

SPECIFICATION FOR GRANULAR ACTIVATED CARBON

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GENERAL

TABLE OF CONTENTS

		PAGE NUMBER
1	Ambient Conditions	6bh - 2
2	Suitability for Potable Water	6bh - 2
3	Definitions	6bh - 2
4	Inspection and Testing	6bh - 2
5	Marking	6bh - 3
6	Protection during Delivery	6bh - 3
7	Storing handling and hauling of Materials	6bh - 3
8	Manufacturer's Certificate	6bh - 4
9	Quality and workmanship	6bh - 4
10.	Features and Benefits	6bh - 4
12.	Technical Specification for Granular Activated Carbon	6bh - 5

GENERAL

1 Ambient Conditions

All materials shall be in every respect suitable for storage, use and operation in the conditions of temperature and humidity appertaining in Sri Lanka.

The annual average temperature is between 30-35°C while the relative humidity varies generally from 70% during the day to 90% at night.

2 Suitability for Potable Water

Granular Activated carbon will come into contact with potable water shall not constitute a toxic hazard, shall not support microbial growth.

3 Definitions

The definitions given in the relevant standards which are referred to in the specification shall apply for the terms used in this specification.

4 Inspection and Testing

All materials shall be tested to the appropriate tests at the manufacturer's premises and shall be supported by a test certificate from the manufacturer, for the conformity to the specified standards hereof.

The format for test certificate shall be in accordance with the format given in the Bidding Document.

The Manufacturer shall supply, furnish and prepare the necessary test samples of materials and supply necessary technical personnel labour, facilities, and appliances for such testing as may be required to be carried out in the manufacturer's premises according to this specification. If there are no facilities at his own for making the prescribed tests, the Manufacturer shall arrange to perform such tests from an accredited testing Agency and shall bear all costs associated with such tests.

Manufacturer shall submit Product Conformity certificate for the conformity to the standards for the product specified in this specification.

The Contractor shall furnish the Engineer with all required facilities and space at Manufacturer's cost for the inspection, testing and obtaining of such information, as he desires regarding the character of material in use and the progress and manner of the work.

The Engineer or his representatives and nominated Inspection Agency shall have full access to all parts of the plant that are concerned with the manufacturing, testing, furnishing or preparation of materials for the performance and testing of work under this Specification.

Contractor shall be held responsible for the assuring the quality of the goods supplied by him up to the final delivery point. Granular Activated Carbon is tested at the Employer's final delivery point by the employer and goods shall conform to the relevant standard for the acceptance.

5. Marking

All markings shall be legible and durable unless otherwise specified and shall be as specified in the Technical Specification.

6. Protection During Delivery

The contractor shall provide protection as approved by the Engineer, prior to the materials leaving the place of manufacture and shall maintain such protection until the items reach their destination in order to guard effectively against damage during transit and storage and the ingress of foreign matter inside the packages.

All details of the proposed method of providing such protection shall be submitted at the time of tendering.

The cost of providing protection shall be included in the unit prices offered in the Bills of Quantities.

7. Storing, Handling and Hauling of Materials.

All materials shall be stored in an approved location and in such a manner as to preserve their quality and condition.

Storage shall be in accordance with the manufacturer's recommendation and shall be stored in a dry place with a proper packing.

Materials and components shall be handled in such a manner as to avoid any damage or contamination and in accordance with the recommendations of the manufacturers.

The contractor shall give instructions to the shipper on precautions to be followed in the handling of materials during loading, towage delivery and unloading and shall give particulars of these instructions to the purchaser.

8. Manufacturer's Certificate

The Contractor shall supply to the Engineer a certificate stating that each item supplied has been subjected to the tests laid down herein and conforms in all respects to this Specification or such other Specification which has been submitted to and approved by the Engineer. In addition to this, contractor shall provide certificate for the conformity to the Standards (BSEN 12902:2009) from an independent testing agency mentioned in General condition of contract. Testing at Manufacturers factory by Employer will perform as specified.

9. Quality and Workmanship

Granular Activated Carbon which are intended to supply shall be manufactured in compliance with the ISO 9001 : 2008/2015 Quality Management System Standards. Any certificate regarding product conformity and quality management should be from an organization accredited to issue such certification and the manufacturer shall have this certification valid during the period of supply and delivery of the materials. Documentary evidence regarding accreditation together with the scope of certification should be provided.

10. Features and Benefits

- Porous material manufactured from carbonaceous raw materials
- Meets AWWA B-604-12 standards/EN 12915:2009

11. Technical Specification for Granular Activated Carbon

11.1 General Requirements

All materials to be supplied under Bill no.1 of this contract shall conform to EN 12915:2009 or AWWA B 604-12, chemicals used for treatment of water for human consumption-granular activated carbon.

11.2 Other Requirements

11.2.1 Features Required

Granular Activated Carbon Used for Potable Water Supply shall comply with requirements as specified in following table.

Table 1 – Product Specification

Parameter	Requirements	Test Method
A. Chemical requirements		
Iodine number, mg/g of dry product	900 min	ASTM D4607, EN 12902: 1999
Uniformity coefficient, UC	1.4-2.2	EN 12902: 1999
B. Impurities		
Water soluble matter, %(w/w)	3.0 max	AWWA B600-96, EN 12902: 1999
Moisture, %(w/w)	5 max	AWWA B600-96 EN 12902: 1999
Ash, %(w/w)	15 max	EN 12902: 1999
Zinc, %(w/w)	0.002 max	EN 12902: 1999
C. Physical Requirements		
Ball pan hardness	75 min	EN 12915: 1999
Wet ability	99 min	EN 12915: 1999
Bulk density, packed, kg/m ³	180 min	EN 12915: 1999
D. Toxic Substances		
	Maximum limit mg/kg of Product	Test Method
Arsenic, As	10	EN 12902: 1999
Cadmium, Cd	0.5	EN 12902: 1999
Chromium, Cr	5	EN 12902: 1999
Mercury, Hg	0.3	EN 12902: 1999
Nickel, Ni	5	EN 12902: 1999
Lead, Pb	5	EN 12902: 1999
Selenium, Se	3	EN 12902: 1999
Antimony, Sb	3	EN 12902: 1999
Cyanide, Cn	5	EN 12902: 1999
PAH	0.02	EN 12902: 1999

11.3 Transport and Storage

11.3.1 Means of delivery

The product shall be delivered in suitable paper sacks (10kg each bag) or suitable polypropylene bags (25 kg each bag). Bags should be stacked in rows with aisles between them and should be stored alone. In order that the purity of the product is not effected the means of delivery shall not have been used previously for different product or it shall have been specially cleaned and prepared before use.

11.3.2 Storage

Granular Activated Carbon shall be stored in a building or compartment in a clean dry and well ventilated area.

Product shall be kept away from oxidants for fire resistant.(eg. Hydrogen peroxide, potassium permanganate, chlorates, Nitrates, Volatile solvents and moisture).

11.4 Marking and Labeling

Each package shall be marked legibly and indelibly with following information: (Letter height shall be 50 mm)

- (a) The name “Granular Activated Carbon” , trade name, trade mark and grade
- (b) The net mass
- (c) Name and address of the manufacturer
- (d) Batch No.
- (e) Date of manufacturing and date of expiry; and shall bear such other markings as requires by applicable laws
- (f) Contract Number
- (g) Statement “Product conforms to EN 12915-1:2009/AWWA B 604-12”

11.5 Sampling & Testing

Sampling and Testing shall be in accordance with the EN 12902-1:2009

All Granular Activated Carbon shall comply with test in accordance with the requirement of specification.

Properties	Value	Method
Abrasion Number (min)	75	ASTM D3802
Moisture as Packed (max)	5%	ASTM D2867
Apparent Density (lbs./ ft ³)	31	ASTM D2854
Backwashed Apparent Density (lbs./ft ³)	27	ASTM D2B54
Mesh Size greater than 8 mesh (max)	8 x 30 5%	U.S. Sieve

Properties	Value	Method
less than 30 mesh (max)	5%	
Typical Surface Area (m ² /g)	1,050	BET N2
Ash Content (max)	12%	ASTM D2866
Iodine Number (mg/g)	900	AWWA B604-12

11.6 Physical Properties

Physical Properties of Granular Activated Carbon used for potable water supply as follows:

No.	Physical Properties	Description
1.	Raw material	Peat, bituminous schists, anthracite, wood, coconut
2.	Presentation	Crushed, extruded
3.	Appearance	i. Black ii. Porous granular of irregular shape
4.	Granulometry	ES- 0.25-3mm UC- 1.4-2.2
5.	Apparent (compacted) density	0.2-.55 g.cm ⁻³
6.	Specific Surface Area	600-2,500 m ² .g ⁻¹

11.7 Pre-Delivery Inspection and Evaluation

It is the responsibility of the supplier to inform in advance the Engineer for inspection purposes during manufacturing and before delivery.

Engineer reserve the right to inspect and witness the testing of the product offered without any prior notice.

11.8 Certification

Manufacturer shall provide product conformity certificate issued by an Accredited Testing and Inspection Agency which is a member of the International Accreditation Forum (IAF).