

## ***Technical Information***

No. 7 · page 1

### ***Economical repair of used metal catalysts from wire enamelling ovens by regeneration***

The ovens of modern enamelling machines are working according to the catalytic air recirculation principle.

The use of KATEC metal catalysts in the air recirculation system contributes considerably to the important reduction in the oven energy demand as the heat produced by combustion of the solvents in the catalyst is recycled into the oven. Therefore this amount of energy can be saved from the energy requirement of the oven.

During the passing of the enamelled wire in order to achieve final polymerisation of the enamel in the oven, not only solvents are driven off but also polymers and enamel catalysts are released into the recirculation air towards the catalyst. Furthermore copper or aluminium dust and other dust particles from inside the factory are carried with the fresh air into the oven and into the recycling air. This also deposits on the catalyst surface.

These deposits do have a negative influence on the catalytic process. The amount and composition of these deposits varies depending on the type and quality of the enamel respectively of the type or make of enamelling oven and the working hours.

A regular washing of the catalysts about every 2 – 3 months as recommended in our Technical Information No. 6, will remove a part of these deposits, but not all.

Even with the recommended washings there will be a continuous decrease in the combustion efficiency of the catalyst with time. This reduction in the activity will cause an increase in heating energy by the oven in order to maintain the required operation temperature.

It is therefore necessary from time to time to exchange used catalysts with fully active ones.

By the process of regeneration catalysts can be renewed in our works to full activity again.

## **Technical Information**

No. 7 · page 2

The regeneration consists of a chemical process, that replaces the dirty and therefore inactive catalyst surface with a new one. The metal frame as well as the support material of the catalysts is being used again.

At the same time necessary mechanical repairs can be carried out at the catalyst elements in order to take care that compressed mats and twisted frames are not the cause for the increase of the pressure drop as well as of air by-passes, which could influence the function of the catalyst negatively.

***This means that through regeneration used catalysts can be renewed into a catalyst with full activity as a new one.***

Depending on the working hours between the regeneration and the working conditions of the ovens - for example temperatures - between 4 and 6 reactivations can be carried out on the same catalyst element.

***The cost involved in carrying out such a regeneration consists of the cost for dismantling the element, transport cost to KATEC works, the direct regeneration cost with possible additional mechanical repair cost, the return shipment and the reinstallation in the oven.***

The direct regeneration cost in our works is about 50 – 60 per cent of the price of a new catalyst, plus mechanical repairs.

In order to reduce the hidden costs when sending catalysts for regeneration, for example administration costs, such as buying office, accounting etc., it is recommended that you send a minimum quantity of catalyst elements per order to KATEC. This also will give some advantages regarding production costs in KATEC thus helping us maintain our low prices.

***This however requires that there will be spare catalysts available in customers plant that can be installed in lieu of the used catalysts. This is the case in most plants.***

The experience shows us, that in spite of this additional expense regular exchange of the catalysts with subsequent reactivation within every 6 – 9 months is economically.

Also customers in oversea countries realised these advantages and are sending their catalysts by air or sea freight to KATEC.

## ***Technical Information***

No. 7 · page 3

The time required for carrying out the reactivation in our works depends on the number of elements involved. The normal delivery time is 1 – 2 weeks. Depending on distances, means of transport and customs clearance from country of origin you have to add approx. 1 – 4 weeks (or according agreement) for the complete reactivation process.

Also for that reason it is recommended to have a certain number of spare elements available, being either new or reactivated ones.

Since many different ovens use the same type of catalyts this does not mean that for each oven a complete set of catalyst elements has to be available.

The catalysts returning from regeneration will be put into stock in order to be used later as replacement catalysts.

Another result of the reduced efficiency of the catalyst besides the economical one is the decrease in the exhaust gas quality. The solvent concentration of the exhaust gas from the wire enamelling oven increases when the catalyst function decreased. Because of this reason a regular exchange of the catalyst is recommended.

It should be pointed out, that leaving a deactive or low function catalyst in the oven will result in a destruction of the catalyst. The failing catalyst will require high heating demands from the oven heating system, through which because of radiation, high temperatures, or even flame contact (in the case of a gas burner) the catalyst can be damaged.

There is also a risk of condensate deposition with a sudden burn off on the catalyst. This can cause also the damage of the catalyst.

The strong demand of heat energy from the heating system, especially when electrical heating is installed, will cause excessive abrasion on the heating elements resulting in the need for frequent replacement.

In order to satisfy the emission level concentrations of many countries several manufacturers of wire enamelling machines offer alternatively ovens equipped with an additional KATEC exhaust gas catalyst.

This catalyst also is subject to a decrease of activity with time. It also can be renewed by the process of regeneration.