

Removal of Dioxin from Acid Washed Municipal Waste Incineration (MWI) Fly ash.

A mutual R&D project of:

- UMTEC
- Von Roll Inova AG
- BSH Umweltservice AG
- KEBAG
- BAFU



Fig. 1: operation of a flotation pilot plant at KEBAG, Zuchwil

Subject: Residues from MWI's

Background and objectives

Fly ash from waste incineration plants MWI is cleaned very effectively from toxic heavy metals by the "acid wash process" (FLAWA). However, it still contains organic pollutants, in particular dioxin. Although dioxin is very strongly attached to the fly ash, it may at least theoretically, be remobilised.

Whilst taking into consideration the precautionary principle of environmental legislation, it would be desirable to remove the dioxin before the ash together with other waste products is dumped at waste sites.

Together with Von Roll Inova AG, BSH AG, a MWI plant and BAFU, UMTEC carried out a research and development project, in which it was shown that dioxin from fly ash may be removed by an innovative method (exDIOX).

The product is a filter cake which is largely free of mobile heavy metals as well as dioxin and other organic pollutants. This filter cake may be deposited mixed with bottom-ash.



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The idea

The core of the exDIOX method lies in a flotation of the fly ash. Here, the dioxin-containing soot particles contained in the fly ash are separated from mineral ash material. The dioxin loaded soot is brought out as a concentrate (Fig. 2 on the left). This concentrate is recycled back into the incineration, wherein the dioxin is finally destroyed. The residue is a mineral fraction (Fig. 2 on the right) which is depleted in dioxin and heavy metals. This "clean" mineral fly ash may be mixed together with the MWI bottom-ash, and be inexpensively deposited in the bottom-ash compartment.

The implementation

Within the framework of the project, the flotation was firstly optimised on a laboratory scale. Here, flotation reactants, pH-value, solid matter content and the flotation time were evaluated.

The laboratory trials showed that by way of the flotation, the dioxin contamination of the fly ash may be reduced by more than two thirds.

In a second step, the flotation was tested on a technical scale. For this, a flotation pilot installation (Fig. 1) was operated for two weeks. The location of the installation was a MWI, whose fly ash purification is equipped with an acid wash (FLAWA).



Fig. 2: dioxin concentrate (left) and "clean" fly ash (right)

Samples of the various substance flows (raw ash, purified ash and pollutant concentrate) was taken regularly during the pilot trials, and was finally processed in the UMTEC laboratories and examined with regard to their dioxin content.

The results

The two-week pilot trial showed that the flotation of the fly ash may also be realised on a technical scale. The depletion of more than two thirds which was achieved previously in the laboratory was also reproduced in the pilot trials (Fig. 3).

A supplementary trial series furthermore showed that dioxin concentrate which was floated out, is destroyed without residue on leading back into the MWI, and did not result in the increase of dioxin concentration in the bottom-ash.

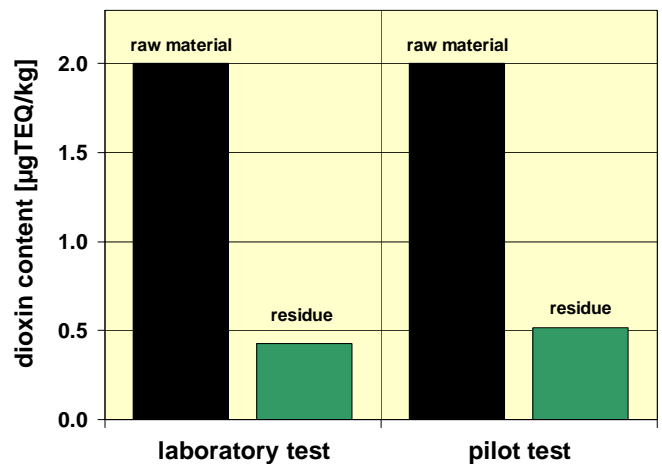


Fig. 3: dioxin depletion of acid-washed fly ash achieved in the laboratory/pilot trials

The conclusion

It is becoming apparent that in harmonisation with EU-regulations, a dioxin limit value for the waste disposal of fly ash will be introduced, which will probably lie at 1 µg/kg. Since fly ash typically has dioxin contents of up to 3 µg/kg, by way of the treatment by exDIOX methods, the dioxin residue contents may be reliably reduced to less than 1 µg/kg. The exDIOX method thus permits the MWI-operator to also be able to deposit his acid-washed fly ash in bottom ash compartments in the future, which results in significant savings in waste disposal site fees.

The exDIOX method was invented at UMTEC and was filed as a patent by Von Roll Inova AG.

A waste incineration plant equipped with the exDIOX method combines ecological advantages with economic advantages in an ideal manner.