement either slab bolster (SB) or beam bolster (BB) bar supports shall be used between the mats or reinforcement and the form work. Either slab bolster upper (SBU) or beam bolster upper (BBU) bar supports shall be used between mats of reinforcing steel. Individual high chair (HC) bar supports shall not be used.

On girder bridges either slab bolster upper (SBU) or beam bolster upper (BBU) bar supports shall be used between mats of reinforcement and placed transverse to the girders. Slab bolsters (SB) or beam bolsters (BB) shall be used under the bottom mat placed parallel to the girders.

The top mat of bridge slab and box culvert reinforcement shall be tied down with 16 1/2 gauge (1.65 mm) diameter (minimum) tie wires or other approved devices. It will not be permissible to tack weld reinforcement.

On girder bridges, ties shall be used along each line of beams at longitudinal intervals not to exceed eight feet (2.5 meters). The ties shall be secured to the shear transfer devices protruding from the top of the beam. Where shear transfer devices are not available, the ties may be secured to the bottom mat of slab reinforcing steel.

Other types of bridges and box culverts the top mat of reinforcement shall be tied down at a maximum of 12 feet (3.5 meters) longitudinal and transverse intervals with the ties secured to either the forms or bottom mat of slab reinforcing steel.

- b. Continuous Reinforced Concrete Pavement:** On continuous reinforced concrete pavement, continuous high chair (CHCP) and beam bolsters (BBP) with earth-bearing bases or sand plates (P) shall be used or approved alternate. Individual high chair (HC) bar supports shall not be used.

**D. Mechanical Bar Splices**

Mechanical bar splices shall only be used when specified in the plans or approved by the Engineer. The model of mechanical bar splice to be used shall be submitted to the Office of Bridge Design through the proper channels for approval.

The mechanical connection shall develop 125 percent of the specified yield strength of a Grade 60 bar. The Contractor shall obtain from the manufacturer and submit to the Engineer certification indicating the mechanical bar splice is capable of developing 125 per cent of the specified yield strength of a Grade 60 bar.

The bar lengths shown in the plans are the lengths of the bars neglecting the mechanical bar splice.

When mechanical bar splices are used to splice epoxy coated bars, the mechanical bar splices shall be epoxy coated by the manufacturer or made of an approved corrosion resistant material. Coating the mechanical bar splice with epoxy touch-up is not an approved method for this situation.

**480.4 METHOD OF MEASUREMENT**

Reinforcing Steel will be measured by the pound (kg), based on the theoretical weight complete in place. The weights calculated shall be based upon the following table:

**Bar Designation (English)**

Size	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 14
*Diameter (mm)	6.4	9.5	12.7	15.9	19.1	22.2	25.4	28.7	32.3	43.0
Weight (lb/ft)	0.167	0.376	0.668	1.043	1.502	2.044	2.670	3.400	4.303	7.650

\* Soft metric conversion included for informational purposes only.

**Bar Designation (Metric)**