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## O – STEEL REINFORCEMENT

### 1.0 GENERAL

#### 1.1 *Scope*

This Specification covers detailing, fabricating, supplying and placing of reinforcing steel and accessories for all cast in place and pre-cast concrete.

The Contractor shall be entirely responsible for the correctness of bar schedules before arranging for the supply, cutting and bending of steel reinforcement.

#### 1.2 *Submission*

The following submissions are required to be submitted by the contractor:

(1) Test Certificates

Manufacturer's test certificates for each delivery of reinforcing steel. Each certificate shall show the country of origin and test.

(2) Data

Manufacturer's data on accessories and mechanical couplings.

#### 1.3 *Steel Reinforcement*

Steel for reinforcement shall be of the following kinds as may be specified or detailed on the Drawings :

Type R - hot-rolled plain round mild steel bars conforming to BS4449

Type Y - either, hot-rolled deformed high yield steel bars conforming to BS 4449 (with geometrical classification Type 2)

- or, cold-rolled deformed high yield steel bars conforming to BS 4449 : 1988 (with geometrical classification Type 2)

Fabric - welded hard drawn steel wire and other cold worked high bond bar fabric conforming with BS 4483.

#### 1.4 *Steel Wires and Bars for Prestressing*

Prestressing steel wire or bars shall be of the following kinds as specified or detailed on the Drawings :

(a) Cold drawn wire or cold drawn and stress relieved wire conforming with BS 5896.

(b) Stress relieved seven-wire strand conforming with BS 5896.

- (c) Cold worked high tensile alloy steel bars conforming with BS 4486.

## **1.5 Accessories**

The Contractor shall supply all accessories such as reinforcing steel supports, hold-downs, spreaders, hangers, tie wire and all other incidentals necessary to complete an acceptable installation of all steel reinforcement. All accessories shall be of steel with the exception of spacers to maintain concrete cover to reinforcement against formed or blinded surfaces which shall be of concrete of same texture, colour and composition as cast-in-place concrete. Concrete spacers shall be in the form of a truncated cone or pyramid and shall be used with the larger face towards the reinforcing steel. The smaller face of a truncated cone or pyramid shall have a maximum dimension of 50 mm.

## **1.6 Detailing**

Steel reinforcement shall be as shown on the Drawings. The contractor shall be responsible for checking the Drawings before cutting and bending reinforcement. When any information relating to reinforcement is missing or apparently incorrect, the Contractor shall remedy the missing or incorrect information to the approval of the S.O.

## **1.7 Cutting and Bending of Reinforcement**

Bars shall be cut and bent in accordance with the provisions of BS 4449. All bending shall be done cold with the use of an approved bending machine. Re-bending of bars will not be permitted. Cut and bent bars shall be bundled and labeled for positive identification with the Drawings and bending schedules, until they are incorporated into the work.

## **1.8 Storage of Reinforcing Bars and Fabric**

The Contractor shall stack separately and label different types of reinforcement for position identification.

Steel reinforcing bars shall be kept clean and shall be free from pitting, loose rust, mill scale, oil, grease, earth, paint, or any other material which may impair the bond between the concrete and the reinforcement.

Reinforcing steel shall be stored and fabricated under cover on wooden or concrete supports such that the steel is elevated from the ground surface by a minimum of 150 mm.

## **1.9 Storage of Pre-Stressing Wire and Bars**

In addition to complying with the above storage requirements, the contractor shall ensure that pre-stressing wire and bars are protected from mechanical damage by storing on timber supports above a concrete slab, and shall ensure that during storage the wire and bars are kept properly coated with water soluble oil inside protective wrappings.

## **1.10 Fixing of Reinforcement**

All reinforcement shall be securely and accurately fixed in positions shown on the Drawings using approved spacer blocks or chairs. All intersections of bars shall be secured with No. 16 gauge (1.60 mm) soft iron wire, the ends being turned into the body of the concrete. The contractor shall ensure that all reinforcement is maintained in position at all times, particular care being taken during placing of concrete.

Concrete cover to reinforcement shall be as specified or detailed on the Drawings, and shall be maintained in accordance with the tolerance specified in BS 8110. Correct concrete cover to reinforcement shall be maintained with the aid of approved spacer pieces. Top reinforcement in slabs shall be maintained in position by means of chairs, the diameter and quantity being sufficient to ensure security of the reinforcement in shape and position.

No part of the reinforcement shall be used to support formwork, access ways, working platform, or the placing equipment or for the conducting of an electric current.

## **1.11 Inspection and Testing**

When required by the S.O., the Contractor shall take samples from reinforcement delivered to site and shall arrange for the samples to be tested by an approved testing agency. Test certificates from that agency shall be submitted to the S.O.

The S.O. or his authorised representative may require to witness such testing and also routine testing at the manufacturer's works.

The Contractor shall be responsible for all checking and inspection of reinforcement before preparations for placing concrete are offered for inspection by S.O.

## **1.12 Measurement of Steel Reinforcement**

Steel reinforcement and all work in connection therewith shall be valued by measurement of only such items as are provided in the Bill of Quantities.

Bar reinforcement shall be measured as the calculated weight of reinforcement detailed on the Drawings or otherwise specified and for this purpose the weight of reinforcement shall be taken as 7.85 kg. per metre per 1000 sq mm of nominal cross-sectional area. Reinforcement required in compliance with specified laps of bars shall be included in the weight measured for payment.

Fabric reinforcement shall be measured as the net area of fabric laid and laps shall not be measured.

In no case shall measurement be made in respect of binding wire, welding, chairs, spacers, waste in cutting, or any laps introduced by the contractor.

## SYABAS' STANDARD SPECIFICATION FOR PIPE LAYING WOKS

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Notwithstanding anything in this clause, where reinforcement is specified as being included in other measured work it shall not be measured for payment.