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# ***Instructions for Calibrated Helium Leak***

*FIELD INSTRUCTION SHEET*

Manual No. 699909988  
Revision A  
Date October 2002

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# Field Instruction Sheet

## Varian Vacuum Technologies

### Instructions for Calibrated Helium Leak

#### INTRODUCTION:

The calibrated helium leak is designed for use in calibrating helium leak detectors. It is equipped with an integral helium reservoir and an isolating valve, and is furnished with either an NW25 or a 1-1/8 inch diameter sealing surface to fit the test port of any Varian Leak Detector.

#### USE:

The details of tuning and calibration of the leak detector are described in the appropriate section of the leak detector manual. When the calibrated leak is not in use, it should always be left with the valve **open**, and be stored at the same temperature at which it will be used.

#### PRINCIPLES OF OPERATION:

The helium reservoir consists of the nickel-plated cylinder to which the label adheres. The valve communicates with a hollow pyrex-glass finger which protrudes into the helium reservoir.

Helium atoms permeate through glass, moving through the inter-molecular spaces in the glass. This permeation rate is dependent on the pressure of helium on each side of the glass and on the area, thickness and temperature of the glass.

If the valve of the calibrating leak is left closed, helium will continue to leak into the glass finger until the helium pressure inside the finger is equal to that in the reservoir (this would take about a year, in fact). As this pressure builds up, however, helium would be absorbed on the metal walls, and the inter-molecular spaces in the glass will become saturated. For both these reasons, a high leak rate will be apparent for some time after re-opening the valve, so it is recommended that the valve be left open.

The leak rate of the calibrated leak is very stable, and is not affected by moisture or dust which can migrate in during periods of disuse. The leak rate is dependent of two effects, however.

#### A. Depletion.

There is some finite depletion of the reservoir over time. This is a function of the leak rate and the volume of helium in the reservoir. The table below shows typical depletion rates in percent per year for some typical leak rates.

P/N Suffix	-320	-301/-321	-302/-322	-303/-323	-304/-324
Nominal Leak Rate	$10^{-5/6}$	$10^{-7}$	$10^{-8}$	$10^{-9}$	$10^{-10}$
Depletion % per Year (approx)	**	3%	2.5%	< 0.1%	< 0.1%

\*\*Refer to chart attached to neck of Calibrated Helium Leak.

#### B. Temperature.

The rate at which helium permeates the pyrex is affected by the temperature of the glass. The actual leak rate increases with increased temperature at 3% per degree (Celsius). About one tenth of this is attributable to increase of the helium pressure with increased temperature.

#### Technical Assistance

The final page of this document lists all the Varian offices from which you can obtain technical assistance. In the United States, contact Varian Vacuum Technologies Customer Service at 1-800-8Varian or on-line at [vpl.customer.support@varianinc.com](mailto:vpl.customer.support@varianinc.com).

Title

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#### Central coordination through:

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### Other Countries

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### Internet Users:

#### Customer Service & Technical Support:

[vpl.customer.support@varianinc.com](mailto:vpl.customer.support@varianinc.com)

#### Worldwide Web Site:

[www.varianinc.com/vacuum](http://www.varianinc.com/vacuum)

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