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JJG

National Metrological Verification Regulations of the People's Republic of China

JJG 631-2013

Ammonia-Nitrogen Automatic Analyzers

氨氮自动监测仪

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Verification Regulation of Ammonia-Nitrogen Automatic Analyzers

JJG 631-2013

Replacing JJG 631-2004

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National Environment Chemistry Metrology Technical Committee

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Shanghai Metrology and Testing Institute

Jiangsu Province Metrology Institute

Shanghai Electronics Scientific Instrument Co., Ltd.

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Introduction

This regulation is the revision to JJG 631-2004 "Ammonia automatic analyzers". Compared with JJG 631-2004, in addition to editorial changes, the main technical changes are as follows:

- Change the regulation's name to "Ammonia-nitrogen automatic analyzers";
- The scope is extended from "applicable to ammonia automatic analyzers (gas sensing electrode method)" to "applicable to online ammonia-nitrogen automatic analyzers that is based on electrode method and Spectrophotometry (see Article 1);
- Modify the instrument's classification (see Article 3);
- Modify indicated value error's performance requirements (see Table 1);
- Modify metrology device's control requirements. Delete the requirements to new ex-factory instruments that all requirements must be verified according to Class A and Class B instruments (see Article 5);
- Modify the list of verification items in metrology device control. Add item "response time" in "Use inspection" for electrode instrument (see Table 2);
- Modify the standard substances' concentrations which are used for verification of instrument's indicated value error, stability, repeatability, and response time (see Articles 5.3.2, 5.3.3, 5.3.4, 5.3.5);
- Modify the test result processing. Verification certificate is required to provide the qualified category (see Article 6).

The historical version of JJG 631-2004 "Ammonia automatic analyzers" is:

- JJG 631-1989 "Ammonia automatic analyzers".

Ammonia-Nitrogen Automatic Analyzers

1 Scope

This regulation applies to initial verification, subsequent verification, and use inspection of online ammonia-nitrogen automatic analyzers which is based on electrode method and spectrophotometry.

2 Overview

Ammonia-nitrogen automatic analyzers can automatically and continuously monitor the ammonia-nitrogen concentration in water bodies such as groundwater, surface water, sewage, and industrial waste.

Measurement methods of ammonia-nitrogen automatic analyzers (hereinafter referred to as the instrument) can be divided in electrode method and spectrophotometry. Spectrophotometry includes salicylic acid spectrophotometry and Nessler reagent spectrophotometry etc. Its principle is: after ammonia or ammonium ions in water reacts with the indicator reagent, it shows in color. At specific wavelength, the absorbance of the solution is proportional to the ammonia-nitrogen content, so as to achieve the quantitative analysis of ammonia-nitrogen in water sample. Electrode method includes gas-sensitive electrode method and ammonia ion selection method. Through measuring the electrode potential, the instrument obtains the ammonia-nitrogen content in the water sample.

3 Measuring performance requirements

According the different use occasions of ammonia-nitrogen automatic analyzers, the instrument is divided into Class A and Class B. Class A instrument is used in occasion of low concentrations. Class B instrument is used in occasion of high concentrations. For those occasions using both classes, the instrument must meet all requirements of Class A and Class B. Measuring instrument's performance requirements are shown in Table 1.

5.3.4 Stability

In accordance with the instrument specifications and requirements, perform preheating stability and calibration to the instrument. For Class A instrument, use the ammonia-nitrogen standard solution with concentration of 2.0 mg/L to measure. For Class B instrument, use the ammonia-nitrogen standard solution with concentration of 25 mg/L to measure. Measure 1 time for each 0.5 h. Continuously measure for 4 h. According to formula (6), calculate the relative change amplitude of initial value for each measured value. Take the maximum absolute value as the verification result of instrument stability.

$$M = (c_i - c_0) / c_0 \times 100\% \quad (6)$$

Where:

M - instrument stability, %;

C_i – Instrument's i-th measured value, mg/L;

c₀ - initial measured value, mg/L.

5.3.5 Response time

The system is firstly cleaned with ammonia-free water. For Class A instrument, use the ammonia-nitrogen standard solution with concentration of 2.0 mg/L to measure. For Class B instrument, use the ammonia-nitrogen standard solution with concentration of 25 mg/L to measure. When the test solution enters into the instrument detection tank, it is as the starting point. Record the time when the instrument's indicated value reaches the 90% of stable indicated value. Repeatedly measure for 3 times. Take the average value as the verification result of response time.

5.3.6 Safety performance

5.3.6.1 Insulation resistance

Power plug is not connected to the grid. The power switch is at ON position. Use insulation resistance meter to apply 500 V d.c. test voltage between the power inlet-line and chassis. After it is stable for 5 s, measure the insulation resistance.

5.3.6.2 Insulation strength

Power plug is not connected to the grid. The power switch is at ON position. Use voltage-withstand tester to respectively apply test voltage between the power inlet line and chassis. The test voltage is gradually increased to 1.5 kV, current-limit of 5 mA. Maintain for 1 min. Observe if there is arcing and

C.2 Conclusion pages of verification certificate

Certificate Number xxxxxx - xxxx

Verification Result

Tested items and verification result:

Instrument category: Class A Class B

S/N	Verification item	Verification result
1	Appearance	
2	Indicated value error /(% or mg/L)	
3	Repeatability / %	
4	Stability / %	
5	Response time/min	
6	Insulation resistance/MΩ	
7	Insulation strength	
8	Leakage Current/mA	

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C.3 Conclusion pages of verification certificate

Certificate Number xxxxxx - xxxx

Verification Result

Tested items and verification result:

Instrument category: Class A Class B

S/N	Verification item	Verification result
1	Appearance	
2	Indicated value error /(% or mg/L)	
3	Repeatability /%	
4	Stability /%	
5	Response time/min	
6	Insulation resistance/MΩ	
7	Insulation strength	
8	Leakage Current/mA	

Unqualified item of verification result:

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