Translated English of Chinese Standard: HJT397-2007
Translated by: www.ChineseStandard.net
Wayne Zheng et al.
Email: Sales@ChineseStandard.net

HJ

INDUSTRY STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

HJ/T 397-2007

Technical specifications for emission monitoring of stationary source

固定源废气检测技术规范

Issued on: December 7, 2007 **Implemented on: March 1, 2008**

Issued by: State Environmental Protection Administration

State Environmental Protection Administration

Announcement

[2007 No.81]

In order to carry out the *Environmental Protection Law of the People's Republic of China*, protect the environment, ensure human health, improve the level of environmental management, and standardize the environmental monitoring work, hereby approve and publish the *Technical Specifications of the Fixed Source Pollutant Emission Monitoring* and other three standards as the state environmental protection standards.

Standard names and standard number are as follows:

I. Technical Specifications for Emission Monitoring of Stationary Source (HJ/T 397-2007)

II. Emissions from Stationary Pollution Source Determination of Flue Gas Blackness Ringelmann Flue Gas Blackness Diagram Method (HJ/T 398-2007)

III. Water Quality-Determination of the Chemical Oxygen Demand Fast Digestion Spectrophotometric Method (HJ/T 399-2007)

IV. Determination of Interior Volatile Organic Compounds and Carbonyl Compounds in Cabin of Vehicles (HJ/T 400-2007)

Above standards are directive standards. They shall be implemented from March 1, 2008, and published by the China Environmental Science Press. The content of the standards are available at the website of State Environmental Protection Administration (www.sepa.gov.cn/tech/hjbz/bzwb).

It is hereby to announce.

December 7, 2007

Table of Contents

Foreword

This Standard is established to carry out the *Environmental Protection Law of the People's Republic of China,* and *Law of the People's Republic of China on the Prevention and Control of Atmospheric Pollution*, prevent and control atmospheric pollution, and improve environmental quality.

This Standard specifies the manual sampling and determination of particulate and gaseous pollutants monitoring methods in smoke flue, chimney, vent emission funnel and other fixed pollutant sources; and the monitoring methods of the portable instruments. It formulated corresponding provisions on the preparation for emission monitoring of stationary source, determination of exhaust emission parameter, sampling and determination method of particulates and gaseous pollutant in exhaust, and the quality assurance of monitoring, etc.

Annex A of this Standard is Informative Annex.

This Standard is first-time released.

This Standard was proposed by the scientific and technical standard department of State Environmental Protection Administration.

This Standard was mainly drafted by organizations: China National Environmental Monitoring Center, and Shenyang Municipal Environmental Monitoring Center.

This Standard was approved by State Environmental Protection Administration on December 7, 2007.

This Standard shall be Implemented from March 1, 2008.

This Standard shall be interpreted by State Environmental Protection Administration.

Technical specifications for emission monitoring of stationary source

1 Scope

This Standard specifies the manual sampling and determination of particulate and gaseous pollutants monitoring methods in smoke flue, chimney, vent emission funnel and other fixed pollutant sources; and monitoring methods of the portable instruments. It formulated corresponding provisions on the preparation for emission monitoring of stationary source, determination of exhaust emission parameter, sampling and determination method of particulates and gaseous pollutant in exhaust, and the quality assurance of monitoring etc.

This Standard applies to the environmental monitor stations at all levels, industry and enterprise professional organizations, and environmental scientific research institutes, to carry out the emission monitoring of exhaust pollutants of stationary source; environmental protection acceptance monitoring upon the completion of construction project; monitoring on the control effect of pollution treatment facilities; verification monitoring on continuous emission monitoring system; and the technical research monitoring of clean production process and pollution prevention.

2 Normative references

The articles contained in the following documents become part of this Standard when they are quoted herein. For the undated documents so quoted, all the modifications or revisions made thereafter shall be applicable to this Standard.

GB/T 16157 The determination of particulates and sampling methods of gaseous pollutants emitted from exhaust gas of stationary source

HJ/T 47 Technical conditions of sampler for stack gas

HJ/T 48 Technical conditions of sampler for stack dust

ISO 12140 Agricultural machinery - Agricultural trailers and trailed equipment - Drawbar jacks

3 Terms and definitions

For the purpose of this Standard, the following terms and definitions apply.

3.1 Pollution source

The facilities or building constructions (such as workshops) that emit atmospheric pollutants.

3.2 Stationary source

The pollution source that generates exhaust gases from the boiler and industrial furnace of coal, fuel oil and fuel gas; and from the production process of petrochemical engineering, metallurgy and building materials; which is emitted into the air via exhaust funnel.

3.3 Particulates

The solid and liquid granular material suspended in the exhaust gases and generated from the combustion, composition, decomposition of fuel and other materials, and the mechanical treatment of various materials.

3.4 Gaseous pollutants

All kinds of pollutants dispersed in exhaust gases in the state of gas.

3.5 Operational condition

The state of production operation of devices and facilities.

3.6 Isokinetic sampling

It refers to keep the plane of sampling nozzle onto airflow of exhaust gas, so as the flow speed of entering the sampling nozzle is equal to exhaust flow speed at the measurement point.

3.7 Dry flue gas of standard conditions

The exhaust gas excluding moisture under conditions of temperature of 273.15 K and pressure of 101 325 Pa.

3.8 Excess air coefficient

The ratio of the actual air supply amount AND the theoretical air requisite amount when fuel is burning.

4 Preparations for testing

Formulation of monitoring scheme

4.1.1 Collect related technical data, and understand the technological process of production and the performance of production facilities that generated exhaust gas, the category of the principal pollutant emitted and the general scope of emission concentration, to determine the monitoring items and monitoring methods.

4.1.2 Survey purification principle, process engineering, major technical indicators and others of process engineering facilities of pollution source to determine the monitoring content.

4.1.3 Survey operational condition of production facilities, emissions methods and rules of pollutants to

current is in direct proportion to the mole number of the oxygen atom involved in the reaction, the current generated from discharging is transferred into voltage via load, and the volume fraction of oxygen can be obtained by measuring the voltage on the load.

b) Instruments:

1) Oxygen meter, consisted of air pump, flow control devices, control circuit and display screen.

2) Sampling pipe and the sample gas preprocessor.

c) Determination steps. Connect the gas circuit according to the requirements of instrument's instruction manual, and perform leak test on the gas circuit system; start the instrument air pump; after the self-inspection of instrument is finished and indicates that it operates normally, insert the sampling pipe into the center or position nearby of the tested flue to sample flue gas for determination, and read the data when the reading of oxygen content is stable.

6.3.4 Determination of O_2 by the thermo-magnetic oxygen meter

a) Principle. The paramagnetism of oxygen attracted by magnetic field is much stronger than that of other gases. When the paramagnetic gases are in the non-uniform magnetic field and have temperature gradient, it shall form gaseous convection, which is called thermo-magnetic convection or magnetic wind. The strength of the magnetic wind depends on the oxygen content in the mixed gas. Determine the change of resistance by converting the change of oxygen content in mixed gas into the change of thermo-magnetic convection and then into the change of resistance, and the volume fraction of oxygen can be obtained.

b) Instruments:

1) Thermo-magnetic oxygen analyzer.

2) Sampling pipe and the sample gas preprocessor.

c) Determination steps. Connect the gas circuit according to the requirements of the instrument operation instruction and check gas circuit system for air leakage. Start the instrument air pump, and after the self-inspection of instrument is finished and indicates that it operates normally, insert the sampling pipe into the center or position nearby of the tested flue to sample flue gas for determination, and read the oxygen content data when the reading is stable.

6.3.5 Determination of O_2 by the zirconium oxide oxygen meter

a) Principle. After adding a certain amount of stabilizer, zirconium oxide material is baked under high temperature and becomes oxygen ion solid electrolyte under certain temperature. Burn the upper

8.4.1 Using absorption bottle or adsorption pipe sampling system for sampling

8.4.1.1 Preparation and installation of sampling pipes

a) Clean the sampling pipes; clean and dry the interior of the sampling pipe before using.

b) Replace filter materials, and when filling alkali-free glass wool or other filter materials, the filling length is 20 - 40 mm.

c) Insert the sampling pipe near the center position of the flue, inlet flow direction and exhaust flow direction shall form a right angle. For a sampling pipe installed with an oblique incision at the outlet, the back-side of the oblique incision shall face to the airflow.

d) Sampling pipes shall be fixed on the sampling hole without air leakage.

e) When sampling is not carried out, the sampling hole shall be sealed by cap or flange.

8.4.1.2 Connection of absorption bottles or adsorption pipes with sampling pipes and flow metering boxes

a) Absorption liquid, absorption bottles and adsorption pipes shall be prepared in accordance with operation requirements of chemical analysis, and the number of samples shall be marked by a marking pen.

b) As shown in Figure 13, connect the sampling pipes, absorption bottles or adsorption pipes, flow metering boxes and sucking pumps with connecting pipes, and the connecting pipes shall be as short as possible.

c) Connect the sampling pipes with absorption bottles and flow metering boxes with spherical joint or tapered joint.

d) Prepare some absorption bottles, put required amount of absorption liquid into each bottle, and two bottles are used as bypass absorption bottles.

e) To prevent grinding mouths of absorption bottles from leaking, silicon sealing grease may be used.

f) An absorption bottle and bypass absorption bottle at the outlet shall be connected by glass three-way valve.

g) Absorption bottle or adsorption pipe shall be close to the outlet of sampling pipe, when the temperature of absorption is high and affects the absorption efficiency, the absorption bottle shall be placed into the cold rinse bank for cooling.

h) Connecting pipe between outlet of a sampling pipe and absorption bottle or adsorption pipe shall be kept warm using heat insulating materials, when pipeline is too long, heating and insulation measures

10 Sampling frequency and sampling time

10.1 Basis for determining sampling frequency and sampling time

10.1.1 Regulations and requirements of relevant standards and specifications.

10.1.2 Objectives and requirements of monitoring.

10.1.3 Emission characteristics, emission ways and emission rules of the pollution sources monitored; operational conditions of manufacturing facilities and control facilities.

10.1.4 The emission concentration of monitored pollutants at pollution sources and the determination limit of adopted monitoring and analyzing methods.

10.2 Sampling frequency and sampling time

10.2.1 If the sampling frequency and time are specified in the relevant standards, such standards shall prevail.

10.2.2 Except otherwise specified in relevant standards, for exhaust gas sampling in exhaust funnel, take average value of 1h's continuous sampling; or collect 3 samples at equal time interval within 1h, and calculate the average value.

10.2.3 Sampling time and frequency under exceptional circumstances: if certain exhaust funnel exhausts discontinuously with exhaust time of less than 1h, perform continuous sampling within the exhaust period or collect 2-4 samples at equal time interval within exhaust period, and calculate average value; if certain exhaust funnel exhausts discontinuously with exhaust time of greater than 1h, perform sampling within the exhaust period in accordance with requirements under 10.2.2.

10.2.4 Supervising monitor of general pollution sources under supervision shall be performed at least once a year, if listed among pollutant discharging organizations under primary annual supervision by national or local competent administrative departments for environmental protection, the supervising monitor shall be performed at least 4 times a year.

10.2.5 Sampling time and frequency for environmental protection acceptance upon completion of construction project shall comply with relevant technical specification for environmental protection acceptance upon completion of construction project issued by State Environmental Protection Administration.

10.2.6 When monitoring contamination incident emissions, the sampling time and frequency shall be set as required rather than be limited by the above requirements.

11 Monitoring and analyzing methods

l) To ensure the monitoring quality, the determination of particles of low concentrations shall adopt ISO 12141 method.

13.3.3 Sampling of gaseous pollutants

a) When sampling exhaust gas, comprehensively consider existential state and characteristics of composition under test, various factors (adsorption, condensation, volatilization, etc.) that may cause error to determine the appropriate sampling method (including selection of sampling tube and filtering media material, sampling volume, heating and insulation measure for sampling tube and duct, etc.).

b) When collecting exhaust gas sample, make sampling tube inlet to be close to center of pipeline, and make the duct used to connect sampling tube and absorption flask as short as possible, and use heat insulating material for heat preservation if necessary.

c) Before sampling, after the sampling system is connected, the air impermeability of the sampling system shall be inspected, if finding air leak, the system shall be inspected section by section to find out the reasons and solve them timely.

d) When using absorption flask or adsorption tube system for sampling, make the absorption equipment as close to sampling tube outlet as possible; make the exhaust go through bypass for 5min before sampling, completely replace air in front tube of absorption flask; maintain constant flow during sampling period, with fluctuation of not greater than 10%; after the sampling, cut off the air course between sampling tube and absorption flask to prevent suck-back of absorption liquid due to negative pressure in tube.

e) Determine sulfur dioxide in flue gas with iodometric method, it must use the heated sampling tube (heating temperature at 120^{o}C) for sampling; use ice-bath or cold bath to control temperature of absorption liquid in absorption flask to improve absorption efficiency.

f) The determination of the desulfurization efficiency for wet desulphurization equipment shall be conducted under normal operating conditions, and the pH value of the cleaning solution shall be determined at the same time. Report the determination results of desulfurization efficiency with indicating the pH value of the cleaning solution.

g) After the sampling, both ends of absorption bottles and tubes of the samples shall be closed immediately, and the samples shall be sent to the laboratory for analysis as soon as possible. During the transport and preservation period of the samples, it shall avoid light and temperature control.

h) Directly monitor pollutants in flue gas with portable instrument; in order to prevent condensation of