

## Leak Testing

The standard test methods for cross-port and outport leakage insure valve performance at pressures and temperatures up to the specifications listed. For valves used on mass spectrometers or for ultra-trace fixed gas analysis, we recommend an optional test method utilizing a helium mass spectrometer, which provides data on mechanical leaks and on those due to seal porosity and permeability. With this method, we can certify leak rates as low as  $10^{-10}$  cc-atm/sec.

Please consult the factory prior to ordering, since the minimum leak rate will vary widely depending on valve configuration.

### Leak Rates for Gas Sampling Valves

The actual minimum leak rates attainable vary widely with seal material and valve type. In general, the acceptable leak rates fall into three ranges. (See chart below.)

In order to seal to less than  $10^{-7}$ , the valve loading tension is increased, which somewhat lowers the maximum operating temperature and the valve lifetime. Currently, only select material can seal to  $10^{-8}$  in most valve styles. Valcon M rotor material can seal to  $10^{-10}$ , but has a temperature limit of 50°C.

Not all valves can achieve these leak rates. As a general rule, the larger the valve seal and port size, the higher the leak rate.

### Test Method for Liquid Sampling Valves

The standard test method for liquid valves is a pressure drop over time for both crossport and outport leakage, using isopropanol at the specified test pressure. This test is designed to ensure proper performance at the specification limit.

#### RANGES FOR ACCEPTABLE LEAK RATES

$10^{-4}$ to $10^{-5}$ cc-atm/sec	<b>Commercial use</b> Not normally sold by VICI
$10^{-6}$ to $10^{-7}$ cc-atm/sec	<b>General GC use</b> Standard tension and components
$10^{-8}$ to $10^{-10}$ cc-atm/sec	<b>Ultra trace gas analysis</b> (ppb range) Higher tension and specially processed stator and rotor material

#### OPTIONAL LEAK TESTING with Helium Mass Spectrometer

To order a valve certified to have helium leak rates less than  $10^{-7}$  cc-atm/sec, add the suffix "Z" to the valve product number and \$175 to the price.

Certified valves are supplied with gold-plated stainless steel ferrules.

We can generally tell you what leak rate is possible prior to manufacturing the valve.