

HJ

INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Guideline for the Determination of Volatile Organic Compound Leaks and Uncovered Liquid Surface Emissions

泄漏和敞开液面排放的挥发性有机物 检测技术导则

(English Translation)

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1 Scope of application

This Standard specifies the technical requirements for the detection of volatile organic compounds (VOCs) originating from equipment leaks and uncovered liquid surface emissions. It specifies the detection methods, instrument and equipment requirements, quality assurance and control of VOCs from unorganized emission sources such as equipment leaks and uncovered liquid surface. This Guideline is not applicable to the direct determination of mass emission rates of VOCs from leakage and uncovered liquid surface emission sources.

2 Terms and definitions

2.1

leak sources

Various equipment and pipelines that contain VOCs materials and may leak and emit, including valves, flanges and other connections, pumps, compressors, pressure relief devices, open-ended valves or open pipelines, sampling connection systems, exhaust ports of pump and compressor sealing systems, tank breathing ports, inspection port seals, etc.

2.2

open-ended valve

Valves in which one side of the valve seat is in contact with organic gas or volatile organic liquid and the other side is in contact with the atmosphere, but a pressure relief device is not included.

2.3

uncovered liquid surface

The unorganized emission source from the uncovered liquid surface of the collection, transportation and storage equipment of production materials containing VOCs and the uncovered liquid surface of the production process wastewater and waste liquid collection and storage and purification treatment equipment.

2.4

leak definition concentration

The concentration limit specified in relevant emission standards or regulations, measured on the surface of the leakage source or the uncovered liquid surface, indicating the existence of VOCs leakage and requiring measures to be controlled (based on the measurement reading of an instrument calibrated with a reference compound).

2.5

no detectable emission

When the concentration of VOCs measured on the surface of the source to be measured, after subtracting the background, is lower than 2.5% of the standard concentration limit, it is defined as no detectable emission.

2.6

reference compound

The reference compounds in this Guideline refer to the VOCs compounds specified in relevant emission standards or regulations and used as the calibration benchmark for leakage measurement instruments. For example, if an emission source in a certain emission standard uses methane as the reference compound, the standard concentration limit is 500×10^{-6} mol/mol.

-6 mol/mol.

2.7

calibration gas

It refers to VOCs compounds used during calibration to adjust instrument readings to known concentrations. The calibration gas is usually a reference compound standard gas close to the concentration limits of the relevant control standard.

2.8

response factor

It refers to the ratio of the concentration value of a known concentration of VOCs compounds to the instrument reading calibrated with a reference compound of the same concentration value.

2.9

response time

It refers to the time it takes for the instrument to measure the concentration of VOCs from when the instrument reading begins to change to when the instrument finally displays 90% concentration of a stable reading.

2.10

zero gas

It refers to clean air with VOCs content less than 10×10^{-6} mol/mol (calculated as methane).

2.11

reference compound standard gas

It refers to the reference compound standard gas whose balance gas is high-purity air, whose concentration is near the relevant control standard concentration limit, and whose relative expanded uncertainty is 2% ($k=2$).

2.12

non-reference compound gas

It refers to compound standard gases other than reference compounds. It is used to determine the response ratio of non-reference compounds and reference compounds on the detection instrument. When measuring the non-reference compound gas sample, the measured ratio can be used to convert the instrument response value into the actual concentration value of the non-reference compound.

3.1 Portable testing equipment

3.1.1

Before use, check or experiment shall be carried out to ensure that the detector responds to the main VOCs components emitted by the emission source to be measured.

Instrument detector types include flame ionization detectors, photoionization detectors, infrared absorption detectors, etc., and can also be other types of detectors.

3.1.2

The measuring range of the instrument shall be able to meet the measurement requirements of the standard concentration limits in the relevant control standards. Its resolution shall ensure readability within $\pm 2.5\%$ of the leak definition concentration or standard concentration limit in the emission standard.

3.1.3

Be equipped with an electric sampling pump that can provide continuous flow.

The sampling flow rate measured at the top of the sampling probe with a glass wool plug or filter installed to protect the instrument shall be in the range of 0.10~3.0 L/min.

3.1.4

Be equipped with a sampling probe. The outer diameter of the front end of the sampling probe shall ensure that it can enter the narrow gaps of various types of equipment for detection. It generally does not exceed 7 mm.

3.1.5

The instrument must be explosion-proof safe and pass explosion-proof safety inspection certification.

3.2 Instrument performance evaluation

Install and start the instrument correctly according to the start-up and initial adjustment requirements in the instrument manual.

3.2.1 Determination of response factor

The response factor of various VOCs emitted by the emission source under test shall be determined before use of the instrument. The response factor can be measured directly or obtained from reference materials. After the response factor of the instrument is determined, it is not necessary to repeat the measurement. The determination of the response factor can ensure that the instrument has sufficient response to the VOCs that need to be detected. When a known emission source emits a single VOC, the detection value can be converted into the concentration of the compound through the response factor of the compound.

instrument's sampling pump or sampling flow rate is adjusted and the instrument's response time changes, the response time must be remeasured before use.

3.2.3.1 Introduce the zero gas from the sampling probe port. After the instrument

reading is stable, quickly switch to the calibration gas. Record the time required for the instrument to reach 90% of the final stable display reading. Repeat this step 3 times.

The average value is taken as the response time of the instrument.

3.2.3.2 The instrument response time shall not exceed 30 s. When measuring the response time, the sampling pump, dilution probe (if any), sampling probe and filtering device shall be in place.