Method to control the amount of helium delivered during leak testing.

Frank E. Juravic Jr.

Purpose

The purpose of this paper is to demonstrate a method for limiting the amount of helium administered during leak testing and provide a method for keeping the atmospheric helium in a location to a minimum to eliminate backstreaming into the system. This method utilizes the permeability of a balloon. The transporting of helium to the leak check area is also safer by not requiring a cylinder in the leak check location. Utilizing the many shapes of balloons and partially filling of the balloon, any configuration can deliver helium to the leak location. The balloon I filled for the test fell to the floor with the amount of helium I put into the balloon.

Introduction

The leak detector manufacturers are making leak detectors with more dry vacuum pumps. This type of pump has very slow pumping speeds at the inlet and very slow pumping on the lighter gases. Leak detection at a gross leak check level with these leak detectors is accomplished by backstreaming helium through these pumps. Leak checking utilizing this method will limit the amount of helium in the area as well as introduced into the msld. When a technician is required to leak check in remote areas the availability of helium can be difficult. Utilizing this method the technician can transport and deliver the helium at the leaks location to perform the leak check simply.

Test

Equipment used for the test was a mass spectrometer leak detector (msld)[Willson Scientific (DuPont/CEC)], Roughing system with a 17cfm rotary vane vacuum pump, balloon and a fixture I was able to vary the size of leak.

The tests were designed to accommodate the two extremes in leak detection. A leak so large the msld could be barely open and with rough pump valve open fully. The large leak had a background of $6x10^{-8}$ atmospheric helium. Approaching the leak with the balloon slightly squeezed the msld rose to the 10^{-6} scale rapidly (See Fig 1). The distance from the part to the balloon was .125". Also, developing a small leak that when the msld was opened, the roughing valve could be closed and a very small rise on the vacuum gauge in the msld. A small sized leak was adjusted and the msld was opened fully with the roughing pump system valved out. The small leak had a background of $1.5x10^{-9}$ atmospheric helium. Approaching the leak with the balloon slightly squeezed at .125" the msld's output rose to $2.7x10^{-9}$ scale (See Fig 1). The leak rate varied by the balloon's time held at leak and the distance from the leak. The msld was calibrated to 2.03 x 10^{-10} atm cc/sec MDL.

Conclusion:

Situation where a high background of helium cannot be tolerated will be avoided by limiting the amount of helium brought into the room during leak checking. Transporting helium in the balloon into remote areas will allow the technician from accidentally introducing huge amounts of helium that can backstream into the msld and can be kept in the remote areas where the space in limited. This method can be applied to all forms of leak checking.

Fig. 1