

Part 1 General

- 1.1 The work under this section includes all labour, materials, equipment, and services necessary for installation of reinforcement and associated items required and/or indicated on the contract drawings for all reinforced concrete.

1.2 Related Sections

- .1 Section 03 10 00 - Concrete Forms and Accessories.
- .2 Section 03 30 00 – Cast-in-Place Concrete.

1.3 References

- .1 American Concrete Institute (ACI):
- ACI SP-66, ACI Detailing Manual (latest edition).
 - ACI 315-99 – Details and Detailing of Concrete Reinforcement.
 - ACI 315R-04 – Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
- .2 American Society for Testing and Materials (ASTM):
- ASTM A 775/A 775M-07b, Specification for Epoxy-Coated Reinforcing Steel Bars (latest edition).
 - ASTM-A123/A123M-09, Zinc (hot dip galvanized) coatings on iron and steel products.
- .3 Canadian Standards Association (CSA - latest revisions):
- CAN/CSA-A23.1-09, Concrete Materials and Methods of Concrete Construction.
 - CAN3-A23.3-04, Design of Concrete Structures for Buildings.
 - CAN/CSA-A23.4, Precast Concrete Material and Construction.
 - CSA G30.3, Cold Drawn Steel Wire for Concrete Reinforcement.
 - CSA G30.5, Welded Steel Wire Fabric for Concrete Reinforcement.
 - CSA G30.14, Deformed Steel Wire for Concrete Reinforcement.
 - CSA G30.15, Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
 - CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.
 - CAN/CSA-G40.21, Structural Quality Steels.
 - CSA G279 Steel for Prestressed Concrete Tendons.
 - CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

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- .4 Reinforcing Steel Institute of Canada (RSIC)
- RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.4 Shop Drawings

- .1 Submit shop drawings including placing of reinforcement in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacing, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings. Indicate sizes, spacing and location of chairs, spacers and hangers. Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard Practice - by Reinforcing Steel Institute of Canada. and ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.
- .3 Design and detail lap lengths and bar development lengths to CAN3-A23.3, unless otherwise indicated. Provide Class B tension lap splices unless otherwise indicated.

1.5 Delivery, Storage and Handling

- .1 Ship reinforcing steel in bundles with identifying tags or markings. Take necessary precautions to maintain identification after the bundles are broken.
- .2 Store reinforcing steel above ground on platforms, skids, or racks and protect from prolonged exposure to weather.

1.6 Waste Management and Disposal

- .1 Separate and recycle waste materials.

Part 2 Products

2.1 Materials

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.
- .2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- .3 Weldable Reinforcing steel: weldable low alloy steel, grade 400, deformed bars to CAN/CSA-G30.18.
- .4 Prestressing Strands: low relaxation 7 wire strands to CSA G279, grade 1860.
- .5 Cold-drawn annealed steel wire ties: to CSA G30.3.
- .6 Deformed steel wire for concrete reinforcement: to CSA G30.14.

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- .7 Welded steel wire fabric: to CSA G30.5.
 - .8 Welded deformed steel wire fabric: to CSA G30.15.
 - .9 Epoxy coating of non-pre-stressed reinforcement: to ASTM A 775/A 775M.
 - .10 Galvanizing of non-pre-stressed reinforcement: to CSA G164, minimum zinc coating 600 g/m².
 - .11 Chairs, bolsters, bar supports, spacers: to CAN/CSA-A23.1. Support devices contacting surfaces to be exposed to earth or weather shall be non-corroding.
 - .12 Mechanical splices: capable of developing 125% of the tensile strength of the coupled reinforcing steel, as proven by laboratory tests; subject to approval of Departmental Representative.
 - .13 Plain round bars: to CAN/CSA-G40.21.

2.2 Fabrication

- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada, ACI 315R, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures, unless indicated otherwise.
- .2 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 Source Quality Control

- .1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to commencing reinforcing work.
- .2 Upon request inform Departmental Representative of proposed source of material to be supplied.

Part 3 Execution

3.1 Field Bending

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
- .3 Replace bars which develop cracks or splits.

3.2 Placing Reinforcement

- .1 Place reinforcing steel as indicated on approved placing drawings and in accordance with CAN/CSA-A23.1 and CAN/CSA-A23.4. Reinforcement shall be adequately supported before concrete is placed, and shall be secured against displacement during concreting. Reinforcement shall be placed with the concrete cover and spacing in accordance with CAN/CSA-A23.1 or as indicated on the drawings.
- .2 Under no circumstances shall the main reinforcement as shown on the drawings be eliminated or moved to avoid interference with other reinforcing steel or other embedded items. If reinforcement or embedded items cannot be placed as indicated, work shall not proceed until necessary modifications have been approved by the Departmental Representative.
- .3 Reinforcement supported from formwork shall rest on bar supports made of precast concrete, metal, plastic, or other acceptable materials. Bar supports over 200mm in height shall be made of bent or welded steel bar. Bar supports shall be sufficient in number and strength to carry the reinforcement they support and prevent displacement by workers or equipment before or during concreting. They shall be spaced so that any sagging between supports will not intrude on the specified concrete cover.
- .4 Side form spacers shall be used for all column, beam side, and wall construction to secure the reinforcement against displacement and maintain the required concrete cover distance between the reinforcement and the vertical formwork. Side form spacers shall be of a type and material that will not cause blemishes, rust spots, or spalling of the concrete surface.
- .5 Reinforcement supported from the ground or mud slab shall rest on precast concrete blocks having a compressive strength equal to or greater than the specified strength of the concrete being placed. Lifting of the reinforcing or welded wire mesh into specified position during the concrete pour will not be permitted.
- .6 Use plain round bars as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply a thick even film of mineral lubricating grease.
- .7 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .8 Ensure cover to reinforcement is maintained during concrete pour.

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- .9 Protect epoxy and paint coated portions of bars with covering during transportation and handling.
 - .10 Tolerances for placing reinforcing steel shall be in accordance with CAN/CSA-A23.1.

3.3 Field inspection

- .1 No concrete shall be placed until the Departmental Representative has completed a review of the reinforcing in place. The Contractor shall provide a minimum of 24 hours notice before any concrete pour.
- .2 The Departmental Representative's review of reinforcing shall be a visual inspection of in-situ work, to determine conformity to the drawings and specifications.

3.4 Field Touch-up

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

Part 4 Measurement and Basis for Payment

4.1 Measurement for Payment

- .1 This item will not be measured for payment.

4.2 Basis for Payment

- .1 No separate or direct payment will be made for work under this Section, which will be considered incidental to work under this Contract. Costs will be deemed to be included in the unit and lump sum prices quoted in the Schedule of Quantities and Prices for concrete work.