ICS 7.06
CCS A 47

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 34286-2017

Greenhouse gas - Carbon dioxide measurement - Off-axis integrated cavity output spectroscopy method

温室气体 二氧化碳测量 离轴积分腔输出光谱法

Issued on: September 7, 2017 **Implemented on: April 1, 2018**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine;
Standardization Administration of the PRC

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard is proposed by China Meteorological Administration. This standard by the National Climate and Climate Change Standardization Technical Committee Atmospheric Composition Observation and Warning Service Technical Committee (SAC / TC540/SC1) centralized. This standard drafting unit. China Meteorological Bureau Meteorological Exploration Center, Beijing Meteorological Bureau, National Satellite Meteorological Center. The main drafters of this standard. Zhang Xiaochun, Zhou Huagang, Jia Xiaofang, Wen Min, Wang Myanmar, Jin Junli, Zhang Xing wins, Lin Weili, Tang Jie.

The warming caused by the greenhouse effect has brought remarkable influence on the global climate, ecology and economic development, National governments, scientists and the public extensive attention. Carbon dioxide is one of the main greenhouse gases in the atmosphere. It is a method for measuring the spectral output of carbon dioxide off-axis integrated-cavity output of a greenhouse gas, Get accurate and reliable measurement data, specially formulated this standard. Greenhouse gas carbon dioxide measurement Off-axis integrated cavity output spectroscopy

1 Scope

China's national method for measuring atmospheric carbon dioxide by off-axis integrated cavity output spectroscopy. It specifies the method overview, the measurement conditions, the preparation, the measurement procedure and the calibration, and it applies to atmospheric greenhouse gas monitoring. The technique solves the basic problem of measuring a gas that absorbs weakly: it puts the sample in an optical cavity between two very high reflectivity mirrors, so the light bounces thousands of times and travels several kilometres inside a box the size of a shoebox. Injecting the beam off-axis rather than along the cavity axis avoids the mode structure that makes the related cavity ring-down technique fussy, and the result is an instrument that is stable enough to run unattended at a monitoring station for months. That matters more than raw sensitivity. The signal being looked for is a rise of a few parts per million per year against a background of four hundred, so what an atmospheric monitoring network needs above all is instruments that do not drift

and that agree with one another.

This standard specifies the use of off-axis integrated output spectroscopy to measure the atmospheric concentration of greenhouse gases in the atmosphere of carbon dioxide method overview, measurement Conditions, measurement preparation, measurement methods and calibration methods. This standard applies to carry out the measurement of carbon dioxide concentration of greenhouse gases.

2 Terms and definitions

The following terms and definitions apply to this document.

2.1 Standard gas standardgas To clean the air as the next gas, the concentration of the target substance is known as a mixed gas.

Note. Rewrite QX/T 125-2011, Definition 10.2.

2.2 Working standard gas workingstandardgas The standard gas used for the quantitative measurement of the concentration of the target substance in the sample.

Note. Rewrite QX/T 125-2011, Definition 10.8.

2.3 Target standard gas standardstandardgas A calibration gas used as a regular and repeat measure for the inspection and evaluation of the operating conditions of a measuring system.

Note. Rewrite QX/T 125-2011, Definition 10.9.

2.4 Sample gas Gas measured by the measurement system.

2.5 Direct measurement method directmeasurementmethod The method of measuring the concentration of the target substance in the sample gas directly by using an off-axis integrating cavity output spectrometer.

2.6 Standard gas standard measuring method externalstandardmeasurementmethod The off-axis integral cavity output spectrometer is used to alternately measure the concentration responses of the working standard gas, the target standard gas and the target substance in the air, and then according to The working standard gas concentration of the target substance calculated target gas or air target substance concentration method.

3 Method Overview

3.1 method principle According to the characteristic absorption spectrum of the target substance, the laser with the specific wavelength is deviated from the optical axis and injected into the high-precision resonant cavity filled with the sample gas, Efficient reflection under the effect of continuous reflection, by measuring and comparing the intensity of incident light and transmitted light to get the sample gas in the target substance