

SECTION 03240

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SCOPE

This specification section describes steel reinforcement to be furnished and installed in cast-in-place concrete. The CONTRACTOR shall furnish all steel reinforcement, supports, and materials and all labor equipment, and other items necessary or convenient to the CONTRACTOR for the proper installation of the reinforcement.

1.02 GENERAL

- A. Steel reinforcement shall be designed, detailed, fabricated and placed in conformance with all applicable requirements of ACI 315, ACI 318, and CRSI Manual of Standard Practice.
- B. No concrete shall be placed until all steel reinforcement to be covered has been inspected in place and approved by the ENGINEER.

1.03 SUBMITTALS

- A. Prior to placing any steel reinforcement, the CONTRACTOR shall submit to the Engineer written evidence that the steel reinforcement has been tested and is in conformance with the material and mechanical requirements specified herein. Certified copies of mill tests may be considered evidence of compliance provided such tests are regularly conducted by the reinforcement supplier by experienced, competent personnel using adequate testing equipment. In case of doubt as to the adequacy or accuracy of the mill tests, the Engineer may require the Contractor to furnish, at no additional cost to the OWNER, test results from an independent testing laboratory acceptable to the ENGINEER on mill samples or delivered steel reinforcement. Mill or laboratory test results for verifying compliance with this specification section shall be provided for each 15 tons of steel reinforcement shipped. Results of laboratory or mill tests submitted to the ENGINEER shall be of tests conducted not earlier than 90 days prior to delivery.
- B. The cost of all sampling and testing of steel reinforcement necessary to furnish satisfactory evidence of compliance shall be borne by the CONTRACTOR and no separate payment will be made.
- C. Prior to fabrication and bending of steel reinforcement, the CONTRACTOR shall submit to the ENGINEER for review and approval complete shop drawings, bending diagrams, and schedules of all steel reinforcement to be incorporated in the work.
- D. The reinforcement shop drawings and bending diagrams shall show all dimensions, details, notes, location, size, length, and each bar mark, together

accessories and other materials belonging to the reinforcement for the concrete. Schedules shall show all information and be of the same general form as those on the Drawings. Concrete walls shall be detailed in elevation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. REINFORCING BARS

Reinforcing bars shall be deformed billet-steel bars conforming to ASTM A 615. All bars #4 and larger shall be Grade 60. All bars #3 and smaller shall be Grade 40. All bars shall be shop fabricated and bent cold. Bars shall be free from defects and kinks and from bends not indicated on the Drawings or approved bending diagrams.

B. MESH REINFORCEMENT

Mesh reinforcement shall be electrically-welded, cold-drawn, mild-steel, plain wire fabric conforming to ASTM A 185. Wire shall be cold-drawn steel conforming to ASTM A 82.

C. SUPPORT CHAIRS

Reinforcement supports shall conform to Product Standard PS7 and CRSI Manual of Standard Practice, Class D or E.

Reinforcement support chairs shall be stainless steel or shall be plastic-tipped when used in walls and elevated slabs. Support chairs used in slabs on grade shall be stainless steel or shall be hot-dip galvanized after fabrication or plastic-tipped in such a manner as to provide a minimum 1-1/2 inches of protection from the subgrade. Nails shall not be used to support reinforcement.

D. TIE WIRE

Tie wire shall conform to Federal Specification QQ-W-461 and shall be of black annealed steel, 16-gauge minimum.

PART 3 - EXECUTION

3.01 DELIVERY AND STORAGE

- A. Reinforcement shall be delivered to the job site carefully bundled and tagged for identification. Reinforcement shall be stored at least 12 inches above ground on timber mats or other supports acceptable to the ENGINEER. Contact between reinforcement and the ground shall not be permitted during storage. Reinforcement shall be supported so as not to bend or deflect excessively under its own weight.

3.02 SURFACE PREPARATION

Before placement, all reinforcement shall be thoroughly cleaned of oil, dirt, mill scale, rust scale, and other coatings that would tend to destroy or reduce bond. A thin coating of orange rust resulting from short exposure will not be considered objectionable; but any reinforcement having heavy rust scale or thick rust coating shall be thoroughly cleaned to the satisfaction of the ENGINEER or shall be ejected and removed from the job site. When there is a considerable delay between placement of reinforcement and placement of concrete, the reinforcement shall be reinspected prior to placement of concrete and recleaned if necessary.

3.03 PLACEMENT

- A. Reinforcement shall be accurately positioned and tied at intersections with annealed wire or suitable clips approved by the ENGINEER. Reinforcement shall be supported by concrete or metal chairs, stays, spacers, hangers, or other supports acceptable to the ENGINEER.
- B. Reinforcing bars shall be fastened with wire ties at a minimum of three places per bar. Bars shall be tied at every intersection around the periphery of slabs. Wall steel shall be tied at every fourth intersection as a minimum.
- C. Reinforcement supports shall have sufficient strength and stability to maintain the reinforcement in place throughout placement and concreting operations. Supports and ties shall not be exposed at the face of the concrete nor shall they discolor the surface of the finished concrete.
- D. Movement of steel reinforcement in place during concreting operations shall be prevented. Any reinforcement which is displaced shall be accurately repositioned in the proper place before being completely covered.
- E. Dowels for successive work shall be securely fastened in correct position before placing concrete. The sticking of dowels after placing concrete shall not be permitted.
- F. Reinforcement which has been exposed for bonding with future work shall be protected from corrosion by heavy wrappings of burlap saturated with a bituminous material.
- G. No bar partially embedded in concrete shall be field-bent unless approved by the ENGINEER.

3.04 MINIMUM COVER AND CLEARANCE

The minimum concrete cover for the protection of embedded steel reinforcement shall be as follows:

- A. Surfaces cast against crushed rock, sand, or earth:
- | | |
|---------------|----------|
| All bar sizes | 3 inches |
|---------------|----------|
- B. Surfaces exposed directly to water, backfill, or weather after form removal:
- | | |
|---------------|----------|
| All bar sizes | 2 inches |
|---------------|----------|
- C. Surfaces not exposed directly to water, backfill, or weather after form removal:
1. Elevated Slabs 1 inch
 2. Floors, Walkways, Pavement 1-1/2 inches
 3. Walls

Less than 12 inches thick	1-1/2 inches
12 inches or thicker	2 inches
 4. Beams

Stirrups	1-1/2 inches
Principal Reinforcement	2 inches

The minimum clearance between adjacent parallel bars shall not be less than the nominal diameter of the bars, not less than 1.5 times the maximum course aggregate size, and not less than 1 inch in beams, 1-1/2 inches in columns, and 2 inches in other locations.

3.05 TOLERANCES

- A. Allowable tolerances for fabricating steel reinforcement shall be as follows:

ITEM	MAXIMUM TOLERANCE
Sheared Length of Bars	+1" -1"
Depth of Truss Bars	+0.0" -1/2"
Outside Dimensions of Stirrups, ties, and Spirals	+1/2" -1/2"
Location of Bends	+1" -1"

- B. Allowable tolerances for placing steel reinforcement shall be as follows:

ITEM	MAXIMUM TOLERANCE
Concrete Cover from Outside of Bar to Finished Surface	+1/4" -0.0"
Lateral Spacing of Bars in Plane of Reinforcement in Beams and Joists	+1/4" -0.0"
Lateral Spacing of Bars in Plane of Reinforcement in Slabs and Walls	+1" -1"
Spacing of Stirrups, Ties, and Spirals along Longitudinal Axis of Member	+1/2" -1/4"
Height of Bottom Bars in Slabs, Beams, and Joists	+1/4" -1/4"
Height of Top Bars in Slabs, Beams, and Joists	
Depth 8" and less	+1/4" -1/4"
Depth 9-24"	+1/2" -1/2"
Depth 25" and greater	+1" -1"

3.06 SPLICES

- A. Splices in reinforcement shall conform to the requirements of AC1-318, Chapter 7, Details of Reinforcement. Unless otherwise shown on the Drawings, all bars shall be lapped a minimum of 36 bar diameters where splicing is necessary and splices shall be staggered. Except where indicated on the Drawings, welding or tack welding of reinforcement shall not be permitted. Lapped connections shall be sufficient to transfer the full stress between the bars by bond and shear and to develop the full strength of the bars. In slabs and beams no splices shall be made at points of maximum positive or negative moment, and in no case shall adjacent bars be spliced at the same place.

- B. Although tolerances are allowed in the lateral spacing of parallel bars in the plane of reinforcement layers and in the spacing of stirrups, ties, and spirals along the longitudinal axis of a member, in no case shall the number of bars per layer of reinforcement provided in walls and slabs be less than the lateral dimension on the wall or slab in the plane of the reinforcement layer divided by the specified spacing, nor shall the number of stirrups, ties, or spirals provided along the longitudinal axis of a member in a given segment be less than the length of the segment divided by the specified spacing.

- C. Welded wire fabric reinforcement shall be lapped a minimum of 6 inches at joints and shall be wired securely. Mesh shall extend to within 2 inches of sides and ends of slabs. Lapped ends of welded wire fabric shall be offset to prevent continuous laps. Splices shall not be made midway between supporting beams or directly over beams of continuous structures.

****END OF SECTION****

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