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مشخصات فنی خرید

کربن فعال برای سیستم شیرین سازی گاز

Activated Carbon for Use in Gas Sweetening System



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شرکت ملی گاز ایران



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باسلام،

به استحضار می‌رساند در جلسه ۱۸۰۱ مورخ ۱۳۹۷/۸/۱۳ هیأت مدیره،
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FOREWORD

This standard is intended to be mainly used by NIGC and contractors, and has been prepared based on interpretation of recognized standards, technical documents, knowledge, backgrounds and experiences in natural gas industry at national and international levels. Iranian Gas Standards (IGS) are prepared, reviewed and amended by technical standard committees within NIGC Standardization division and submitted to the NIGC's "STANDARDS COUNCIL" for approval. IGS Standards are subject to revision, amendment or withdrawal, if required. Thus the latest edition of IGS shall be checked/ inquired by NIGC employees and contractors. This standard must not be modified or altered by NIGC employees or its contractors. Any deviation from normative references and / or well-known manufacturer's specifications must be reported to Standardization division. The technical standard committee welcomes comments and feedbacks about this standard, and may revise this document accordingly based on the received feedbacks.

GENERAL DEFINITIONS:

Throughout this standard the following definitions, where applicable, should be followed:

- 1- "STANDARDIZATION DIV." is organized to deal with all aspects of industry standards in NIGC. Therefore, all enquiries for clarification or amendments are requested to be directed to mentioned division.
- 2- "COMPANY": refers to National Iranian Gas Company (NIGC).
- 3- "SUPPLIER": refers to a firm who will supply the service, equipment or material to NIGC whether as the prime producer or manufacturer or a trading firm.
- 4- "SHALL ": is used where a provision is mandatory.
- 5- "SHOULD": is used where a provision is advised only.
- 6- "MAY": is used where a provision is completely discretionary.

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1. Scope

This standard specification covers the minimum requirements for activated carbon to be used in circulating amine solution in gas sweetening units.

The granular carbon shall be suitable to adsorb organic components such as degradation products and dissolved hydrocarbons in amine stream.

2. References

ASTM D 4607 (2011) “Standard Test Method for Determination of Iodine Number of Activated Carbon”

ASTM D 2862 (2016) “Standard Test Method for Particle Size Distribution of Granular Activated Carbon”

ASTM D 2866 (2004) “Standard Test Method for Total Ash Content of Activated Carbon”

ASTM D 2867 (1999) “Standard Test Method for Moisture in Activated Carbon”

ASTM D 3802-79 (1999) “Standard Test Method for Ball-Pan Hardness of Activated Carbon.

ASTM D 3838-80 (1999) “Standard Test Method for Ph of Activated Carbon”

ASTM D 5029-98 (2014) “Standard Test Method for Water Soluble in Activated Carbon”

ASTM D 5158-98 (2013) “Standard Test Method for Determination of the Particle Size of Powdered Activated Carbon by Air Jet Sieving”

ASTM D 5159-91 (1991) “Standard Test Method for Dusting Attrition of Granular Activated Carbon.

ASTM D 5160-95 (2014) “Standard Guide for Gas-Phase Adsorption Testing of Activated Carbon

ASTM D 5832-98 (2014) “Standard Test Method for Volatile Matter Content of Activated Samples.

ASTM D 2854-96 (2004) “Standard Test Method for Apparent Density of Activated Carbon”

ASTM E 727/ E 727M-08 (2013) “Standard Test Method for Determining Bulk Density of Granular Carries and Granular Pesticides.

ASTM D 3860-98 (2014) “Standard Practice for Determination of Adsorptive Capacity of Activated Carbon by Aqueous Phase Isotherm Technique”

ASTM D 6647-01 (2011) “Standard Test Method for Determination of Acid Soluble Iron via Atomic Adsorption”

ASTM D-2652 (2011) “Terminology Relating to Activated Carbon”

3. Definitions

3.1 Activated carbon is a form of carbon processed to have small, low-volume pores that increase the surface area available

3.2 Absorption The operation in which one or more components in the gas phase are transferred to (absorbed into) a liquid for adsorption or chemical reactions. Activated is sometimes substituted with active solvent.

3.3 Adsorbent A solid substance used to remove components from natural gas being processed.

3.4 Adsorption The process by which gaseous components are adsorbed on solids because of their molecular attraction to the solid surface.

3.5 Desiccant A substance used in a dehydrator to remove water and moisture. Also a material used to remove moisture from the air.

3.6 Bulk (apparent) density is a property of powders, granules, and other "divided" solids, especially used in reference to mineral components (soil, gravel), chemical substances, ingredients, foodstuff, or any other masses of corpuscular or particulate matter. It is defined as the mass of many particles of the material divided by the total volume they occupy. The total volume includes particle volume, inter-particle void volume, and internal pore volume.

3.7 Specific surface area (SSA) is a property of solids which is the total surface area of a material per unit of mass solid or bulk volume or cross-sectional area. It is defined either by surface area divided by mass (with units of m^2/kg), or surface area divided by the volume (units of m^2/m^3).

3.8 Iodine value (or "iodine adsorption value" or "iodine number" or "iodine index")

In chemistry is the mass of iodine in grams that is consumed by 100 grams of a chemical substance.

The amount of iodine absorbed (in milligrams) by 1 g of carbon using test conditions listed herein is called the iodine number.

3.9 Hardness is a measure of how resistant solid matter is to various kinds of permanent shape change when a compressive force is applied.

3.10 Porosity or **void fraction** is a measure of the void (i.e., "empty") spaces in a material, and is a fraction of the volume of voids over the total volume, between 0 and 1, or as a percentage between 0 and 100%.

3.11 Physisorption (also called physical adsorption) is a process in which the electronic structure of the atom or molecule is barely perturbed upon adsorption.

3.12 Ash content refers to the mineral content of flour, and is determined by burning a given quantity of flour under prescribed conditions and measuring the residue.

3.13 Moisture Content Dry basis moisture content is described by the percentage equivalent of the ratio of the weight of water to the weight of the dry matter. Wet basis moisture content is described by the percentage equivalent of the ratio of the weight of water to the total weight of the material.

4. Requirements

4.1 Characteristics

Activated Carbon shall be in accordance with the requirements given in Table 1 when tested according to the specified test methods.

4.2 Sampling

The sampling shall be carried out in accordance with ASTM E 725. 96(2012)

5. Inspection

The supplier and/or manufacturer set up and maintain such quality and inspection system to ensure the products comply with all aspects of the requirements of this standard specification.

The supplier and/or manufacturer shall be responsible for carrying out all the tests and quality assurances required by this standard specification and shall maintain complete

records of all such tests and qualifications. Such records shall be available for review by the purchaser or its nominated inspector. These documents and test results shall be

traceable with regard to the batch number. The supplier and/or manufacturer shall furnish to the purchaser a certificate of quality stating that each batch has been sampled, tested, and qualified in accordance with this standard specification and has been found to meet the requirements specified.

The purchaser or its nominated inspector reserves the right to inspect a part or whole of the products during manufacturing and prior to packing and could be witnessed by any inspections and tests in accordance with this standard specification.

Purchaser's inspector reserves the right to have access to the products at any time during manufacturing. The supplier and/or manufacturer shall provide all facilities necessary for carrying out all inspections and tests as required by this standard specification.

Random sampling proportional to the quantity of each batch and frequency of inspections and tests as required by this standard specification shall be at the discretion of the inspector. If a sample rejected in any inspection or test, re-sample shall be carried out, in the case of any rejection in new samples all products represented by such sampling shall be rejected. Inspection or tests that carried out by the purchaser's inspector, in no way relieves the supplier and/or manufacturer of his responsibilities and liabilities under the conditions, terms and inspection of this standard specification.

6. Packaging

6.1 The Activated Carbon shall be suitably packed in air tight bags/ new steel drums and palletized in accordance with N.I.G.C packing and marking instructions.

6.2 The Activated Carbon shall be suitably packed in approved containers in accordance with N.I.G.C packing and marking instructions.

The containers shall be Big Bags or new steel drums with inner PE liner in accordance with the requirement of the purchase order.

6.3 The Containers/Pallets shall be protected against all damages or defects which may occur during handling.

7. Marking

7.1 Marking of Containers/Pallets

Each Container/Pallet shall be legibly marked at least with the following information:

- Product designation (type and trade name)
- IGS No.
- Net weight
- Handling
- Storage Condition
- Date of Manufacture
- Date of Expiry
- Order No.
- Batch No.
- Supplier and/or manufacturer's name and address
- HMIS (including Health, Fire, Reactivity, Personal Protection, Specified Hazard, etc)

7.2 Instructions for Use

The supplier and/or manufacturer shall provide complete sets of instructions for use and replacement of Activated Alumina in service and refilling with an unused material.

8. Storage Life

The Activated Carbon shall meet the requirements of this standard specification after storage for 24 months from date of delivery at supplier and/or manufacturer's mentioned storage condition.

Table 1- Physical and Chemical Specification of Activated Carbon

Parameter	Unit	Value	Test method
Iodine Number (min)	mg/g	950	ASTM D 4607
Specific surface area (min)	m ² /g	10	BET N ₂ Method, C819
Particle size	8*30	> 8 mesh (2.36 mm) max 15%	ASTM D 2862 ASTM D 5158-98
		< 30 mesh (0.60 mm) max 5%	
		Mean particle diameter, 1.5-1.7 (mm)	
	6*12	> 6 mesh (3.35 mm) max 15%	
		< 12 mesh (1.70 mm) max 5%	
		Mean particle diameter, 2.5-2.7 (mm)	
Hardness Number (min.)	%wt	75	ASTM D 3802-79
Moisture (as packed)	%wt	3	ASTM D 2867 - 99
Ash content (max.)	% wt	8	ASTM D 2866 - 94
Bulk density (max.)	Kg/m ₃	0.5	ASTM D 2854 -E 727/727 M
pH	-	9-11	ASTM D 3838-80