



# Virtual Wall™

## NITROGEN BARRIER DEVICE FOR LPCVD TEOS

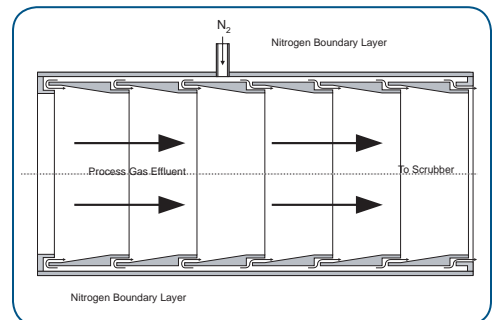
Low-pressure chemical vapor deposition (LPCVD) using TEOS (tetraethylorthosilicate,  $\text{Si}(\text{OC}_2\text{H}_5)_4$ ) is a popular precursor for the deposition of silicon dioxide as a dielectric film. The use of TEOS does create problems on the downstream side of the process chamber in the vacuum pump lines. TEOS and its byproducts have a propensity to clog the vacuum pump line with solid and viscous-liquid effluent byproducts. This increases particle levels, impedes gas flow, and can cause catastrophic pump failure. The Virtual Wall™, when used as one element of a TEOS Effluent Management Subsystem™, has proven very effective in reducing particulates and increasing uptime. The Virtual Wall combats TEOS byproducts by:

- Preventing the surface chemical reaction of TEOS and water on the ID of the tubing
- Sweeping particles downstream from the furnace exit

Tightly controlled heating combined with a nitrogen boundary layer created by the Virtual Wall prevents the TEOS byproducts from depositing on the walls of the vacuum foreline at the exit of the furnace or process chamber. System temperature control is critical. An optimized temperature minimizes the chemical reaction and allows the by-products to travel to the trap.

### Features and Benefits

- Reduces surface chemical reaction, lowering the solid deposition in the pump line, for longer time between servicing
- Moves possible deposition downstream from furnace exit
- One-way gas flow reduces particle levels and prevents particle back flow, improving product yield
- Available in several sizes for use with the most common furnaces

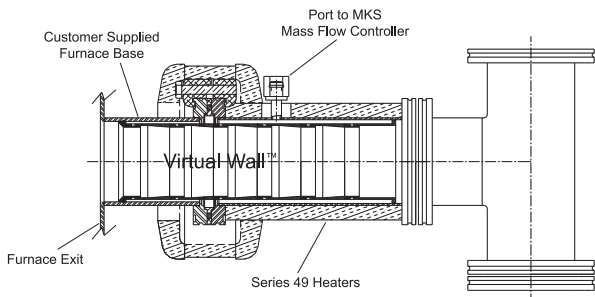
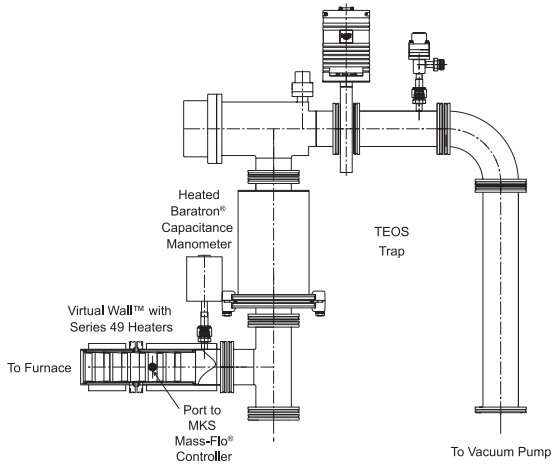


Schematic Drawing



# Specifications

## Installation Example



## Designing the Virtual Wall™

Since the Virtual Wall is tailored specifically to the vacuum furnace, specific dimensions are required. The Virtual Wall will be located in the exit of the furnace, to lower deposition and particle backstreaming. The seal is critical, to prevent nitrogen backflow into the furnace.

To insure precise fit, accurate measurements must be taken. If system drawings are available, these are helpful to the design engineers. For the best result, contact MKS to have an engineer measure the system lines. Measure each component dimension separately, starting from the furnace. First is the tubing internal and external diameter. Both diameters can be measured directly with a pair of calipers. Measure each subsequent component length, modulus and any ports.

## The Virtual Wall™ Kit

The Virtual Wall kit includes:

- MKS Virtual Wall Nitrogen Barrier Device
- MKS Manifold
- MKS Type 1179 Mass-Flo® Controller
- MKS Type 246 Power Readout
- MKS Flow Controller Cable
- MKS Series 49 Heaters (for the manifold)

MKS offers process solutions that go beyond a wide variety of vacuum parts. We offer Integrated Component Subsystems™, which are products engineered to work together to improve the system beyond the sum of the parts. Each Effluent Management Subsystem™ is tailored to the specific semiconductor process, taking into account chemistries and process pressures.

MKS' team of mechanical and chemical engineers will design an Effluent Management Subsystem specifically for your process needs. For more information, call MKS, Integrated Process Solutions at 1-800-345-1967 or 303-449-9861.

## Specifications

**Materials Exposed to Vacuum**

Stainless Steel type 304

**O-Ring**

Users choice: Viton®, Kalrez®, Chemraz®

**Weight (NW 80 10" section)**

1.6 lbs (0.73 kg)

**Maximum Length**

10" (254 mm)

**Incremental Lengths**

1.5" (38 mm)



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