HJ

ENVIRONMENTAL PROTECTION STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

HJ 212-2017

Replacing HJ/T 212-2005

Data transmission standard for online monitoring systems of pollutant

污染物在线监控（监测）系统数据传输标准

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Data transmission standard for online monitoring systems of pollutant

1 Scope

This standard applies to the data transmission between the online monitoring system of pollutants, the automatic monitoring system of the pollutant discharge process (working conditions), and the monitoring center. It specifies the transmission process as well as the format of parameter commands, interactive commands, data commands, control commands; gives the definition of code. This standard allows for expansion, but the expansion of content shall not conflict with the control commands used or retained in this standard.

This standard also specifies the data transmission format between the online monitoring instrumentation and the data acquisition transmitter, meanwhile gives the definition of code.

2 Normative references

This standard refers to the following documents or their terms. For undated references, the valid version applies to this standard.

GB 3096-2008 Environmental quality standard for noise

GB/T 16706-1996 Codes for environmental pollution source categories

GB/T 19582-2008 Modbus industrial automation network specification

HJ/T 75-2007 Specifications for continuous emissions monitoring of flue gas emitted from stationary sources (on trial)

HJ/T 76-2007 Specification and test procedures for continuous emission monitoring systems of flue gas emitted from stationary sources (on trial)

HJ 524-2009 Codes for air pollutants

HJ 525-2009 Codes for water pollutants

3 Terms and definitions

The following terms and definitions apply to this standard.

Process monitoring

According to the process design, the monitoring of key parameters (including such processing parameters as flow rate, temperature, oxygen content, pressure, etc., and such electrical parameters as current, voltage, frequency, rotation speed, etc.) of the operation of production facilities and pollution treatment facilities (hereinafter referred to as treatment facilities) that affect discharge of pollutants; combined with the enterprise's production process and end monitoring data, comprehensively monitor the operation of the production facilities and treatment facilities of the enterprise, pollutant treatment effects and emissions, determine the rationality, authenticity, acceptability of the monitoring data of the pollutant discharge, which is named as the emission process (working conditions) monitoring in this standard.

3.7

Clearance

The process of using clean water, water sample, chemical reagent, etc., to clean and wash the sample injection pipeline and the main measurement parts to ensure the accuracy of the measurement data, before the online monitoring equipment tests the sample, which is called clearance.

3.8

Blowback

In the measurement process of online monitoring instrument, in order to prevent the measurement results from being affected by the blocking or un-smoothness of the measurement circuit, use high-pressure gas to automatically and regularly purge the measurement circuit, so as to ensure the smooth flow of the measurement circuit, which is called blowback.

3.9

Sampling for overproof

The process of triggering the automatic sampling equipment to collect pollutant samples when the pollutants exceed the standard, which is called sampling for overproof.

3.10

Zero calibration

The process of using the zero calibration solution as the specimen to perform test, where the indicated value of the online monitoring instrument is

One of more of above communication media consists the transmission network as referred to in this standard.

The application layer of this standard depends on the basic transmission layer. The basic transmission layer uses the TCP/IP protocol (the TCP/IP protocol has four layers, namely the network interface layer, the network layer, the transmission layer, the application layer), the TCP/IP protocol is constructed in the selected transmission network, which realizes the interface with the transmission network through the network interface layer in the TCP/IP protocol. The application layer in this standard substitutes the application layer (only use three layers of it) in the TCP/IP protocol. The protocol of the entire application layer is irrelevant to the specific transmission network. This standard is irrelevant to the communication media.

6 Communication protocol

6.1 Answer mode

A complete command consists of the requester's initiation and the responder's response. The specific steps are as follows:

1) The requester sends a request command to the responder;

2) After receiving the request, the responder sends a request response (the handshake is completed) to the requester;

3) After receiving the request response, the requester waits for the responder to respond to the execution result; if the requester does not receive the request response, it is processed as overtime of request response;

4) The responder performs the request operation;

5) The responder sends the execution result to the requester;

6) The requester receives the execution result and the command is completed; if the requester does not receive the execution result, it is processed as overtime of execution.

6.2 Overtime retransmission mechanism

6.2.1 Overtime for request response

• If the response is not received within the specified time after a request command is issued, it is considered as overtime;

• In case of retransmission after overtime, if the response is not received after the retransmission exceeds the specified number, it is considered that the

			Note: This field may not be available if the packet is not split, it is related to the flag bit
Command parameters CP	Character	0 ≤ n ≤ 950	CP = &&data area&&, data area is as defined in clause 6.3.3

6.3.3 Data area

6.3.3.1 Structure definition

The field is concatenated with its value by "="; in the data area, the different classification values of the same item are separated by ",", the different items are separated by ";".

6.3.3.2 Field definition

6.3.3.2.1 Field name

Field names are case sensitive, the first character of a word is uppercase, the other parts are lowercase.

6.3.3.2.2 Data type

C4: It indicates a character string of up to 4 digits, it is based on the actual number of digits if it is less than 4 digits;

N5: It indicates a character string of up to 5 digits, it is based on the actual number of digits if it is less than 5 digits;

N14.2: A numeric representation expressed as a variable-length string, which represents a 14-bit integer and a 2-digit fraction, with a decimal point, signed, the maximum length is 18;

YYYY: Date year, for example, 2016 indicates the year 2016;

MM: Date month, for example, 09 indicates September;

DD: Date date, for example, 23 indicates 23rd;

hh: Time hour;

mm: Time minute;

ss: Time second;

zzz: Time milliseconds.

6.3.3.2.3 Field comparison

The field comparison is as shown in Table 4. The "width" in Table 4 only contains

Table 4 (continued)

Name of field	Descriptions	Character set	Width	Value and description
NewPW	New password	0 ~ 9 / a ~ z / A ~ Z	C6	
OverTime	Overtime	0 ~ 9	N2	The unit is second, the value is 0 < n ≤ 99
ReCount	Number of retransmissions	0 ~ 9	N2	The value is 0 < n ≤ 99
VaseNo	Sampling bottle No.	0 ~ 9	N2	The value is 0 < n ≤ 99
CstartTime	Sampling startup time of equipment	0 ~ 9	N6	hhmmss
Ctime	Sampling cycle	0 ~ 9	N2	The unit is hour, the value is 0 < n ≤ 24
Stime	Sampling time	0 ~ 9	N4	The unit is minute, the value is 0 < n ≤ 120
xxxxxx-Info	Field information	-	--	"xxxxxx" is the field information code. Refer to Table B.10 of Appendix B for details
InfoId	Field information code	0 ~ 9 / a ~ z	C6	The value is as shown in Table B.10 of Appendix B
xxxxxx-SN	Online monitoring instrumentation coding	0 ~ 9/A ~ F	C24	It consists of an EPC-96 code converted string, consisting the 24 characters of 0 ~ 9, A ~ F
Note: The (converted) real-time value of pollutants, the (converted) maximum value, the (converted) minimum value, the (converted) average value, etc., determine the width of the uploaded characters according to the actual pollutant monitoring range and accuracy, meanwhile the metering unit of the (converted) real-time value of pollutants, the (converted) maximum value, the (converted) minimum value, the (converted) average value shall be consistent.				

6.4 Coding rules

There are three types of monitoring factors involved in this standard. The first category is the pollutant factor, the second category is the condition monitoring factor, the third category is the field information. The pollutant factor code is defined by relevant national and industry standards GB 3096-2008, HJ 524-2009, HJ 525-2009. The definition of the condition monitoring factor and the field information coding are as shown in the following clauses.

6.4.1 Coding rules for working condition monitoring factor

The coding of condition monitoring factor consists of a six-digit fixed-length alphanumeric hybrid format. The alphanumeric code is abbreviated, the numeric code is represented by an Arabic numeral, using an incremental numeric code.

6.6.1 System code (expandable)

It corresponds to the system code in Figure 4 “Data structure in communication protocol”.

6.6.1.1 Division of categories

System code is divided into four categories, each category represents a system type:

10 ~ 29 indicates the category of environmental quality;

30 ~ 49 indicates the category of environmental pollution source;

50 ~ 69 indicates the category of working conditions;

91 ~ 99 indicates the category of system interaction;

A0 ~ Z9 are used for expansion of unknown system code.

6.6.1.2 System coding method

The system code (as shown in Table 5) is represented by two characters with values 0 ~ 9 and A ~ Z.

Table 5 -- System coding table (refer to GB/T 16706-1996)

System name	System code	Descriptions
Monitoring of surface water quality	21	
Monitoring of air quality	22	
Monitoring of acoustic environmental quality	23	
Monitoring of groundwater quality	24	
Monitoring of soil quality	25	
Monitoring of seawater quality	26	
Monitoring of volatile organic compound	27	
Atmospheric pollution sources	31	
Surface water environmental pollution sources	32	
Groundwater environmental pollution sources	33	
Marine environmental pollution sources	34	
Soil environmental pollution sources	35	
Acoustic environmental pollution sources	36	
Vibration environmental pollution sources	37	
Radioactive environmental pollution sources	38	
Site dust fly pollution sources	39	
Electromagnetic environmental pollution sources	41	
Monitoring of flue gas emission process	51	
Monitoring of sewage discharge process	52	

3) Setting of real-time data reporting interval;

4) Setting of minute data reporting interval;

5) Setting whether the real-time data is reported or not;

6) Setting whether the operation status of the pollution treatment equipment is reported or not.

7 Communication method of online monitoring instrumentation and data acquisition transmitter

The online monitoring instrumentation and the data acquisition transmitter use the RS-485 serial communication standard to realize data communication.

7.1 Electrical interface standards between online monitoring instrumentation and the data acquisition transmitter

It is recommended that the online monitoring instrumentation and the data acquisition transmitter adopt the two-wire system RS-485 interface. For the electrical standard of the RS-485 interface, refer to the RS-485 industrial bus standard.

The RS-485 interface of the on-line monitoring instrumentation and the data acquisition transmitter shall clearly indicate the words “RS485+” and “RS485-’, etc., to indicate the wiring method.

7.2 Serial communication standards between online monitoring instrumentation and the data acquisition transmitter

7.2.1 Serial communication bus structure

The communication bus structure between the online monitoring instrumentation and the data acquisition transmitter is single-master and multi-slave, as shown in Figure 11.

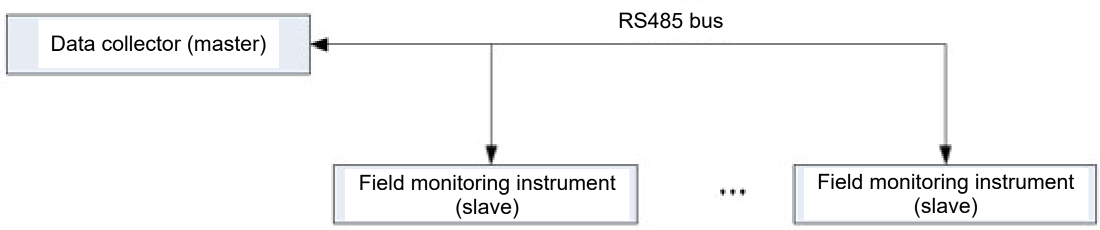

Figure 11 -- RS485 bus system structure

7.2.2 Transmission protocol of serial communication

Appendix A

(Normative)

Cyclic redundancy check (CRC) algorithm

The CRC check (cyclic redundancy check) is a method for checking the data transmission error. This standard uses ANSI CRC16, which is shortly referred to as CRC16.

The CRC16 code is calculated by the transmission equipment and added to the data packet. The receiving equipment recalculates the CRC16 code of the received data packet, compares it with the received CRC16 code. If the two values are different, there is an error.

The steps for generating the CRC16 check byte are as follows:

1) The CRC16 check register is assigned 0xFFFF;

2) Assign the first byte of the checked string to the temporary register;

3) The temporary register is XORed with the upper byte of the CRC16 check register, assigns to the CRC16 check register;

4) Take the last bit of the CRC16 check register, assign it to the detection register;

5) Move the CRC16 check register one bit to the right;

6) If the detection register's value is 1, the CRC16 check register is XORed with the polynomial 0xA001, assigns to the CRC16 check register.

7) Repeat steps 4 ~ 6, until 8 bits are moved;

8) Assign the next byte of the checked string to the temporary register;

9) Repeat steps 3 ~ 8, until all bytes of the checked string are verified;

10) Return the value of the CRC16 check register.

The check code is stored in the order of the first high byte and then low byte.

Example of CRC check algorithm:

```
/*************************************************************************************

Function: CRC16_Checkout
```

Appendix B

(Normative)

Coding table of commonly used monitoring factors and equipment information (expandable)

Note: The data types in the Table below refer to the definition of “6.3.3.2.2 Data type”.

Table B.1 -- Coding table of water monitoring factor (citing HJ 525-2009)

Code	Chinese name	Original code	Default measurement unit (concentration)	Default measurement unit (discharge)	Default data type (concentration)
w00000	Sewage	B01	L/s	m^3	N5.2
w01001	pH value	001	Dimensionless		N5.2
w01002	Chroma	002	Chroma		N3.2
w01006	Total dissolved solids	--	mg/L	kg	N4
w01009	Dissolved oxygen	--	mg/L		N3.1
w01010	Water temperature	--	°C		N3.1
w01012	Suspended solids	003	mg/L	kg	N4
w01014	Conductivity	--	Micro-siemens/cm		N3.1
w01017	5-day biochemical oxygen demand	010	mg/L	kg	N5.1
w01018	Chemical oxygen demand	011	mg/L	kg	N5.1
w01019	Permanganate index	--	mg/L	kg	N3.1
w01020	Total organic carbon	015	mg/L	kg	N3.1
w02003	Fecal coliform	550	piece/L		N9
w02006	Total bacteria	--	piece/L		N9
w03001	Total alpha radioactivity	570	Becquerel/L		N3.1
w03002	Total beta radioactivity	571	Becquerel/L		N3.1
w19001	Surfactant	--	mg/L	kg	N3.2
w19002	Anionic surfactant	520	mg/L	kg	N3.2
w20012	Barium	039	mg/L	kg	N3.3
w20023	Boron	037	mg/L	kg	N3.3
w20038	Cobalt	040	mg/L	kg	N3.4
w20061	Molybdenum	038	mg/L	kg	N3.4
w20089	Thallium	041	ng/L	mg	N4
w20092	Tin	036	mg/L	kg	N3.1
w20111	Total mercury	020	μg/L	g	N3.2
w20113	Alkyl mercury	021	ng/L	mg	N4
w20115	Total cadmium	022	μg/L	g	N3.1

Appendix C

(Informative)

Example of communication command as well as example of split package and response mechanism

Descriptions of example: In the example of Appendix C, QN=20160801085857223 means that a command request is triggered at 8:58:57:223 milliseconds on August 1, 2016, ST=32 means that the system type is the environmental pollution source of surface water, MN=010000A8900016F000169DC0 indicates the unique identifier of the equipment, PW=123456 indicates the equipment access password.

I. Example of communication command

Table C.1 -- Set overtime and number of retransmissions

<table>
<tr><th>Category</th><th colspan="2">Item</th><th>Example / description</th></tr>
<tr><td rowspan="3">Command used</td><td>Host computer</td><td>Send “set overtime and number of retransmissions”</td><td>QN=20160801085857223;ST=32;CN=1000;PW=123456;MN=010000A8900016F000169DC0;Flag=5;CP=&&OverTime=5;ReCount=3&&</td></tr>
<tr><td>Field computer</td><td>Return the request response</td><td>QN=20160801085857223;ST=91;CN=9011;PW=123456;MN=010000A8900016F000169DC0;Flag=4;CP=&&QnRtn=1&&</td></tr>
<tr><td>Field computer</td><td>Return the execution result</td><td>QN=20160801085857223;ST=91;CN=9012;PW=123456;MN=010000A8900016F000169DC0;Flag=4;CP=&&ExeRtn=1&&</td></tr>
<tr><td rowspan="4">Field used</td><td colspan="2">Overtime</td><td>Overtime</td></tr>
<tr><td colspan="2">Recount</td><td>Number of retransmissions</td></tr>
<tr><td colspan="2">OnRtn</td><td>Request response result</td></tr>
<tr><td colspan="2">ExeRtn</td><td>Request execution result</td></tr>
<tr><td>Execution process</td><td colspan="3">1. The host computer sends a request command of “set overtime and number of retransmissions”, waits for the response from the field computer;
2. The field computer receives a request command of “set overtime and number of retransmissions”, responds “request response”;
3. The host computer receives the “request response”, determines whether to wait for the execution results of field computer according to the value of the request response flag QnRtn;
4. The field computer executes the request command of “set overtime and number of retransmissions”, returns the “execution result”;
5. The host computer receives the “execution result”, judges whether the request is completed according to the value of the execution result flag ExeRtn, the request execution is completed.</td></tr>
</table>

Table C.50 -- Extract hour data of pollutant (with response, with split packet)

Category	Item		Example / description
Command used	Host computer	Send the request of "Extract hour data of pollutant"	QN=20160801085857223;ST=32;CN=2061;PW=123456;MN=010000A8900016F000169DC0;Flag=5;CP=&&BeginTime=20160801080000;EndTime=20160801080000&&
	Field computer	Return request response	QN=20160801085857223;ST=91;CN=9011;PW=123456;MN=010000A8900016F000169DC0;Flag=4;CP=&&QnRtn=1&&
	Field computer	Upload hour data of pollutant	QN=20160801085857534;ST=32;CN=2061;PW=123456;MN=010000A8900016F000169DC0;Flag=7;PNUM=2;PNO=1;CP=&&DataTime=20160801080000;w00000-Cou=63.0,w00000-Min=16.4,w00000-Avg=17.5,w00000-Max=20.1,w00000-Flag=N;w01001-Min=7.1,w01001-Avg=7.5,w01001-Max=7.8,w01001-Flag=N;…&&
	Host computer	Return data response	QN=20160801085857534;ST=91;CN=9014;PW=123456;MN=010000A8900016F000169DC0;Flag=4;CP=&&&&
	Field computer	Upload hour data of pollutant	QN=20160801085857535;ST=32;CN=2061;PW=123456;MN=010000A8900016F000169DC0;Flag=7;PNUM=2;PNO=2;CP=&&DataTime=20160801080000;w01018-Cou=63.0,w01018-Min=40.1,w01018-Avg=40.1,w01018-Max=40.1,w01018-Flag=N;…&&
	Host computer	Return data response	QN=20160801085857535;ST=91;CN=9014;PW=123456;MN=010000A8900016F000169DC0;Flag=4;CP=&&&&
	Host computer	Return execution result	QN=20160801085857223;ST=91;CN=9012;PW=123456;MN=010000A8900016F000169DC0;Flag=4;CP=&&ExeRtn=1&&
Field used	BeginTime		Start time of history request, accurate to hour
	EndTime		End time of history request, accurate to hour
	QnRtn		Request return result
	ExeRtn		Request execution result
Execution process	1. The host computer sends a request command "Extract hour data of pollutant", waits for the field computer to respond; 2. The field computer receives the request command of "Extract hour data of pollutant", responds the "Request response"; 3. The host computer receives the "Request response", determines whether to wait for the field computer to report the history data according to the value of the request response flag QnRtn; 4. The field computer executes the request command of "Extract hour data of pollutant"; 5. The field computer reports one message of hour data of pollutant within the time period of request; 6. The host computer receives the command of "Upload hour data of pollutant" and executes it, returns the "Data response"; 7. The field computer receives the "Data response"; 8. The field judges whether the hour data of pollutant within the time period of request is all reported; if it is not all reported, jump to step 5; otherwise return the "Execution result"; 9. The host computer receives the "Execution result", judges whether the request is completed according to the value of the execution result flag ExeRtn, the execution of request is completed		

Appendix D

(Informative)

Calculation method for main pollutants in monitoring points of sewage and flue gas pollution sources

D.1 Calculation method of main pollutants in monitoring points of sewage pollution sources

D.1.1 Sewage discharge

D.1.1.1 Sewage discharge within time slice (seconds)

$$D_{\Delta i} = Q \times T \times 10^{-3} \quad \text{(1)}$$

Where:

$D_{\Delta i}$ - The sewage discharge within the i^{th} T time slice, m^3;

Q - Instantaneous flow rate of sewage, L/s;

T - Length of time slice, collecting a set of real-time data at least 5 s, s.

Note: The sewage discharge within the time slice (second) can also be obtained by the method of accumulating the flow difference of the corresponding time period.

D.1.1.2 Minute (for example, 10 minutes), hour, daily sewage discharge

$$D_m = \sum_{i=1}^{n} D_{\Delta i} \quad \text{(2)}$$

$$D_h = \sum_{i=1}^{m} D_m \quad \text{(3)}$$

$$D_d = \sum_{i=1}^{h} D_h \quad \text{(4)}$$

Where:

D_m - The sewage discharge at the m^{th} minute, m^3;

n - The number of sewage discharge data within the time slice of effective

$D_{\Delta i}$ - Sewage discharge in the i^{th} T time period, m^3.

D.1.2.2 Minute (for example, 10 minutes), hour, day water pollutant discharge

$$G_m = \sum_{i=1}^{n} G_{\Delta i} \quad (9)$$

$$G_h = \sum_{i=1}^{m} G_m \quad (10)$$

$$G_d = \sum_{i=1}^{h} G_h \quad (11)$$

Where:

$G_{\Delta i}$ - Pollutant discharge in the i^{th} T time period, kg;

G_m - Water pollutant discharge at the m^{th} minute, kg;

n - The number of pollutant discharge data in the time slice as effectively measured within the m^{th} minute, (n is an integer, $n \geq 120$);

G_h - Water pollutant discharge at the h^{th} hour, kg;

m - The number of minute pollutant discharge data as effectively measured in the h^{th} hour, (m is an integer, $1 \leq m \leq 6$);

G_d - Daily water pollutant discharge, kg;

h - The number of hour pollutant discharge as measured effectively within one day, (h is an integer, $1 \leq h \leq 24$).

D.1.2.3 Minute (for example, 10 minutes), hour, daily average of water pollutant concentration (weighted average method)

$$\overline{C_m} = \frac{G_m}{D_m} \times 10^3 \quad (12)$$

$$\overline{C_h} = \frac{G_h}{D_h} \times 10^3 \quad (13)$$

$$\overline{C_d} = \frac{G_d}{D_d} \times 10^3 \quad (14)$$

Where:

It is cited from HJ/T 75-2007, HJ/T 76-2007.

D2.1 Calculation formula for conversion of pollutant concentration

(1) The conversion between the concentration of pollutant at working conditions (measured status) and the concentration at standard conditions (standard status) are calculated according to formula (18):

$$C_{sn} = C_s \times \frac{101325}{B_a + P_s} \times \frac{273 + t_s}{273} \quad (18)$$

Where:

C_{sn} - Mass concentration of pollutant under the standard status, mg/m^3;

C_s - Mass concentration of pollutant under the working conditions, mg/m^3;

B_α - The ambient atmospheric pressure value of the CEMS installation site, Pa;

P_s - Static pressure value of flue gas as measured by CEMS, Pa;

Ts - Temperature of flue gas as measured by CEMS, °C.

Note: The dry/wet-base state for the concentration at working conditions and the concentration at standard conditions in the formula (18) shall be the same.

(2) The conversion of pollutant's dry-base concentration and wet-base concentration is calculated according to formula (19):

$$C_{dry} = \frac{C_{wet}}{1\text{-}X_{sw}} \quad (19)$$

Where:

C_{dry} - Dry-base concentration of pollutant, mg/m^3 (μmol/mol, ppm);

C_{wet} - Wet-base concentration of pollutant, mg/m^3 (μmol/mol, ppm);

X_{SW} - Absolute humidity of flue gas (also known as moisture), %.

Note: The working conditions of dry-base concentration and wet-base concentration in formula (19) shall be the same; the calculation method of dry/wet-base concentration conversion of oxygen content is the same as in formula (19).

(3) The conversion of the volume concentration of gaseous pollutants and the

$$\overline{C_{Qj}} = \frac{\sum_{i=1}^{n} C_{Qi}}{n} \quad \text{(23)}$$

Where:

$\overline{C_{Qj}}$ - The average value of the dry-base standard status mass concentration of the pollutant as measured by the at j^th minute, mg/m^3;

C_{Qi} - Instantaneous mass concentration of pollutant at dry-base standard status as acquired and measured by the CEMS at the maximum interval of 5s, mg/m^3;

n - The number of instantaneous data as effectively measured by CEMS during that minute, (n is an integer, n ≥ 12).

Note: For the other monitoring factors such as oxygen content of flue gas, flow rate of flue gas, temperature of flue gas, static pressure of flue gas, humidity of flue gas, the calculation method is same as the formula (23).

(2) The hour data of mass concentration of pollutant is calculated according to formula (24):

$$\overline{C_{Qh}} = \frac{\sum_{j=1}^{k} \overline{C_{Qj}}}{k} \quad \text{(24)}$$

Where:

$\overline{C_{Qh}}$ - The average mass concentration of pollutant discharge at dry-base standard status as measured by CEMS at the h^th hour, mg/m^3;

k - The number of minute average as effectively measured by CEMS during that hour (45 ≤ k).

Note: For the other monitoring factors such as oxygen content of flue gas, flow rate of flue gas, temperature of flue gas, static pressure of flue gas, humidity of flue gas, the calculation method is same as the formula (24).

(3) Daily average value data of mass concentration of pollutant is calculated according to formula (25):

$C_{VO2\ dry}$ - Dry-base volume concentration of oxygen content in flue gas emission, %.

(3) For the type of pollution source whose oxygen content of industry emission standard is specified in the pollutant discharge standard, the converted emission concentration of the pollutant is calculated according to the formula (28):

$$C_{converted} = C_{sn\ dry} \times \frac{21\% - C_{O2s}}{21\% - C_{VO2\ dry}} \quad (28)$$

Where:

C_{O2s} - The oxygen content of industry standard as specified in the emission standards, %.

(4) For the types of pollution sources whose standard excess air coefficient or standard oxygen content are not specified in the pollutant discharge standard, the converted concentration of the pollutant discharge is calculated according to the dry-base mass concentration at standard status.

D2.4 Calculation formula for pollutant discharge flow rate

(1) The average flow rate of flue gas emissions along the cross-section of the chimney or flue is calculated according to formula (29):

$$\overline{V_s} = K_v \times \overline{V_p} \quad (29)$$

Where:

K_v - The velocity field coefficient as set by CEMS;

$\overline{V_p}$ - The flow rate of the flue gas as acquired and measured by the CEMS at the maximum interval of 5 s, m/s;

$\overline{V_s}$ - The instantaneous flow rate of the flue gas along the cross-section of chimney or flue, m/s.

(2) The hour flow rate of flue gas emission under working condition is calculated according to formula (30):

$$Q_{sh} = 3600 \times F \times \overline{V_{sh}} \quad (30)$$

------ The End ------