For cold sterilization with microbicidal gas mixtures, ethylene oxide is applied in gas concentrations of 1,250 - 1,500 g/m³. It is easy to see why especially large-scale plants were interested to learn how much gas is emitted after sterilization and in which radius and for how long MEC (maximum emission concentration) values are exceeded.

The aim of the following tests was to determine the ethylene oxide concentrations directly at the emission opening during evacuation of the sterilization chamber under different conditions. The concentration of ethylene oxide was determined according to the heat-tone principle. The detection limit of ethylene oxide was determined at less than 5 g/m³. In order to first gain a survey of the effect of the abovementioned factors on the emission of ethylene oxide, different ethylene oxide concentrations were dosed into empty chambers and subsequently pumped out immediately.

Graphs 1 and 2 demonstrate how much only the air speed influences the concentration of ethylene oxide next to the rain cap. In both cases, we used a gas concentration of 1,500 g/m³. In graph 1, the air speed was only 0.25 m/sec so that we could measure considerably higher ethylene oxide concentrations at the beginning of the readings as compared to the air speed of 1.4 m/sec. in graph 2.

The air speed also affects the length of ethylene oxide emission: At a low air speed (graph 1) ethylene oxide was emitted during a maximum of 6.5 minutes of chamber aeration; at higher air speed, ethylene oxide could already be no longer determined after 3.5 minutes (graph 2).

*) Registered trademark of Deutsche Gesellschaft fuer Schaedlingsbekampfung mbH, Frankfurt am Main
(ETOX = 90 % ethylene oxide
10 % CO₂)
Ethylene Oxide emission
Concentration in the chamber: 1.500 g ETOX\(^3\)/m\(^3\)
Chamber, 2 m\(^3\) capacity, empty
Emission speed \(v\) (theoretical) = 15.6 m/sec
Wind velocity: 0.25 m/sec, gusty
Temperature: 24°C (shade, 75.2 °F)
\(x\) = emission at the rain hood
\(\sigma\) = emission at a distance of 25 cm