APPLICATION OF CONTINUOUS DIOXIN MONITORING TECHNIQUE ACCORDING THE EUROPEAN STANDARD[1] AT HIGH DUST LEVELS AT A BRICK PRODUCTION PLANT AND CALULATION OF THE ANNUAL MASS FLOW

Thomas Steiner, Gerhard Kahr

MonitoringSystems GmbH, Schloss 2, 2542-Kottingbrunn, Austria

Introduction

The transfer of the European standard for the measurement of dioxins[1] for the application of continuous monitoring, better understood described as continuous sampling, started in 1993 in Vienna[2]. Several different plants were under surveillance since this time, where the main application is the use of continuous sampling for a flue gas after passing a respective treatment system. This paper presents the experience and results collected at an installation at an industrial plant that does not use any treatment of the flue gas, which causes very a high dust content and several unexpected flue gas components.

Methods and Materials

The respective plant where the measurements took place is a plant producing bricks, located in Belgium. The main production process is same like the usual used process, but the main differences cause a very typical change of the flue gas conditions. This plants uses an additive for the raw material for the bricks, that has an own caloric value. This helps the optimisation of the production process due to generating also heat from the raw bricks inside while the burning process using an oil fuel. The production seems to be a continuous due to adding a new block of bricks to the oven every time when another one leaves the oven on the other side, but the conditions inside the oven change often and fast, sometimes in a huge range, so the real process is more batch similar.

The monitoring was done using a DioxinMonitoringSystem, Version G.18, which is able to sample flue gas according the European Standard for a time up to 6 weeks. The device works according the dilution method with the main advantage of being a complete dry process which makes the application at high dust content possible. The dilution gas if purified in a filter stack of several different filter materials and techniques. The flue gas is sucked using a sophisticated direct isocinetics controlling process without the need of the measurement of any flow data. The mixture of these gases pass a multi-layer filter stack, which is analysed in a laboratory periodically.

Results and Discussion

The measurement was done for two weeks each using one of two titanium filter cartridges alternating. While the first measurements the working conditions of the monitoring device were adapted to meet all the requirements of sampling quality also for this type of plant and flue gas especially to meet the required criteria of the dust sampling standard[3] due to a dust content of 80 to 100 mg per m^3 causing approximately 30 g of dust load for each sampling filter. After this the measurements were done on a regular base with results that have been similar to results measured before with short time measurement techniques, but they give now the confidence that due to the batch-similar process the emission of dioxins in not influenced in a way that the emissions is over the legal limit of 0.1 ng per m^3.

Using the data collection function of the monitoring device all the plant data as well as the sampling data were collected and put together to a calculation of the annual mass flow. There mainly the registered temperature, velocity and humidity of the flue gas are processed together with the quality assurance data of the sampling including isocinetic, filter temperature and sampling speed as well as plant signals of the production process which indicates the actual operation state.

This calculation resulted in a plant's mass flow of about 9 mg TEQ per year with the estimation of a production time of 80 %. This value is to be reflected to the process' target which is the production of bricks.

Conclusions

The used standard measurement device is applicable for the respective plant type by only improving the sampling logistics.

Compared to other plant types the gained TEQ mass flow result represents e.g. about the half value of the TEQ mass flow of the hazardous waste incinerator in Vienna[4].

Due to this unexpected result the flue gas treatment of respective plant types should include one step to ensure low dioxin emissions for typical operation conditions.

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References

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