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Process description of the rotary kiln at the REMONDIS QR site in Dorsten

In Dorsten REMONDIS QR operates a rotary kiln system for the treatment of various metal-containing wastes including especially mercury. The main purpose of distillating mercury containing waste in the rotary kiln is the removal of metallic mercury and the recovery of nonferrous metal concentrates (e.g. copper), if any.

Mercury and nonferrous metals are recovered by means of distillation which is being done by heating up the waste in the rotary kiln and transforming them into a gas phase. Main objective of the distillation in the rotary kiln is the removal of the hazardous substances like mercury contained in the waste and, if possible, a further use of the mercury-free (metall) residue. If re-use or recycling of the residue is not feasible, it will be disposed of as waste.

After the distillation of metallic mercury in the rotary kiln, mercury will be stabilized in the HgS plant converting to mercury sulphide (HgS). In the last step, the mercury sulphide will be disposed of in an underground landfill (salt mine).

Process description

Material feeding of the rotary kiln is located in a separate area. The mercury containing waste, delivered mostly in big-bags or drums, will be unloaded into a screen from which the material is transported onwards via a screw. By means of the bucket elevator, the material is conveyed to the metering screw for the rotary tube feed. Both input and output devices of the rotary kiln and the exhaust air from the hall are constantly sucked off and filtered through a dust and a fine dust filter. The flue gas from the distillation process is cleaned by an e-filter. All exhaust air flows finally are being fed to an activated carbon filter.

Technical data

- The rotary kiln is directly heated
- and operated with natural gas
- Length 8m
- Diameter 1.80m
- Maximum capacity 2t/h

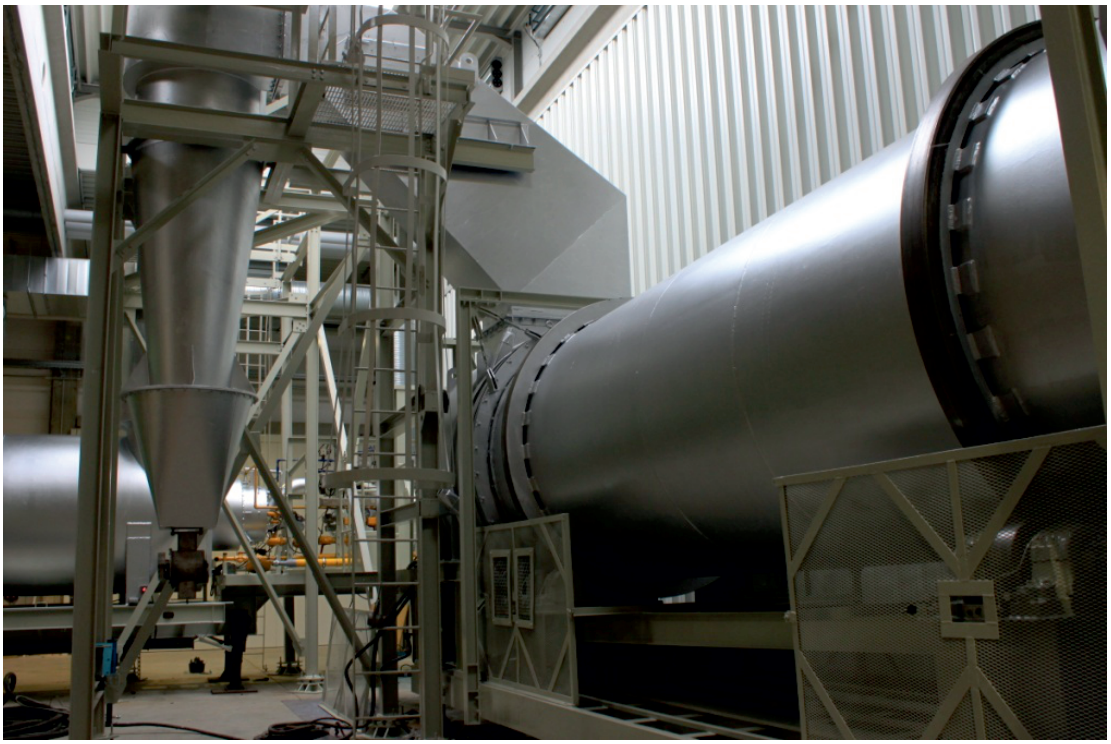

Figure: Rotary kiln for distillation of mercury containing waste

The rotary kiln is operated in slight under-pressure atmosphere in order to prevent dust emissions. To minimize the not wanted intrusion of atmospheric oxygen in the rotary kiln, a few millibar of pressure difference can be set.

Input materials such as actived carbon, catalyst, soil, button cells, fluorescent tube powder or sludge are continuously heated at a temperature up to about 800°C. As a result, water and mercury are transformed into the gas phase and removed from the rotary kiln as exhaust vapor. The remaining solid residue from the process is conveyed out at the end of the kiln via a screw and made available for further re-use or disposal of in big-bag.

The exhaust vapor stream from the rotary kiln is transported by a cyclone into the post-combustion chamber. Dust particles are separated in the cyclone before the exhaust stream enters the combustion. Under controlled oxygen atmosphere in the post-combustion chamber, the elemination of hydrocarbons and CO takes place. Mercury treated under these conditions is almost completely released in gaseous form, consequently only elemental mercury is left in the vapor.

After combustion, the remaining exhaust gas stream reaches the 3-stages exhaust gas treatment, in which the exhaust stream is cooled down to achieve a condensation of mercury and water. Afterwards the remaining gas stream, predominantly consisting of non-air polluting substances, passes an electro filter achieving the deposition of aerosols. The electro filter is operated as wet system. Finally the exhaust gas stream is further transported through an activated carbon filter system to remove residual mercury.

Disposal code:

D9: Physicol chemical treatment

The rotary kiln is to be classified as D9 operation only in combination with subsequent stabilisation of the recovered mercury in the HgS-plant, where metallic mercury is stabilized into mercury sulphide and finally dispose of in an underground mine (D12).