

JJG

INDUSTRY STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Verification Regulation of Carbon Monoxide and Carbon Dioxide Infrared Gas Analyzer (English Translation)

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1 Scope

This Standard applies to the initial verification, subsequent verification and in- use inspection of carbon monoxide, carbon dioxide infrared gas analyzer (hereinafter referred to as the instrument).

2 Overview

The instrument is mainly composed of infrared sensor plus electronic parts and display part. The sensor converts the detected carbon monoxide gas or carbon dioxide gas into an electrical signal. And then it is processed by electronic parts.

Display as concentration value.

The instrument can be divided into continuous measurement and discontinuous measurement instruments according to the working state. According to the sampling method, it can be divided into diffusion type and suction type instruments.

3.1 Detection gas, indication error, repeatability and response time

See Table 1 for detection gas, indication error, repeatability and response time.

Table 1 -- Detection gas, indication error, repeatability and response time

3.2.1 Zero drift: not greater than the instrument's indication value reference

error.

3.2.2 Range drift: not greater than the instrument's indication value reference

error.

3.3 Non-measured component interference error

3.3.1

Interference error of non-measured components excluding water vapor:

$\pm 2\%FS$.

3.3.2 Water vapor interference error: not greater than the instrument's indication

value reference error.

4.1 Appearance

4.1.1

The instrument shall be marked with the name of the manufacturer, the instrument model and serial number, and the date of manufacture.

Domestically-made instruments must have the mark and number of the manufacturing license for measuring instruments. The accessories shall be complete, with instructions for use.

4.1.2

The display of the instrument shall be clear and complete. Each regulator component shall be able to work normally. The fasteners shall not be loose.

4.1.3

The instrument shall not have appearance damage that affects its normal operation.

4.2 Insulation resistance

Insulation resistance $\geq 40M\Omega$.

4.3 Insulation strength

For instruments that use alternating current, the insulation strength of the phase (or middle) line of the power supply to the ground shall be able to withstand the test of which the AC voltage is 1500V, 50Hz and the test current is 10mA, which lasts for 1min.

5 Measuring instrument control

The measuring instrument control of the instrument includes the initial verification, subsequent verification and in-use inspection.

5.3.1 Appearance

Use visual inspection and hand feel method according to requirements of 4.1.

5.3.2 Instrument adjustment

Carry out the warm-up stabilization of the instrument and the adjustment of the zero point and the indication value according to the requirements of the instrument manual.

During the instrument verification, connect the standard gas, the flow controller and the inspected instrument as shown in Figure 1. According to the different sampling methods of the tested instrument, use the flow controller to control different standard gas flow. When verifying a diffusion instrument, the flow rate shall be in accordance with the requirements of the instrument manual. If there is no clear requirement in the instrument manual, it is generally controlled in the range of (300 ± 50) mL/min. When verifying suction instruments, it is necessary to ensure that the bypass flowmeter in the flow controller has flow vent.

5.3.3 Indication value reference error

Access the standard gas with a concentration of approximately 20%, 50% and 80% of the upper limit of the instrument range. After the reading is stable, record the display value A_i of the instrument. Repeat the measurement 3 times.

Calculate the reference error Δe of the indication value of each concentration point of the instrument according to formula (1). Take the largest absolute value

Δe as the indication error of the instrument.

Where,

- Arithmetic mean of the values displayed by the instrument at each concentration test point;

As - Concentration value of standard gas;

R - Upper limit of the measuring range of the instrument (the same below).

5.3.4 Repeatability

Access standard gas with a concentration of about 50% of the upper limit of the instrument range. After the reading is stable, record the instrument display value A_i . Then access zero-point gas. After the instrument is stable, access the standard gas of the above concentration. Repeat the above measurement 6 times. Repeatability is expressed as the relative standard deviation of a single measurement. Calculate the repeatability s_r of the instrument according to formula (3):

5.3.5 Response time

Access standard gas with a concentration of about 50% of the upper limit of the instrument range. After the instrument display value stabilizes, record the instrument reading. Then access zero-point gas. After the instrument is stable, access the standard gas of the above concentration. At the same time start the stopwatch to start timing. When the indication value of the instrument reaches

90% of the last stable value, stop the watch, and the time displayed by the stopwatch shall be the response time. Repeat the measurement 3 times. Take the arithmetic average value as the response time of the instrument.

5.3.6 Drift

Access zero-point gas. After the instrument is stable, record the displayed value of the instrument A_{z0} . Access standard gas with a concentration of about 50% of the upper limit of the instrument range. After the instrument is stable, record the reading A_{s0} . Remove the standard gas. Discontinuity measurement instrument runs for 1h. Repeat the above steps every 15min. Continuity measurement instrument runs for 8h. Repeat the above steps every 2h. At the same time record the instrument display values A_{zi} and A_{si} ($i=1,2,3,4$). Calculate the zero drift ΔA_{zi} according to formula (5). Take the largest absolute value ΔA_{zi} as

Figure 2 -- Water vapor generator

5.3.9 Insulation resistance

The instrument is not connected to the power supply, and the power switch is on. Respectively connect the two wires of the insulation resistance tester to the phase (or center) wire and ground terminal of the power plug of the instrument.

Use the insulation resistance tester to measure the insulation resistance of the instrument.

5.3.10 Insulation strength

The instrument is not connected to the power supply, and the power switch is on. Respectively connect the two wires of the insulation strength tester to the phase (or center)