

Ozon depletion by a catalyst based on open pore metal foam

We are surrounded by air which is charged permanently by germs, dust and odour molecules. For the removal of the pollution, filters with adsorbing materials can be used. However, these must be cleaned regularly.

In oxidising all organic components by ozone (O_3) and air humidity to CO_2 and H_2O is another option to get this result.

In modern airing systems the air is cleared by application of ozone and is nearly free of smell, dust and germs.

As well with the water treatment, ozone serves for the oxidation of metals, organic matters and for the sterilization. Hence, the treatment with O_3 belongs to the central steps of the water treatment.

Due to the very oxidising effect ozone is harmful for humans. The odour threshold is $40\mu g / m^3$, from $200\mu g / m^3$ symptoms appear and over $360\mu g / m^3$ serious danger for the health exist.

The average half-life of O_3 is approx. 20min. By application in ventilation systems with a high aerial change rate a dangerous accumulation of the ozone could happen.

The measurements in a room with approx. $120m^3$ showed this concentration effect with a small air-lonisorator.

To prevent this effect the ozone molecules have to be reduced especially by a catalyst. Open pore metal foams coated with special metal oxides can achieve this effect.

To keep the pressure drop of the ventilation system low, a pore size of 4.5mm (10ppi) was chosen. With a metal foam height of 20mm, which reduces the concentration of O_3 to 50% of the input level, a pressure drop of $\Delta p = 5 m^2/s^2$ is measured.

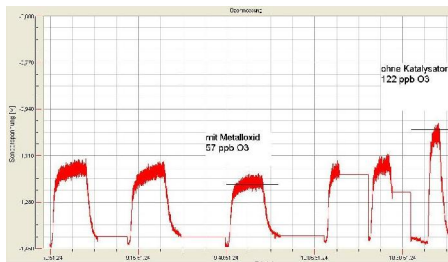


Fig. shows the O_3 concentration without catalyst and with different catalytic coatings, best results are with metal oxid coating

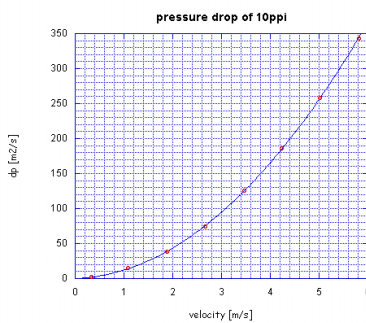


Fig. : pressure drop of open pore metal foam with pore size 4.5mm (10ppi)

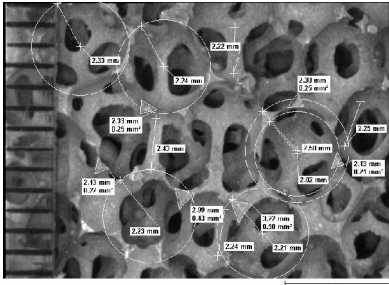


Fig: pore size of 10ppi open pore foam

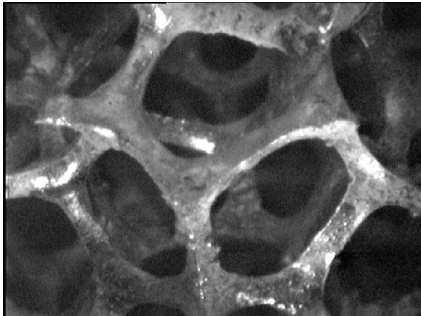


Fig: Pore of open pore foam

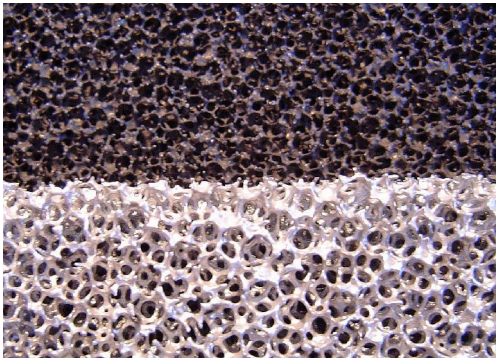


Fig: open pore aluminium foam (white) and coated aluminium foam (dark)