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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 33017.6-2024

**Technical requirements of high efficiency air pollution control
equipment for assessment - Part 6: Wet electrostatic
precipitator**

高效能大气污染物控制装备评价技术要求 第6部分:湿式电除尘器

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2 Normative references

The document cites GB/T 8924 (test method for the burning behaviour of fibre reinforced plastics, oxygen index method), GB/T 13931 (performance test method for electrostatic precipitators), GB/T 16845 (terminology for dust collectors), GB/T 19001 (quality management systems, requirements), GB/T 24001 (environmental management systems, requirements with guidance for use), GB/T 33017.1 (Part 1 of the series, general rules for preparation), GB/T 40505 (performance test method for wet electrostatic precipitators), GB/T 40514-2021 (electrostatic precipitators), DL/T 5182 (design code for the installation of local instrument and control equipment, piping and cables in thermal power plants), JB/T 5909 (porcelain insulators for electrostatic precipitators), JB/T 12593 (wet electrostatic precipitators downstream of wet flue gas desulfurization of coal-fired flue gas) and JB/T 13556 (tubular wet electrostatic precipitators).

3 Terms and definitions

3.1 wet electrostatic precipitator: an electrostatic precipitator that removes the particulate matter collected on the electrodes by means of water or another liquid.

3.2 particulate matter: the solid and liquid particulate substances suspended in the flue gas.

3.3 power consumption: the total active electric energy consumed per unit time. A note states that it does not include the resistance power consumption and gives the unit as kilowatt hours per hour.

3.4 power consumption ratio: the electric energy consumed in treating unit volume of dust-laden flue gas at working conditions. A note gives the unit as kilowatt hours per thousand cubic metres.

3.5 resistance power consumption: the power consumed per unit time by the induced draught fan in overcoming the pressure drop of the wet electrostatic precipitator. A note gives the unit as kilowatt hours per hour.

3.6 water consumption: the average quantity of water consumed per unit time. A note gives the unit as cubic metres per hour.

3.7 water consumption ratio: the quantity of water consumed in treating unit volume of dust-laden flue gas at working conditions. A note gives the unit as cubic metres per thousand cubic metres.

4 Evaluation requirements

4.1.1 The enterprise that makes the precipitator is to meet the relevant environmental protection laws, regulations and standards, and to set up and run a quality management system and an environmental management system under GB/T 19001 and GB/T 24001 respectively.

4.1.2 The design, manufacture and installation of the precipitator meet JB/T 12593 and JB/T 13556.

4.1.3 Steel structure strength calculation software is used to analyse the strength of the whole machine. Materials are used sparingly in design and manufacture, and green materials are used.

4.1.4 The requirements for the high voltage power supply and its design selection meet GB/T 40514, as does the communication between the high voltage power supply, the low voltage automatic control device and the host computer or distributed control system.

4.1.5 The configuration and structure are fixed from the volume of flue gas to be treated at working conditions, taking into account the nature of the gas, the collection efficiency required and the working conditions, and are arranged as required by C.6 of GB/T 40514-2021.

4.1.6 In the tubular wet electrostatic precipitator of conductive fibre reinforced plastic, the base material of the anode tube is an epoxy vinyl ester resin, the reinforcement is alkali-free glass fibre and the conductive layer on the inner surface is a carbon fibre surface mat.

4.1.7 The insulators meet JB/T 5909, are of the anti-condensation type, and are fitted with a hot air purging device.

4.2 The quantitative evaluation indicators are graded under GB/T 33017.1. The second-level indicators chosen are the outlet particulate matter concentration, the particulate matter removal efficiency, the sulfur trioxide removal efficiency, the pressure drop, the air leakage rate, the power consumption ratio, the water consumption ratio, and the service life of the anode plates or tubes and the cathode wires; the evaluation requirements meet Table 1.

4.2 Table 1 groups the indicators under four first-level headings and carries two evaluation columns, one for the metal wet electrostatic precipitator and one for the tubular wet electrostatic precipitator of conductive fibre reinforced plastic. Only two rows carry a separate figure for each column; on all the other rows a single requirement covers both types. Under the environmental indicators, the outlet particulate matter concentration is not more than 2.50 mg per cubic metre and the operating noise not more than 70 dB(A). Under the technical performance indicators, the particulate matter removal efficiency is at least 85 per cent, the sulfur trioxide removal efficiency at least 80 per cent, the pressure drop not more than 200 Pa and the air leakage rate not more than 0.50 per cent. Under the energy consumption indicators, the power consumption ratio is not more than 0.13 kilowatt hours per thousand cubic metres, and the water consumption ratio, in cubic metres per thousand cubic metres, is not more than 2.50 times ten to the power of minus three for the metal type and not more than 0.66 times ten to the power of minus three for the conductive fibre reinforced plastic tubular type. Under the safety and reliability indicators, the service life of the anode plates or tubes and the cathode wires is at least four years, and the oxygen index of the conductive fibre reinforced plastic is at least 32 per cent, this last requirement not applying to the metal type. A note explains that a dash means that the indicator does not apply, and two footnotes state that a precipitator reaching the stated removal efficiency for particulate matter, or the stated removal efficiency for sulfur trioxide, may likewise be recognized as a high efficiency wet electrostatic precipitator.

5 Test methods

5.1 The environmental, technical performance and energy consumption indicators are tested after the equipment has been in normal operation for two months and within six months, the first performance test being carried out by a qualified testing body. A second performance test by a qualified testing body is preferably carried out after twelve months of continuous operation or within the month before the warranty expires.

5.2 The outlet particulate matter concentration is tested under GB/T 40505.

5.3 Noise is measured with a sound level meter on A weighting at 1.50 m from the casing and 1.20 m above the ground, on the slow setting, three times for 10 s each, the arithmetic mean of the three being the operating noise value.

5.4 The particulate matter removal efficiency and the sulfur trioxide removal efficiency are tested under GB/T 40505.

5.5 The pressure drop is tested under GB/T 13931.

5.6 The air leakage rate is tested under GB/T 40505.

5.7 The power consumption of the high voltage supply equipment and of the low voltage equipment, and the flue gas volume, may be taken as the mean of seven consecutive days of measurement; where the equipment is shared with other systems, the consumption is apportioned according to the share of each system.

5.8 Water consumption is measured with a calibrated water meter installed under DL/T 5182; the start and finish times of the test and the matching meter readings are recorded, and the test period is a whole number of flushing cycles.

5.9 The service life of the anode plates or tubes and the cathode wires is counted year by year after one year of operation.

5.10 The oxygen index of the conductive fibre reinforced plastic is tested under GB/T 8924.

6 Calculation methods

6.1 The outlet particulate matter concentration is calculated under GB/T 40505.

6.2 The particulate matter removal efficiency, the sulfur trioxide removal efficiency and the air leakage rate are calculated under GB/T 40505; the pressure drop is calculated under GB/T 13931.

6.3.1 The power consumption is the sum of the power consumption of the high voltage supply equipment and that of the low voltage equipment, the latter taking in insulator heating, hot air purging and the spray water circulating pumps. It does not include the resistance power consumption, and where the equipment is shared with other systems it is apportioned according to the share of each system; the unit is kilowatt hours per hour. The power consumption ratio is the power consumption divided by the volume of dust-laden flue gas treated at working conditions, in thousand cubic metres per hour, and is expressed in kilowatt hours per thousand cubic metres.

6.3.2 The water consumption is the difference between the finishing and the starting reading of the water meter, in cubic metres, divided by the time in hours, and is expressed in cubic metres per hour. Where the precipitator is set to intermittent flushing, the time is one flushing cycle, that is, from the start of one flush to the start of the next; where it is set to continuous flushing, the time is not less than eight hours. The water consumption ratio is the water consumption divided by the volume of dust-laden flue gas treated at working conditions, in thousand cubic metres per hour, and is expressed in cubic metres per thousand cubic metres.