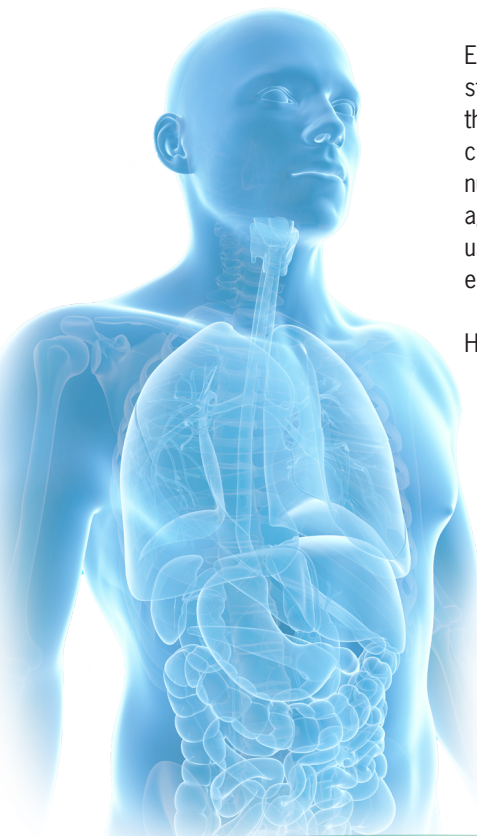




Application and Risks of Ethylene Oxide (EtO) Sterilization



Ethylene oxide (EO or EtO) is commonly used to sterilize medical materials, instruments, and devices that cannot tolerate heat, moisture, or abrasive chemicals. It attacks the cellular proteins and nucleic acids of microorganisms, making it effective against a broad range of contaminants. EtO can be used in both small-batch and large-scale processes, enabling high-throughput sterilization.

However, EtO poses health and environmental risks:

- Acute exposure can cause skin, eye, gastrointestinal, and respiratory irritation, as well as central nervous system depression.
- Chronic inhalation may lead to cataracts, cognitive impairment, neurological dysfunction, and polyneuropathies.
- Occupational exposure is linked to blood disorders, higher risks of spontaneous miscarriage, and various cancers.
- EtO is flammable and explosive above 3% concentration in air.

Regulations strictly limit EtO emissions both exhausted from and generated within facilities that deal with the products.

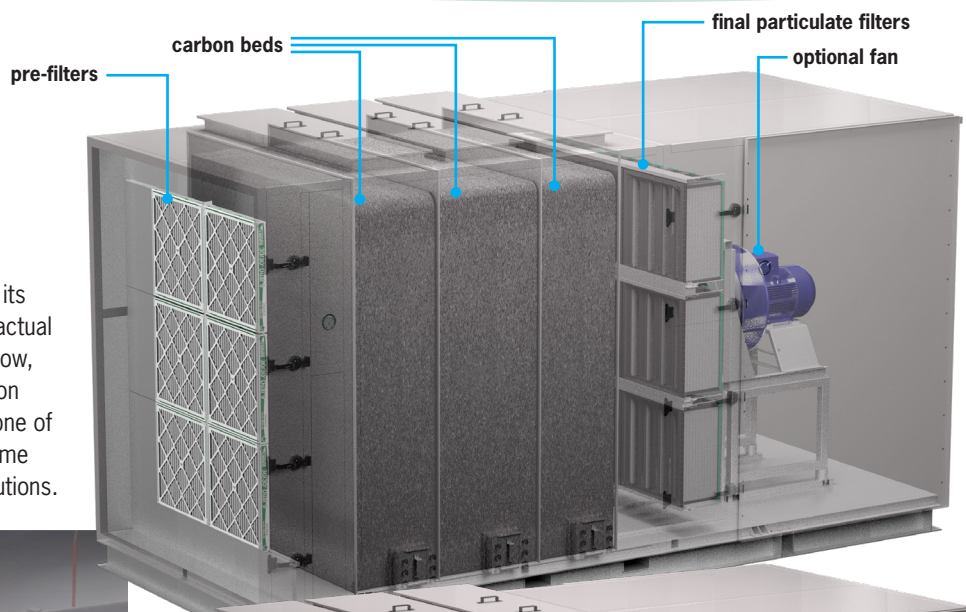
High EtO concentrations—upwards of thousands of ppm—are used in the sterilization chambers, and the exhaust is treated with technologies such as thermal or catalytic oxidizers. Additional steps may be required to further reduce the EtO below the allowable threshold.

Inside warehouses and device assembly areas, EtO can continue to off-gas from the products, and small-batch sterilization processes can cause brief EtO spikes as products move between chambers.

Camfil offers a range of molecular filtration solutions specifically designed for these relatively lower concentration (parts per billion) scenarios.

Molecular Filtration Tailored Solutions by Camfil

Camfil designs solutions based on data generated on its unique ISO 10121-2 test rig that challenges filters in actual process conditions, including gas, concentration, airflow, temperature and relative humidity to determine filtration efficiency and life expectancy. This data is the backbone of the proprietary Molecular Contamination Control Lifetime Determination simulation program used to design solutions.



Camfil CEX004B2 Media

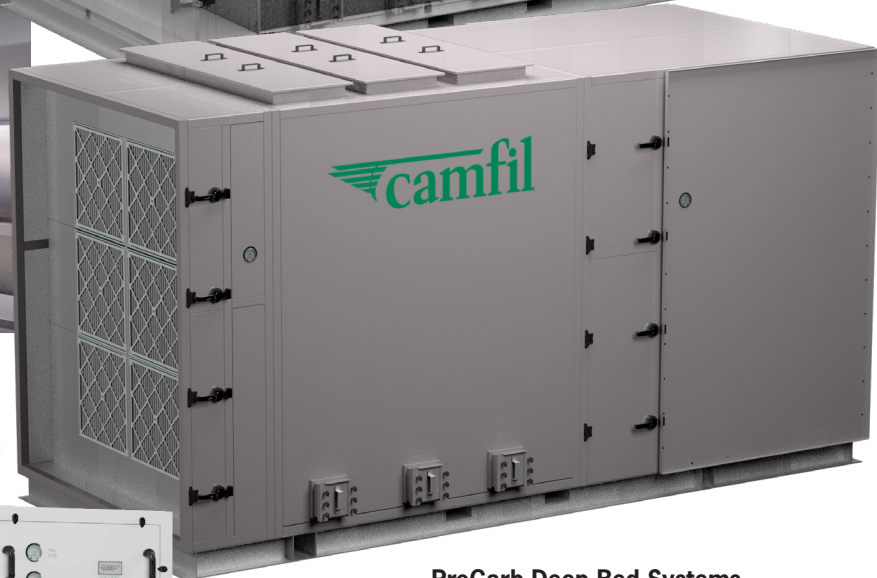
Specialty carbon media is designed to capture EtO.

This media is housed in a variety of filter configurations to provide tailored engineered solutions based on airflow, temperature, relative humidity, space constraints, EtO efficiency requirements and desired filter change-out intervals. These systems also integrate the required particulate filters to maximize the life of the molecular media and meet air quality requirements.



CamCarb XG Cylinders

The new tapered design offers an energy-efficient solution that extends a high removal efficiency service life against EtO in areas where space is limited.



ProCarb Deep Bed Systems

Recirculation or exhaust for highest removal efficiency and longest lifetime

CamCleaner Air Cleaners

Perfect for recirculation. Versatile, portable plug-and-play solutions.

