

WATER SUPPLIES DEPARTMENT

STANDARD SPECIFICATION M-09-01

GLASSFIBER REINFORCED POLYESTER INTAKE SCREENS

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GLASSFIBER REINFORCED POLYESTER INTAKE SCREENS

1. GENERAL

This Specification covers the fabrication of glassfiber reinforced polyester (GRP) intake screens for seafront salt water pumping stations.

2. MATERIALS REQUIREMENTS

2.1 GRP Gratings

Only GRP gratings of proven design and manufacture will be accepted. All suppliers of GRP gratings shall be on the List of Approved Suppliers of Materials and Specialist Contractors for Public Works under the Category “Design, Manufacture and installation of Glass (or Fibre) Reinforced Polyester Units”.

The GRP gratings are to be designed in one-piece that shall be produced in open mould compression mouldings. Unless stated otherwise in the Particular Specifications, the GRP gratings shall meet the following requirements:

(a) General properties:

Type of GRP Laminate	not less than 35% glass content by weight
Tensile Strength	not less than 170 Nmm ⁻²
Elongation	not more than 1.8%
Tensile Module	not less than 12600 Nmm ⁻²
Compression Strength	not less than 100 Nmm ⁻²
Flexural Strength	not less than 250 Nmm ⁻²
Flexural Modulus	not less than 12800 Nmm ⁻²
Inter-laminate Shear Strength	not less than 18 Nmm ⁻²
Maximum Deflection for a uniformly distributed imposed load of 1 kN/m ² over a clear span of 1000 mm	not greater than 10 mm

- (b) The GRP gratings shall resist ultraviolet to BS EN 20105-B02 under sunlight;
- (c) The resin used for the GRP gratings shall be ISOFR polyester, vinyl ester or phenolic, with chemical formulations as necessary to provide the corrosion resistance, strength and other physical properties as required. Moreover, the resin shall be suitable for marine environment in accordance with BS 6920, and shall meet BS 476: Part 7 in respect of surface spread of flame;
- (d) The supporting elements of the GRP gratings shall be 20-25 mm in thickness with mesh of square hole size of 10-15 mm in between; the effective open area of the GRP gratings shall be not less than 35%;
- (e) The weight of the gratings shall not exceed 18 kg per one square meter;
- (f) All finished surfaces of the GRP gratings shall be resin-rich, free of voids and without dry spots, cracks, crazes or un-reinforced areas; all glass fibers shall be well covered with resin to protect against their exposure to corrosives, wear or weathering;
- (g) Colour shall be dark grey or other colour approved by the Engineer.

2.2 Antifouling Paints

An approved antifouling paint and primer shall be applied on the whole intake screen to prevent marine organisms such as barnacles, mussels and algae attaching to the GRP gratings.

Only tin-free, insoluble matrix type, antifouling paints that are registered pesticides under the Pesticides Ordinance CAP. 133 shall be used for the application. The antifouling paint and primer shall be suitable for applying on GRP and stainless steel surfaces in a marine environment.

At least one coat of primer and two coats of antifouling paint shall be applied by airless spray or brush in accordance with the paint manufacturer's recommendation to give a dry film thickness (DFT) of not less than 80 microns and 200 microns respectively. Thinning of antifouling paint beyond the paint manufacturer's recommendation is not allowed. Before the application of primer, all surfaces of the GRP grating shall be thoroughly cleaned, dried and treated by abrasive blasting or other appropriate surface preparation methods to increase adhesion of the paint on

the GRP gratings. Precautions shall be taken to ensure that the structure of the GRP gratings would not be weakened during any surface preparation or treatment.

3. DESIGN AND CONSTRUCTION

3.1 GRP Intake Screen

All GRP intake screens shall be standardized in heights of 1 metre each and the screens shall be able to stack up in the screen guides to a height well above the sea water level even at high tide in order to prevent ingress of debris into the intake culvert.

A general arrangement of GRP intake screen is shown in Appendix I. Unless otherwise specified in the Particular Specifications, the width of the intake screens shall be designed to suit all pairs of guide rails in the pumping station concerned.

3.2 Intake Screen Lifting Bar

GRP intake screen lifting bar shall be fabricated if requested in the Particular Specifications. A typical lifting bar is shown in Appendix II. The dimensions of the lifting bar shall be specified in the Particular Specifications or determined on site. The design shall suit the particular requirements of the GRP intake screens and guide rails in each pumping station. The safe working load (SWL) of the lifting bar shall not be less than 50 kg.

Each lifting bar shall be load tested to the statutory requirements as specified in the Factories and Industrial Undertakings (Lifting Appliances and Lifting Gear) Regulations (CAP. 59 Sub. Leg. J) of the Hong Kong Special Administrative Region.

4. WORKS TESTS

The Contractor shall at least arrange and carry out the following works inspection and tests on the intake screens and the intake screen lifting bars:

- (a) Dimensional verification against approved drawings;
- (b) Verification of the correct use of materials, including fasteners;

- (c) Verification of the correct quantities of items to be supplied;
- (d) Verification of the correct painting process and measurement of DFT of the painting system;
- (e) Visual inspection on the quality of the finished painting;
- (f) Load test for the intake screen lifting bars.

5. SITE TESTS

The GRP intake screens and/or the GRP intake screen lifting bars as requested in the Particular Specifications shall be installed between pairs of guide rails inside the culverts at seafront salt water pumping stations. The Contractor shall be responsible to demonstrate the raising and lowering of the GRP intake screens and/or lifting bars in the culverts to the satisfaction of the Engineer or his representative for acceptance.

6. INFORMATION TO BE SUBMITTED

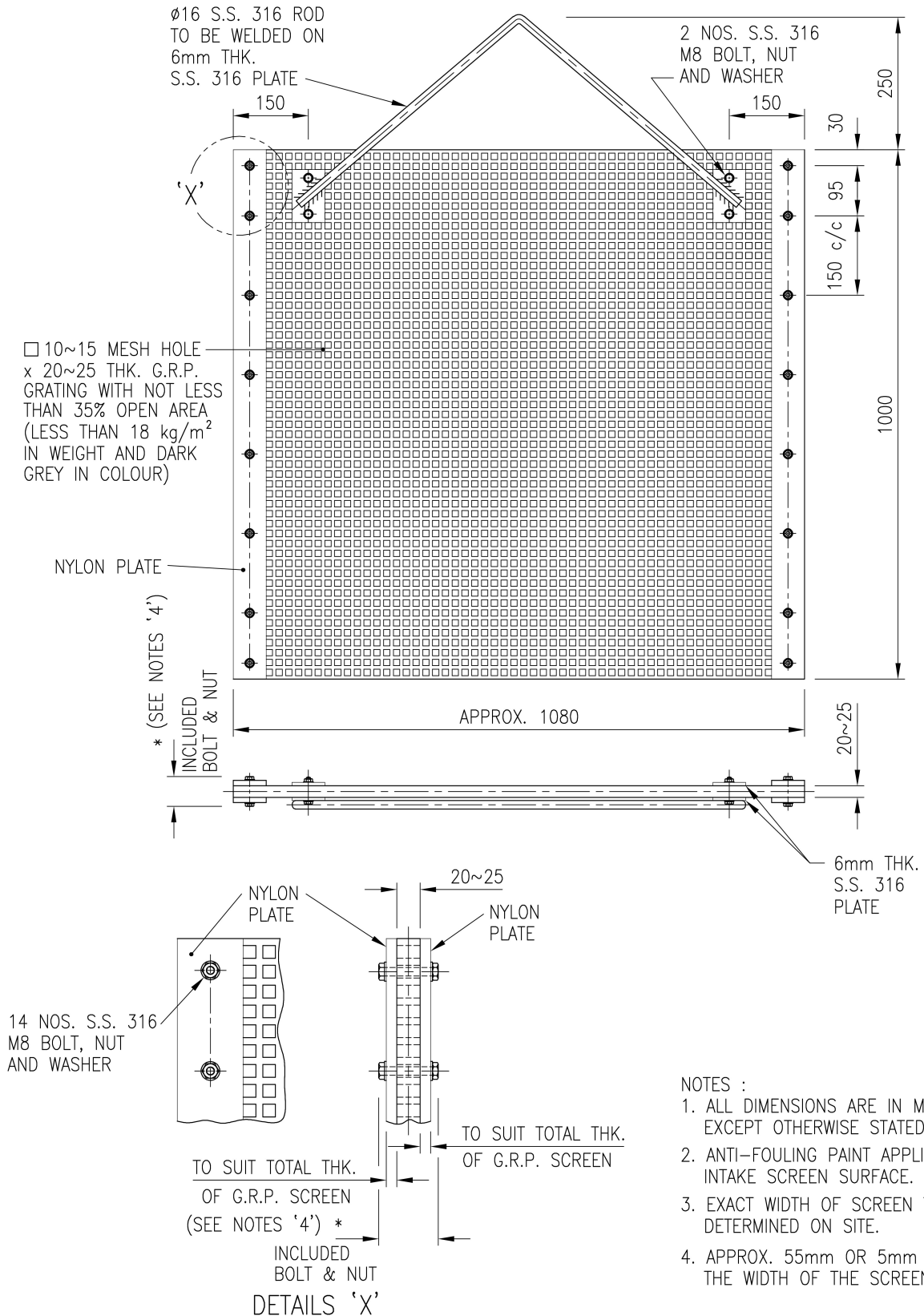
Unless otherwise specified in the Particular Specifications, catalogues, drawings, specifications, samples, product data sheets, suppliers' information and other relevant documents of the GRP gratings, antifouling paints and primers shall be submitted for approval prior to commencement of the fabrication works.

The general layout with full dimensions and fixing details of the GRP intake screens and/or GRP intake screen lifting bars shall be submitted for approval prior to commencement of the fabrication works.

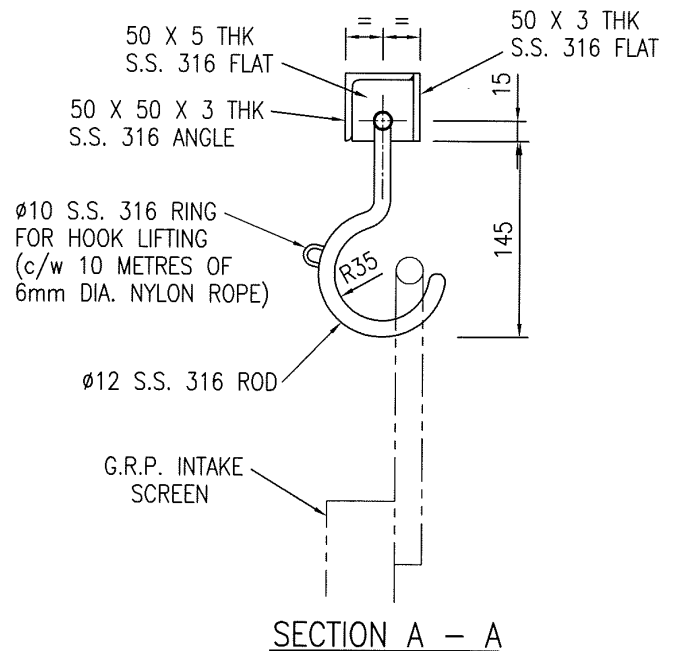
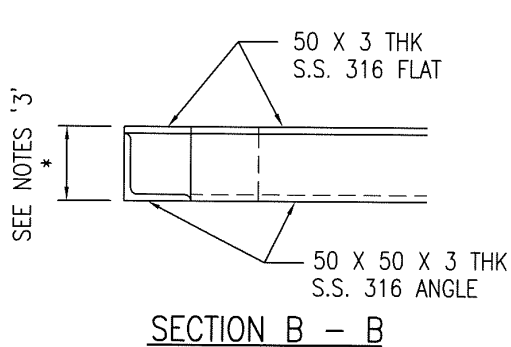
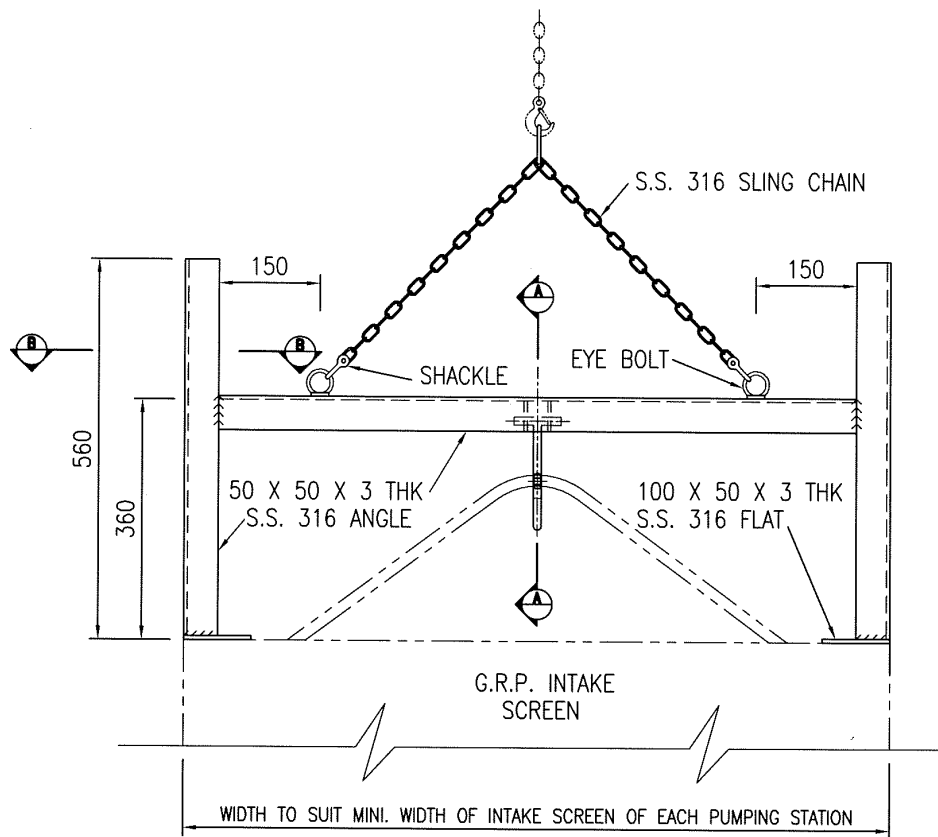
Upon request, type test reports shall be submitted to demonstrate compliance with the requirements in Clauses 2.1a to c.

Works test reports for the intake screens and the intake screen lifting bars shall be submitted prior to delivery. In addition, load test certificates for the intake screen lifting bars shall also be submitted.

Appendix I



GENERAL ARRANGEMENT OF
GLASSFIBER REINFORCED
POLYESTER (G.R.P.) INTAKE SCREEN



NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETRES EXCEPT OTHERWISE STATED.
2. ANTI-FOULING PAINT APPLIED TO ALL METAL SURFACE.
3. 53mm OR DIMENSION TO SUIT THE WIDTH OF SCREEN GUIDE OF EACH PUMPING STATION.

TYPICAL ARRANGEMENT OF
G.R.P. INTAKE SCREEN LIFTING BAR