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Development of Stack Particulate Matter Simulator

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Abstract

A simulator has been developed to reproduce exhaust gases containing particles in a flue gas and to perform various tests using simulated flue gases. One of the applications of the simulator is to evaluate the performance of automatic dust concentration measuring instruments (dust monitors). Dust monitors are widely used in thermal power stations and waste incinerators, as they can constantly monitor the dust concentration. With the development of automatic dust concentration measurement technology, installation and operation is becoming more common. In Europe, certification systems have been established through MCERTS in the UK and TÜV in Germany, and are legally recognised as continuous monitoring systems (CMS). In Japan, these developments were delayed, but a series of JIS standards were finally established in 2020 and a certification system is currently being developed. However, only gravimetric methods are still permitted by Air Pollution Control Act in Japan for measuring dust concentration in exhaust gases, and not dust monitors. One of the reasons is the lack of scientific evidence on those dust detection characteristic performance. In this report, the actual performance of a newly developed simulator is evaluated to confirm compliance with JIS standards, and useful findings such as validity and operational problems are reported. The simulator made it possible to evaluate the correspondence between the measured values of the dust monitor and by gravimetric methods. In the future, evidence on the performance of the dust monitor will be accumulated and improvements will be made to enable testing at lower concentrations.

Keywords: Dust monitor, Performance evaluation test, continuous monitoring systems, JIS B-7996; JIS B-7997