

## ADVANCED MICRO TUBE CAPILLARY LEAK STANDARDS OFFER SUPERIOR PERFORMANCE

LACO Technologies has been manufacturing gas leak standards since the 1990's. For years we used traditional leak element technology to produce leak rates in our leak standards (i.e. Teflon® Permeation, Crimped Metal Capillary, and Glass Permeation). However, we were never quite satisfied with the performance of these leak elements, and neither were our customers. This pushed us into developing a new leak element technology which could offer far superior leak performance. One more reliable and rugged, with the capability of producing quick repeatable results. LACO's solution was the Micro Tube Capillary (MTC) leak element which has now become the standard technology we use in all of the calibrated leaks we manufacture.

The leak element is what is used to control gas leak rates in calibrated leak standards. It is an internal component which sits behind the outlet connection of a leak standard and produces a constant flow of gas, based on the differential gas pressure across it.

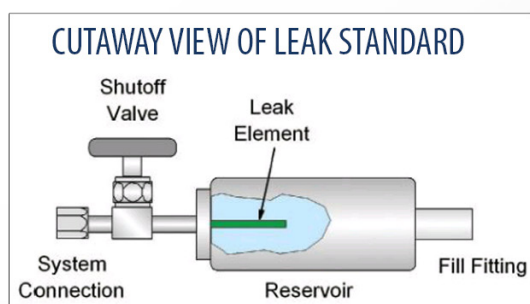
Here is a graphic showing common leak element technologies next to LACO's Micro Tube Capillary as well as a cutaway view of a leak standard illustrating where the leak element is usually installed:

### LEAK ELEMENT TYPES

GLASS PERMEATION



LACO MICRO TUBE CAPILLARY (MTC)



TEFLON® PERMEATION



METAL CRIMPED CAPILLARY



### Development and Validation of the Micro Tube Capillary Leak Standard

The MTC leak standard was tested and validated over an extensive time period and multiple environments to ensure high reliability of the leak standard in extreme manufacturing environments. The MTC leak standard uses a proprietary process to create a leak-tight seal around a capillary tube. The leak element seal for most leak standard designs is all-metal and elastomers are not used in the seal. The leak standard is designed to be resistant to shock, vibration and plugging due to particulate contamination. Unlike metal crimped capillary leak elements, the MTC design does not have induced stresses or the potential for corrosion or creep. This means your leak standard remains accurate over extended time periods even if it experiences harsh environments.

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Testing and validation were performed to determine long term reliability and repeatability of the Micro Tube Capillary leak standard. LACO's test and validation protocols included a wide range of exposure environments by using both internal resources and outside independent testing labs.

The MTC design was exposed to the following environments:

- High Temperature (up to 150 °F)
- Low Temperature (down to 20° F)
- Humidity (above 80%)
- Rapid Temperature Change
- Bench Shock/Drop Test
- Transportation Vibration and Shock
- Oil Contamination
- Long-term Storage (3 years)



Before and after each exposure, the leak rate was measured to determine the effect of the exposure. The sample of leak standards used in this study experienced no failures due to either plugging or variations in leak rate values. Based on the results of this validation, LACO is confident that the materials, design and manufacturing techniques employed produces a repeatable product that is extremely reliable in the harshest environments and over long time periods. LACO's Micro Tube Capillary Leak Standards can now be seen in use all around the world in an array of different applications, and rarely experience failures.

### Benefits of the Micro Tube Capillary Over Traditional Leak Elements

The Micro Tube Capillary leak standard design is both a robust and a highly reliable leak standard. In addition, this leak standard design features:

- Built with or without gas reservoir
- Use with any gas
- Broad leak rate range
- Unbreakable construction
- Clog resistant

LEAK ELEMENT	GASES	LEAK RATE	TEMP COEF.	CLOGGING	VACUUM RESPONSE	STABILITY	DURABILITY	PRESSURE RESPONSE
Glass Permeation	Helium Only	10 <sup>-7</sup> - 10 <sup>-10</sup>	4% per °C	None	Fair	Excellent	Breakable	Fair
Teflon Permeation	Helium Only	10 <sup>-4</sup> - 10 <sup>-8</sup>	2% per °C	None	Fair	Fair	Unbreakable	Fair
Metal Capillary	All Gases	10 <sup>-1</sup> - 10 <sup>-6</sup>	0.2% per °C	Frequent	Excellent	Varies	Unbreakable	Excellent
Micro Tube Capillary	All Gases	10 <sup>-1</sup> - 10 <sup>-10</sup>	0.1 % per °C	Very Rare	Excellent	Excellent	Unbreakable	Excellent

### Conclusion

LACO's manufacturing process and product design have been validated to ensure consistency and stability of the Micro Tube Capillary leak standard. Many customers worldwide are also using Micro Tube Capillary Leak Standards with great success. LACO MTC leak standards offer quick gas signal response, extreme ruggedness, high accuracy, and provide reliable and repeatable results. Contact LACO's sales team at [calibrations@lacotech.com](mailto:calibrations@lacotech.com) to learn if the Micro Tube Capillary leak standard is right for your application and enjoy our Fast, Accurate, and Accredited service. LACO's Calibration Lab Quality Management System is Accredited by A2LA to ISO/IEC 17025:2005 standards and our manufacturing process is certified to ISO 9001:2008.