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

HJ 353-2019

Replacing HJ/T 353-2007

Technical specification for installation 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）安装技术规范

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

1 Scope of application

This Standard specifies the composition of wastewater on-line monitoring system, construction requirements for wastewater discharge outlets, flow monitoring units, monitoring stations, automatic water quality sampling units and data control units, installation requirements for flow meter, automatic water quality sampler and automatic water quality analyzer, as well as technical requirements for debugging and trial operation of wastewater on-line monitoring system.

This Standard is applicable to the construction of components of wastewater on-line monitoring system (COD_{Cr}, NH₃-N et al.), as well as the installation, debugging and trial operation of wastewater on-line monitoring equipment such as used flow meter, water quality automatic sampler, chemical oxygen demand (COD_{Cr}) automatic water quality analyzer, total organic carbon (TOC) automatic water quality analyzer, ammonia nitrogen (NH₃-N) automatic water quality analyzer, total phosphorus (TP) water quality automatic analysis Meter, total nitrogen (TN) automatic water quality analyzer, thermometer, pH automatic water quality analyzer.

The wastewater on-line monitoring system (COD_{Cr}, NH₃-N et al.) standardized in this Standard is applicable to the on-line monitoring of chemical oxygen demand (COD_{Cr}), ammonia nitrogen (NH₃-N), total phosphorus (TP), total nitrogen (TN), pH, temperature and flow monitoring factors.

2 Normative references

The following documents contain the provisions which, through reference in this Standard, become the provisions of this Standard. For undated reference documents, the latest versions apply to this Standard.

GB 15562.1, *Graphical signs for environmental protection - Discharge outlet (source)*

GB 50057, *Design Code for Protection of Structures against Lightning*

GB 50093, *Code for construction and quality acceptance of automation instrumentation engineering*

GB 50168, *Standard for construction and acceptance of cable line electric equipment installation engineering*

GB 50169, *Code for construction and acceptance of grounding connection electric equipment installation engineering*

GB/T 17214, *Industrial-process measurement and control equipment - Operating conditions*

HJ 15, *Technical specifications and test procedures for ultrasonic open channel sewage flowmeter*

HJ 91.1, *Technical specifications for wastewater monitoring*

HJ 101, *Technical specifications and test procedures for water quality on-line automatic monitoring equipment of ammonia*

HJ 212, *Data transmission standard for on-line monitoring systems of pollutant*

HJ 354-2019, *Technical specification for check and acceptance of wastewater on-line monitoring system (COD_{Cr}, NH₃-N et al.)*

HJ 355-2019, *Technical specification for operation of wastewater on-line monitoring system (COD_{Cr}, NH₃-N et al.)*

HJ 377, *Technical specifications and test procedures for water quality on-line automatic monitoring equipment of chemical oxygen demand (COD_{Cr})*

HJ 477, *The Technical Requirement for Data Acquisition and Transmission Equipment of Pollution Emission Auto Monitoring System*

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*

HJ/T 96, *The technical requirement for automatic water quality analyzer of PH*

HJ/T 102, *The technical requirement for automatic water quality analyzer of total nitrogen*

HJ/T 103, *The technical requirement for automatic water quality analyzer of total phosphorous*

HJ/T 104, *The technical requirement for automatic water quality analyzer of total organic carbon*

5.1.2 The discharge outlet shall be equipped with environmental protection graphic signs in accordance with the requirements of GB 15562.1.

5.1.3 The discharge outlet shall be able to meet the construction requirements of the flow monitoring unit.

5.1.4 The discharge outlet shall be able to meet the construction requirements for automatic water sampling unit.

5.1.5 If it uses concealed pipes or underdrains for discharge, it shall need to set up a shaft or build an open channel that can meet the manual sampling conditions. If the sewage surface is above 1m below the ground level, it shall be equipped with sampling steps or ladder frames. The pressure pipeline type discharge port shall be equipped with a sampling valve that meets the conditions of manual sampling.

5.2 Flow monitoring unit

5.2.1 It needs to measure the sewage unit of flow. According to the terrain and drainage method as well as the amount of drainage, it shall, at the position where the upstream of its discharge outlet can contain all sewage beams, construct a flow measurement section of special channel (pipe), so as to meet the requirements of measuring flow and velocity.

5.2.2 Generally, it can install standardized measuring weirs (flumes) such as triangular thin-wall weirs, rectangular thin-wall weirs, and Parshall flume.

5.2.3 The construction of standardized metering weirs (flumes) shall be able to remove deposits near the weir plate and compare open channel flowmeters.

5.2.4 The construction of pipe flowmeter shall make that: there shall be sufficient length and space around the pipeline to meet the metering verification and manual comparison of pipeline flowmeters.

5.3 Monitoring station room

5.3.1 There shall be a dedicated monitoring station room. The area of the newly-built monitoring station room shall meet the functional needs of different monitoring station room and ensure the placement, operation and maintenance of the wastewater on-line monitoring system. The use area shall not be less than 15m², and the height of the station building shall not be less than 2.8m. See Annex B for the recommended scheme.

5.3.2 The monitoring station room shall be as close as possible to the sampling point. The distance from the sampling point shall be less than 50m.

5.3.3 It shall install air-conditioning and winter heating equipment. The air conditioner has self-starting function of incoming power. It shall have a thermo-

5.4.5 The automatic water sampling unit shall set manual comparison sampling port for composite sample.

5.4.6 The pipeline of automatic water sampling unit shall be set as open pipeline and mark the direction of water flow.

5.4.7 The automatic water sampling unit shall use high-quality polyvinyl chloride (PVC), tripropylene polypropylene (PPR) and other rigid pipes that do not affect the analysis result.

5.4.8 When using an open channel flow meter to measure the flow, the water inlet of automatic water sampling unit shall be set in front of the weir, and the place where it shall be fully mixed after confluence. Try to be located in the center of the flow path at the head of the water inlet of the standardized metering weir (flume) of the flow monitoring unit. The direction of the water inlet is consistent with the direction of the water flow to reduce the front-end clogging of water inlet. The water sampling device shall be arranged in a form that can move up and down with the fluctuation of the water surface.

5.4.9 The sampling pump shall be reasonably selected according to the sampling flow rate, the head loss of the automatic water sampling unit and the water level difference. It shall use the sampling pumps that have a long service life, are easy to maintain and have no effect on water quality parameters. The installation location shall facilitate the maintenance of the sampling pump.

5.5 Data control unit

5.5.1 The data control unit can coordinate and operate the wastewater on-line monitoring system. Collect, store and display monitoring data and running record, and upload pollution source monitoring data to the monitoring center platform. The specific schematic is shown in Figure 2.

5.5.2 The data control unit can control the sampling, sending and retaining of the automatic water sampling unit.

5.5.3 The data control unit triggers wastewater on-line monitoring equipment to perform operations such as measurement, standard solution verification and calibration.

5.5.4 The data control unit reads the measurement data of each wastewater on-line monitoring equipment, realizes the query and display of real-time data, hourly average and daily average values and uploads to the monitoring center platform through the data acquisition and transmission instrument.

5.5.5 The data control unit records and uploads the monitoring data of wastewater. The reported data shall be marked with time and data state identifiers. Refer to sub-clause 6.2 in HJ 355-2019 for details.

suitable on-site working range of automatic water quality analyzer. See sub-clause 5.1 in HJ 355-2019 for specific setting method.

6.5.2 The automatic water quality analyzer that is equipped with high-temperature heating device shall avoid combustibles and places where fireworks are strictly prohibited.

6.5.3 The cable connection between the automatic water quality analyzer and the data control system shall be reliable and stable. Try to minimize signal transmission distance and reduce signal loss.

6.5.4 The high-pressure gas cylinders necessary for the operation of automatic water quality analyzer shall be firmly fixed to prevent the cylinders from falling. If conditions permit, it can set up cylinder rooms.

6.5.5 The COD_{Cr}, TOC, NH₃-N, TP, TN automatic water quality analyzer can automatically adjust the zero point and calibration range value. The interval between two calibrations is not less than 24h.

6.5.6 According to the actual situation of wastewater discharged by enterprises, the automatic water quality analyzer can be installed with pretreatment devices such as filtration device. The pre-treatment equipment such as filtration device installed in the pre-treatment equipment shall prevent excessive filtration. The comparison results of the actual water samples after filtering meet the requirements of Table 3.

7 Debugging requirements

7.1 Basic requirements

7.1.1 After the construction of wastewater on-line monitoring system, it needs to debug flowmeter, automatic water quality sampler, automatic water quality analyzer, and report data in parallel on the Internet.

7.1.2 The display result of the data control unit shall be consistent with the measuring instrument, so as to make easy access to various reports specified in this Standard.

7.1.3 The open channel flowmeter adopts the method specified in 6.3 of HJ 354-2019 to conduct the flow comparison error test and the level comparison error test.

7.1.4 The automatic water quality sampler adopts the method specified in 6.3 of HJ 354-2019 to conduct the sampling volume error test and the temperature control error test.

Annex A

(normative)

Determination of TOC and COD_{Cr} conversion coefficients

A.1 Reagents

A.1.1 Experimental water

Obtain CO₂-free distilled water according to HJ 104.

A.1.2 TOC standard stock solution

P=2000.0mg/L

Weigh 1.7004g of potassium hydrogen phthalate (KHC₈H₄O₄, guaranteed reagent) that is dried at 120°C for 2h and cooled to constant weight. Dissolve in an appropriate amount of water. Move into a 1000mL volumetric flask. Dilute to the mark line. Other low-concentration TOC standard solutions are obtained from the TOC standard stock solution after stepwise dilution.

All standard solutions are prepared when needed.

A.1.3 Other reagents

They shall be provided by the instrument manufacturer.

A.2 Verification of TOC automatic water quality analyzer

A.2.1 Check each component of the instrument. Adjust the instrument to the normal working state.

A.2.2 Check each reagent of the instrument and ensure sufficient quantity and quality meet requirements.

A.2.3 After connecting the power supply, perform warm-up operation according to the warm-up time specified in the operating instruction manual provided by the instrument manufacturer, so as to stabilize the function of each part.

A.2.4 According to the following method, use the newly-prepared TOC standard solution to verify the indication error of the instrument. The indicators shall meet Table A.1.

During the instrument's normal operating, respectively measure three standard solutions of which the TOC concentrations are about 20%, 50% and 80% of upper limit of working range. Continuously measure each solution 6 times.

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