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NATIONAL ENVIRONMENTAL PROTECTION STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

HJ 354-2019

Replacing HJ/T 354-2007

Technical specification for check and acceptance of wastewater on-line monitoring system (COD_{Cr}, NH₃-N et al.)

水污染源在线监测系统（COD_{Cr}, NH₃-N 等）验收技术规范

Issued on: December 24, 2019

Implemented on: March 24, 2020

Issued by: Ministry of Ecology and Environment

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Technical specification for check and acceptance of wastewater on-line monitoring system (COD_{Cr}, NH₃-N et al.)

1 Scope

This standard specifies the acceptance conditions and acceptance procedures of the wastewater online monitoring system; the acceptance requirements for water pollution source discharge outlets, flow monitoring units, monitoring stations, automatic water sampling units and data control units; the acceptance methods and acceptance technical indicators of flow meters, water quality automatic samplers and water quality automatic analyzer; as well as the acceptance content of the operation and maintenance plan of the wastewater online monitoring system.

This standard applies to the acceptances of the components of the wastewater online monitoring system constructed and installed in accordance with HJ 353 as well as the online monitoring instruments of water pollution sources such as flow meters, automatic water quality samplers, water quality automatic analyzers of chemical oxygen demand (COD_{Cr}), water quality automatic analyzers of total organic carbon (TOC), water quality automatic analyzers of ammonia nitrogen (NH₃-N), water quality automatic analyzer of total phosphorus (TP), water quality automatic analyzer of total nitrogen (TN), thermometers, pH water quality automatic analyzers, etc.

The wastewater online monitoring system specified in this standard is applicable to the online monitoring of chemical oxygen demand (COD_{Cr}), ammonia nitrogen (NH₃-N), total phosphorus (TP), total nitrogen (TN), pH value, temperature, flow monitoring factors .

2 Normative references

This standard refers to the following documents or clauses therein. For undated references, the valid version is applicable to this standard.

GB/T 6920 Water quality - Determination of pH value - Glass electrode method

GB/T 11893 Water quality - Determination of total phosphorus - Ammonium molybdate spectrophotometric method

GB/T 15562.1 Environmental protection graphic sign - Discharge port (source)

GB/T 50093 Code for construction and acceptance of automation instrumentation engineering

GB/T 50168 Code for construction and acceptance of cable lines for electrical installation engineering

HJ 212 Data transmission standard for online monitoring systems of pollutant

HJ 353-2019 Technical specification for installation of wastewater on-line monitoring system (COD_{Cr}, NH₃-N et al.)

HJ 355 Technical specification for operation of wastewater on-line monitoring system (COD_{Cr}, NH₃-N et al.)

HJ 535 Water quality - Determination of ammonia nitrogen - Nessler reagent spectrophotometry

HJ 536 Water quality - Determination of ammonia nitrogen - Salicylic acid spectrophotometry

HJ 636 Water quality - Determination of total nitrogen - Alkaline potassium persulfate digestion UV spectrophotometric method

HJ 828 Water quality - Determination of the chemical oxygen demand - Dichromate method

HJ/T 70 High-chlorine wastewater - Determination of chemical oxygen demand - Chlorine emendation method

3 Terms and definitions

The following terms and definitions apply to this standard.

3.1

Wastewater on-line monitoring system

Refers to a system consisting of software and hardware facilities that implement functions such as monitoring the flow of water pollution source flow, collecting water samples from water pollution sources, analyzing water samples from water pollution sources, analyzing data statistics and uploading.

3.2

Data marker

Refers to the markers used to represent different test data attributes of wastewater online monitoring instruments.

4 Acceptance conditions and acceptance content

4.1 Acceptance conditions

4.1.1 Provide relevant technical information on the type selection, engineering design, construction, installation and commissioning, performance of the wastewater online monitoring system.

4.1.2 The wastewater online monitoring system has been installed, commissioned and test run in accordance with HJ 353; all indicators meet the requirements of Table 3 in HJ 353-2019; it has submitted commissioning reports and test run reports.

4.1.3 Provide verification certificates for flow meters and standard measurement weirs (grooves). The wastewater online monitoring equipment that meet the technical requirements in Table 1 of HJ 353-2019.

4.1.4 The basic communication network and basic communication protocol used by the wastewater online monitoring system shall comply with the relevant requirements of HJ 212, respond to the various contents of the communication specifications, provide relevant self-inspection reports. At the same time, provide the network certification issued by the competent environmental protection department.

4.1.5 The automatic water sampling unit has been running stably for one month. It can collect instantaneous samples and representative composite samples for the analysis of the wastewater online monitoring instruments. It may retain samples and alarm.

4.1.6 The power supply is uninterrupted during the acceptance process.

4.1.7 The data control unit has been operating stably for one month, sending data to the monitoring center platform in time, during which the equipment operation rate shall be greater than 90%; the data transmission rate shall be greater than 90%. Equipment operation rate and data transmission rate are calculated with reference to formulas (1) and (2).

$$\text{Equipment operation rate} = (\text{Actual operating hours} / \text{enterprise discharge hours}) \times 100\% \dots\dots\dots (1)$$

Wherein:

ultrasonic probes at the installation place of the flowmeter, which can facilitate the maintenance and comparison of the flowmeter.

5.2.3 All open edges of the working platform shall be provided with protective railings. Protective railings and steel platforms shall be provided at the water intakes in the air and high places. The edges of each platform shall be provided with devices to prevent debris from falling into the water intakes.

5.2.4 The installation and construction of the maintenance and sampling platform shall all meet the requirements.

5.2.5 The installation of protective railings shall all meet the requirements.

5.3 Monitoring station building

5.3.1 The monitoring station building has its all rooms dedicated for special purposes.

5.3.2 The monitoring station building is airtight and equipped with heating and cooling air conditioners and exhaust fans. The air conditioner has the automatic running function once power is on.

5.3.3 The area of the newly-built monitoring station building shall not be less than 15 m²; the height of the station shall not be less than 2.8 m. All instruments and equipment shall be placed reasonably, which can facilitate maintenance and repair.

5.3.4 The distance between the monitoring station and the sampling point shall not be greater than 50 m.

5.3.5 The foundation load intensity, area, space height and ground elevation of the monitoring station building meet the requirements.

5.3.6 There are safe and qualified power distribution equipment in the monitoring station building; the power load provided is not less than 5 kW; it is equipped with a regulated power supply.

5.3.7 The power supply lead-in line of the monitoring station uses lighting power; the power supply line has a surge protector; the power supply shall be clearly marked; the ground wire is firm and clearly marked.

5.3.8 The power supply of the monitoring station is provided with a master switch; each instrument is provided with an independent control switch.

5.3.9 There are qualified water supply and drainage facilities in the monitoring station building, which can use tap water to clean the instruments and related devices.

records; upload the wastewater monitoring data to the monitoring center platform.

5.5.2 It can receive the command from the platform of the monitoring center; realize the control of the wastewater online monitoring system. If the automatic water sampling unit is triggered to take sample, the wastewater online monitoring instrument performs measurement, standard solution verification, calibration and other operations.

5.5.3 It is possible to read and display the real-time measurement data of each wastewater online monitoring instrument.

5.5.4 It can query and display: hourly change range and daily change range of pH value, hourly accumulated flow rate and daily accumulated flow rate, hourly average temperature and daily average temperature, hourly value and daily average value of COD_{Cr}, NH₃-N, TP, TN; meanwhile use the data acquisition and transmission instrument to upload to the platform of monitoring center.

5.5.5 The uploaded pollution source monitoring data is marked with time and data status, which complies with clause 6.2 of HJ 355-2019.

5.5.6 It can generate and display the daily statistics table, monthly statistics table and annual statistics table of the monitoring data of various wastewater online monitoring instruments.

6 Acceptance requirements for wastewater online monitoring equipment

6.1 Basic acceptance requirements

6.1.1 The various cables and pipes of the wastewater online monitoring instrument shall be protected by pipes laid in the ground or erected in the air. The cables erected in the air shall be attached to a solid bridge frame; the cables, pipes, as well as both ends of the cables, pipes are clearly marked. The construction of cable lines shall meet the relevant requirements of GB/T 50168.

6.1.2 When necessary (such as lightning-prone areas in the south), equipment and power supplies are provided with lightning protection facilities.

6.1.3 All instruments and equipment are installed on the floor or wall. There are necessary anti-vibration measures to ensure that the equipment installation is firm and stable.

6.1.4 Leave enough space around the instrument to facilitate instrument maintenance.

6.1.5 For the requirements not mentioned here, refer to the relevant content of the corresponding instruction manual of the instrument and shall meet the relevant requirements of GB/T 50093.

6.2 Functional acceptance requirements

6.2.1 It has time setting, proofreading and display functions.

6.2.2 It has automatic zero calibration (positive) function and span calibration (positive) function; meanwhile it has a calibration record. The calibration record shall include the calibration time, calibration concentration, main parameters before and after calibration, etc.

6.2.3 It shall be capable of displaying, storing and outputting test data.

6.2.4 It shall be possible to set a three-level system login password and corresponding operation authority.

6.2.5 When the power is accidentally cut off and turned on again, it shall be able to automatically discharge the remaining samples, reagents, etc. in the system, automatically clean it, automatically reset to the state of restarting the measurement.

6.2.6 It shall have fault alarm, display and diagnosis functions; it shall have automatic protection functions and shall be able to output fault alarm signals to the remote control network.

6.2.7 It shall have limit alarm and alarm signal output functions.

6.2.8 It shall have the functions of receiving external trigger commands from remote control network and starting analysis.

6.3 Performance acceptance method

6.3.1 Level comparison error

Use a portable open-channel flowmeter comparison device (level measurement accuracy ≤ 0.1 mm) and an ultrasonic open-channel flowmeter to measure the liquid level at the observation cross-section at same water level; conduct a comparison test; record data pairs every 2 minutes; record 6 consecutive times; use the formula below to calculate the error value H_i of each data pair; select the maximum H_i as the level comparison error of the flowmeter.

$$H_i = |H_{1i} - H_{2i}| \quad (3)$$

Wherein:

H_i - Level comparison error, mm;

transmission, to guarantee the security of data transmission. One end requests a connection and the other end shall authenticate.

7.3 Correctness of communication protocol

The communication protocol used shall fully comply with the relevant requirements of HJ 212.

7.4 Correctness of data transmission

After the system has been running stably for one month, any data that is not less than 7 consecutive days can be taken for inspection. It is required that the data received by the monitoring center platform and the data collected and stored by the data control unit are completely consistent; at the same time, check the measured value as stored by the online continuous automatic analysis equipment of wastewater, the data as collected and stored by the data control unit, the data as received by the platform of the monitoring center. The real-time data error of the 3 links is less than 1%.

7.5 Network stability

Within a continuous month, the system can run stably without any other connecting-network problems except communication stability, correctness of communication protocols, correctness of data transmission.

7.6 Requirements for field failure simulation recovery test

During the on-site acceptance of the automatic wastewater online continuous monitoring system, artificially simulate the failures such as on-site power failure, water and gas outages. After external conditions such as power supply are restored, the automatic wastewater online continuous monitoring system shall be able to start normally and remotely. The analysis results of the complete analysis before the failure are stored in the data control unit and are not lost during the failure. The data control system completely records all fault information.

7.7 Measurement frequency and measurement result report

It can automatically generate daily statistics, monthly statistics and annual statistics according to the requirements. For the report format, refer to Appendix C of HJ 353-2019.

8 Acceptance requirements for operation and maintenance program

8.1 The operation and maintenance program shall include a description of the

wastewater online monitoring system, operation and maintenance work instructions and record forms; form a written document for effective management.

8.2 The description of the wastewater online monitoring system shall include at least the following: basic information of the sewage unit, the water pollution online monitoring system's composition diagram, the automatic water sampling system's flow diagram, the data control system's composition diagram, the installed wastewater online monitoring instrument's method, principles, selected ranges, main parameters, reagents used, as well as the maintenance points and procedures for each component established in accordance with HJ 355.

8.3 The contents of the operation and maintenance instructions shall include at least the following: maintenance methods of various components of the online water pollution monitoring system, operation methods of installed wastewater online monitoring instruments, reagent preparation methods, maintenance methods, flow monitoring units, maintenance method of automatic sample acquisition unit and data control unit.

8.4 The record form shall meet the setting requirements in the operation and maintenance work instructions.

9 Requirements for preparation of acceptance report

9.1 For the format of the acceptance report, see Appendix A.

9.2 For the comparison monitoring report format, see Appendix B.

9.3 The acceptance report shall be accompanied by an acceptance comparison monitoring report, a network certification, an installation and commissioning report.

9.4 The acceptance report shall not pass until the contents of the acceptance report are all qualified or consistent.

I. Introduction

Basic situation of the enterprise;

Basic situation of product production;

Basic situation of pollution control facilities;

Automatic monitoring equipment manufacturer, equipment name, equipment model.

(Testing organization) had carried out comparison monitoring of the wastewater online continuous automatic monitoring system/equipment which was installed by this company at the location of □□□□□□ from □□ year □□ month □□ day to □□ month □□ day.

II. Basis of monitoring

- (1) HJ 91.1 Technical specifications for wastewater monitoring
- (2) HJ/T 92 Technical requirements for monitoring of total amount of pollutants in wastewater
- (3) HJ/T 273 Technical specifications for quality assurance and quality control of stationary pollution sources
- (4) CJ/T 3008.1 ~ 5 Standards for municipal wastewater discharge measurement
- (5) JJG 711 Verification regulation of weirs and flumes for flow measurement
- (6) HJ 828 Water quality - Determination of chemical oxygen demand - Dichromate method
- (7) HJ/T 70 High-chlorine wastewater - Determination of chemical oxygen demand - Chlorine emendation method
- (8) HJ 535 Water quality - Determination of ammonia nitrogen - Nessler's reagent spectrophotometry
- (9) HJ 536 Water quality - Determination of ammonia nitrogen - Salicylic acid spectrophotometry
- (10) GB/T 11893 Water quality - Determination of total phosphorus - Ammonium molybdate spectrophotometric method
- (11) HJ 636 Water quality - Determination of total nitrogen, alkaline, potassium, persulfate digestion UV spectrophotometric method

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