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**Part 1            General**

**1.1            RELATED REQUIREMENTS**

- .1        The list of work sections in this division is indicative and non-exhaustive. It does not exclude the works described in the other specification sections, shown in the drawings or necessary for the execution of the works in keeping with overall intent of the plans.
- .2        Section 01 33 00 – Submittal Procedures.
- .3        Section 01 45 00 – Quality Control.
- .4        Section 01 61 00 – Common Product Requirements and with Manufacturer's Written Instructions.
- .5        Section 01 74 11 – Cleaning.
- .6        Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

**1.2            SCOPE OF WORK**

- .1        Provide all material, equipment and labour required to fabricate and install the reinforcing steel framework required on all of the plans and/or required for the complete and correct execution of the work.
- .2        Provide and install rebar chairs, tie bars and spacers in reinforced concrete raft foundations, walls, slabs and beams required to support the reinforcing steel.
- .3        Provide and install the cement bricks required to support the reinforcing steel and/or metal mesh in the slab on ground, footings and raft foundations.

**1.3            REFERENCE CODES AND STANDARDS**

- .1        Unless otherwise indicated, the most recent editions of all reference standards must be used.
- .2        Unless otherwise specified, reinforcing steel work to be done in compliance with A23.1 or S6 and supplement.

**1.4            ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submit shop drawings and required samples in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2        Upon request, provide Departmental Representative with certified copy of mill test report presenting physical and chemical steel properties of steel to be used; at least two (2) weeks prior to starting rebar fabrication.

- .3 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.
- .4 Shop Drawings :
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Quebec of Canada.
    - .1 Shop drawings shall indicate placing of reinforcement and :
      - .1 Bar bending details.
      - .2 Rebar list.
      - .3 Quantities of reinforcement.
      - .4 Size, spacing, and location of reinforcement and required mechanical splices if approved by Departmental Representative. Rebar shown on shop drawings must have identifying code marks to permit correct placement without reference to structural drawings, as per Reinforcing Steel Institute of Canada Manual of Standard Practice.
      - .5 Shop drawings must also show size, spacing and locations of wire mesh, chairs, spacers and supports.
      - .6 The details related to the installation of reinforcement, when required for special conditions.
- .5 Unless otherwise indicated, overlapping lengths, extension lengths of bars beyond critical points and rod overlapping lengths must comply with the CAN/CSA-A23.3 standard.
- .6 Generally, all of the reinforcing steel must be bent so that it is parallel to the face of the concrete work, as specified in the plans. The shaping must be done at the plant, in compliance with the shop drawings.
- .7 Corrections or comments on the shop drawings during their review do not relieve the Contractor from his obligation to comply with the requirements of the plans and specifications. The verification only aims to control the general conformity of design and of the application of the information specified in the contract. The Contractor is responsible for the confirmation and correlation of all degrees of quality and sizes, for choosing the fabrication processes and building techniques and for the safe execution of his work.
- .8 When a Chromate solution is used as replacement for galvanizing for non-prestressed reinforcement, provide product description for review by Departmental Representative prior to its use.

## 1.5 SUBSTITUTION

- .1 Written permission must be obtained from Departmental Representative prior to substituting specified bar with different bar sizes.

## **1.6 QUALITY ASSURANCE**

- .1 Submit in accordance with Section 01 45 00 - *Quality Control* and as described in PART 2 - SOURCE QUALITY CONTROL.
  - .1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 2 weeks prior to beginning reinforcing work.
  - .2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

## **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - *Common Product Requirements* and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements :
  - .1 Store materials off ground, in a dry, clean and well ventilated location in accordance with manufacturer's recommendations to avoid rust formation.
  - .2 Protect the reinforcing steel if it must remain unused for long periods of time.
  - .3 Remove all important traces of rust from the steel before its installation, subject to the approval of the Departmental Representative.
  - .4 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Substitute different size bars only if permitted in writing by Departmental Representative.
- .2 Reinforcing steel: Unless otherwise indicated, deformed bars made from grade 400R steel billet, in compliance with CSA-G30.18.
- .3 Reinforcing steel which must be welded to concrete embedded elements: weldable low alloy steel deformed bars to CSA-G30.18, grade 400W.
- .4 Cold-drawn annealed steel wire ties: to ASTM A 82/A 82M and G30.3.
- .5 Deformed steel wire for concrete reinforcement: to ASTM A 82/A 82M and G30.3.
- .6 Epoxy Coating of non-prestressed reinforcement: to ASTM A 775/A 775M.
- .7 If required, Galvanizing of non-prestressed reinforcement: to CAN/CSA-G164, minimum zinc coating 610 g/m<sup>2</sup>.

- .1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.
- .2 If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.
  - .1 Temperature of solution equal to or greater than 32 degrees and galvanized steels immersed for minimum 20 seconds.
- .3 If galvanized steel bars are at ambient temperature, add sulphuric acid as bonding agent at concentration of 0.5% to 1%.
  - .1 In this case, no restriction applies to temperature of solution.
- .4 Chromate solution sold for this purpose may replace solution described above, provided it is of equivalent effectiveness.
  - .1 Provide product description as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .8 Chairs, bolsters, bar supports, spacers : to CSA-A23.1/A23.2 and related supplements, with sufficient strength and appropriate for the frame used. The Contractor must use vinyl covered chairs.
- .9 Mechanical splices : subject to approval of Departmental Representative.
- .10 Plain round bars : to CSA-G40.20/G40.21.
- .11 Welded wire mesh to CSA G30.15 and supplied in mat sections. Rolled wire mesh will not be accepted.

## **2.2 FABRICATION**

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 and within tolerances defined in Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Unless otherwise indicated in the plan, hooks must be standard and sizes must comply with the Reinforcing Steel Institute of Canada's manual of standards.
- .3 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.
- .4 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .5 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
- .6 Ship epoxy coated bars in accordance with ASTM A 775A/A 775M.

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## **2.3 CLEANING AND PROTECTION**

- .1 When delivered to site, unload reinforcing steel on wood dunnage to prevent rust formation.
- .2 Protect the reinforcing steel if it must remain unused for long periods of time.
- .3 Remove all important traces of rust from the steel before its installation, subject to the approval of the Departmental Representative.

## **2.4 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 2 weeks prior to beginning reinforcing work .
- .2 Upon request inform Departmental Representative of proposed source of material to be supplied.

# **Part 3 Execution**

## **3.1 PREPARATION**

- .1 If galvanised reinforcing steel is used, galvanizing is to include chromate treatment.
  - .1 Duration of treatment is a function of bar size, which is to be 1 hour per 25 mm of bar diameter.
- .2 If applicable, conduct bending tests to verify galvanized bar fragility in accordance with ASTM A 143/A 143M.

## **3.2 FIELD BENDING**

- .1 Do not field bend reinforcement except where otherwise indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heating, apply slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

## **3.3 PLACING REINFORCEMENT**

- .1 Place reinforcing steel as indicated on approved placing drawings and in accordance with CSA-A23.1/A23.2.
- .2 Use plain round bars as slip dowels in concrete work.
  - .1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.

- .2 When paint is dry, apply thick even film of mineral lubricating grease.
- .3 At least 18 hours prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .4 Ensure cover to reinforcement is maintained during concrete pour.
- .5 Protect epoxy coated portions of bars with covering during transportation and handling.
- .6 Make mechanical splices where indicated on the shop drawings.
- .7 Clean the reinforcing elements prior to concreting.
- .8 In slabs on ground, footings and raft foundations, reinforcements and/or meshes will be installed on chairs, supports and/or cement bricks. The technique consisting in lifting the reinforcement and/or mesh with a hook when pouring the concrete is prohibited, as is the use of stones or wood pieces. Regarding structural slabs, the reinforcement of the lower bed must be installed on continuous supports. Steel wire supports for the reinforcement of the higher layers are prohibited. Use plastic supports.
- .9 The technique consisting in moving a structural rod under a reinforcement bed in order to use it as an anchoring bar or support bar is prohibited. If bars are to be used for anchoring or support, they must be additional bars.
- .10 **Welding the reinforcement bars shown on the plans is prohibited**, unless otherwise specified. In such cases, weldable grade 400W steel compliant with the G30.18 standard is required.
- .11 Wall and column dowels must be installed using formworks or templates prior to concreting.
- .12 Overlap welded wire mesh by 150mm unless noted otherwise on drawings.

### 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.

### 3.5 CLEANING

- .1 Progress Cleaning : clean in accordance with Section 01 74 11 - *Cleaning*.
  - .1 Leave Work area clean at end of each work day.
- .2 Final Cleaning : upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - *Cleaning*.
- .3 Waste Management : separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

### 3.6 REINFORCING STEEL CONCRETE COVER (TYPICAL, UNLESS OTHERWISE INDICATED ON THE PLANS)

- .1 Concrete cover must be measured from the surface of the concrete to the closest reinforcement bar deformation or up to the surface of smooth bars or wires, as the case may be.
- .2 The reinforcement includes bar filaments (or ligatures), stirrups and the main steel.
- .3 Regarding textured architectural surfaces, concrete cover must be measured from the deepest point of the textured surface.
- .4 The minimum net concrete cover (in mm) of the reinforcement bars is as follows, unless otherwise indicated :

SURFACE CONDITIONS	EXPOSURE CLASSIFICATION				
	Unexposed <sup>(1)</sup>	Exposed to freeze-thaw cycle	Expose to chlorides <sup>(2)</sup>	Parking <sup>(3)</sup>	Hydraulic work
Concrete poured against the ground and in permanent contact with the latter	75	75	75	75	75
Columns, walls, beams, curbs and footings	40	40	60	40	50
Slabs	25	40	60	45 (high) 40 (low)	50
Concrete cover to nominal bar diameter ratio	1.0	1.5	2.0	1.5	1.5
Concrete cover to nominal aggregate size ratio	1.0	1.5	2.0	2.0	1.5

**Notes :**

- <sup>(1)</sup> Unexposed concrete only applies to concrete that will continually be maintained as dry in a conditioned space, i.e. all of the elements will be inside the vapor barrier around the building.
- <sup>(2)</sup> Subject or not to the freeze-thaw cycle.
- <sup>(3)</sup> Concrete protected by a liner as specified in the S413 standard.

### 3.7 SUPERVISION

- .1 For the entire duration of concreting, the Contractor will assign a worker to the construction site, who will re-position the reinforcement steel bars and/or metal mesh that may move during the pouring.

**END OF SECTION**