



“Gheorghe Asachi” Technical University of Iasi, Romania



RESEARCH AND APPLICATION OF LOW PARTICULATE MATTER CONCENTRATION TESTING TECHNOLOGY IN HIGH HUMIDITY AND LOW TEMPERATURE ENVIRONMENT

Huimei Yao^{1,3}, Weixiang Chen¹, Xinglian Ye^{1,2*}, Yulan Liang³, Fang Zheng¹, Limei Wu¹

*¹State Environmental Protection Engineering and Technology Center for Power Industrial Dust Control,
Longyan 364000, Fujian Province, China*

²School of Metallurgy, Northeastern University, Shenyang 110819, China

³Minxi Vocational and Technical College, Longyan 364012, Fujian Province, China

Abstract

The accuracy of the particulate matter (PM) emission measurement in coal-fired power plants has been enhanced to meet stricter environmental standards. The self-made "test and calibration device of low PM concentration" was used to simulate the complex field conditions of flue gas with high humidity, high acid and low temperature (about 50°C). The detection limits and PM trapping performances of six filtration membranes were tested. The filtration membrane with the best trapping performance was studied under different filtration wind velocities and low flow velocity condition. And the simulation test was verified by practical application. The results showed the feeding frequencies had a good linear relationship to the PM concentrations, which can be used as a standard curve to calibrate the PM concentration. The borosilicate membrane had the lowest detection limit and the best PM trapping performance in high humidity and low temperature environment. The large diameter sampling nozzle should be selected for the measurement of low PM concentration. Predicting constant current isokinetic sampling method was recommended for the measurement of low velocity PM concentration. Practical application had proved that our test method is feasible, and the borosilicate membrane is more suitable than the commonly used Swedish quartz membrane for the measurement of low PM concentration in saturated wet flue gas.

Keywords: coal-fired power plant, high humidity, low temperature, low PM concentration, testing technology

Received: November, 2019; Revised final: July, 2020; Accepted: July, 2020; Published in final edited form: January, 2021

* Author to whom all correspondence should be addressed: e-mail: yexinglian1228@126.com; Phone: +8615206070144; Fax: +8605972996919