

Experiences with calibration of dust AMS according to VDI 2066 and prEN 13284

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For the past 25 years dk-TEKNIK has been calibrating various monitors in Denmark. Traditionally the VDI standards has been used, but in the near future when the E-directive for waste plant is implemented, the Cen standards belonging to his directive will also be implemented. In order to get experience with the new equipment, as well as to see how well the existing standards compare with the coming standard, there has been made a series of parallel measurements.

The measurements were made in the stack after a sludge incinerator. After the boiler the gas is cleaned in a scrubber and emitted via the stack. At the inlet of the stack the gas is reheated with cooling air 130-140°C, from xx to approx, 78°C. In the stack the dust concentration is monitored by a SICK RM 210.

The measurements performed according to VDI 2056 were made instack with a 47 mm. Whatman QMA plane filter, while the other measurements were performed outstack with the same type of filter and a filtration temperature of 160 degree C.

The main results of the measurements are shown in the table below.

Test	Unit	1	2	3	4	5	6	7	8	9	10
Gasetemp.	°C	76.8	78.4	76.6	77.8	79.1	79.3	77.5	78.0	77.6	78.9
H2O content	%	5.5	7.1	6.2	6.5	5.67	6.1	6.6	7.2	6.6	6.6
O2 content	%	15.8	15.6	15.4	15.5	16.0	15.3	15.4	15.6	15.5	15.5
Dustconc. VDI	mg/m ³	31.5	28.9	40.1	24.6	19.2	28.6	43.3	30.4	31.9	34.4
Dustconc. CEN	mg/m ³	13.7	12.6	18.0	17.0	15.5	17.4	19.0	17.9	17.9	14.2
AMS signal	mA	8.0	7.1	8.7	6.0	5.8	6.5	8.7	6.9	6.8	7.2

Table 1 Main results of dust concentration measurements vs AMS.

In the figures below the calibration curve for each series of measurements is shown.

Figures showing calibration curves omitted from the CD-ROM.

Figure 2 Calibration curve, VDI

Figure 3 Calibration curve, CEN

Since the monitor detects the changes in concentration with a higher correlation for the VDI method than the method the conclusion is, that the collected amount of dust is present as dust in the stack and not artefact.

Our measurements from March to December, 29 in total exposed during 7 visits to the plant, re within the range from $15\text{mg}/\text{m}^3$ to $55\text{ mg}/\text{m}^3$ and with a good correlation.

Nowadays many plant emit the flue gas in the temperature range from 60 to 100°C , and with the definition of dust in prEN 13284, as the mass remaining on the filter after post treatment at 160°C , some semivolatiles might fall out as particles before the flue gas is emitted.

In Denmark as well as Germany the purpose of the legislation is to protect the impact on health and environment, and therefore the limit values are based on our knowledge of how each substance is injurious to health and environment. In this specific case the emission is artificially reduced to approximate 50% compared to the traditional measurements which are performed at the plant.