LACO TECHNOLOGIES

APPLICATION NOTE

NOTE #13-18

MICRO TUBE CAPILLARY LEAK STANDARDS

SCOPE

This application note covers LACO's proprietary Micro Tube Capillary leak standards.

BACKGROUND

LACO Technologies has been manufacturing gas leak standards since the 1990s with great success and has recently undergone a rigorous validation process to verify the reliability and performance of the Micro Tube Capillary (MTC) leak standard.

DESCRIPTION

LACO Technologies is excited to present to our customers the results of our validation study and introduce our Micro Tube Capillary leak standard. The MTC leak standard has been 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 design 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.

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)

DESCRIPTION (CONTINUED)

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 experience 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.

BENEFITS

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

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

LEAK ELEMENT COMPARISON

LEAK ELEMENT	GASES	LEAK RATE	TEMP COEF.	CLOGGING	VACUUM RESPONSE	STABILITY	DURABILITY	PRESSURE RESPONSE
Glass Permeation	Helium Only	10^{-7} - 10^{-10}	4% per °C	None	Fair	Excellent	Breakable	Fair
Teflon Permeation	Helium Only	10^{-4} - 10^{-8}	2% per °C	None	Fair	Fair	Unbreakable	Fair
Metal Capillary	All Gases	10^{-1} - 10^{-6}	0.2% per °C	Frequent	Excellent	Varies	Unbreakable	Excellent
Micro Tube Capillary	All Gases	10^{-1} - 10^{-9}	0.1 % per °C	Very Rare	Excellent	Excellent	Unbreakable	Excellent

Characteristic Explanations

- Gases: Gases that can be used with each leak element type.
- Leak Rate: High and low leak rate limits for each leak element type in atm-cc/sec.
- Temp Coef: The lower the coefficient the less the leak rate will vary due to fluctuations in temperature.
- Clogging: Probability the leak will element clog and stop functioning.
- Vacuum Response: Stability of leak rate when vacuum is initially applied to leak standard.
- Stability: Long and short term leak rate variability.
- Durability: Resistance of the leak element to breakage when mishandled.
- Pressure Response: How quickly leak rate responds to changes in supply gas pressure.

SUMMARY

LACO's manufacturing process and product design have been validated to ensure consistency and stability of the Micro Tube Capillary leak standard. Call LACO's sales team to learn if the Micro Tube Capillary leak standard is right for your application.