

LEAK DETECTION IN PLASTIC CONTAINERS WITH COMPOSITE CLOSURES

Package Tested: Plastic container with composite closure

Inspection Requirement: Vacuum Inspection

Equipment to Test with: TapTone Acoustic System

A composite cap is made of plastic and metal. The outer ring or band is made from plastic and the center is a metal disk. The closure, which can be used on plastic and glass containers, offers superior sealing performance yet requires less torque to remove the cap, making it easier to open. Plastic containers with composite closures can be tested for seal integrity using an acoustic sensor. When a plastic container is filled with a hot product then sealed, vacuum is drawn as the product cools. Because the center disk is more rigid than the plastic sidewalls of the container, the container walls are drawn in by the vacuum and the closure remains flat. The acoustic system is used to measure the tension on the metal cap created by the internal vacuum. A cap with tension will have a different tone (frequency) than a cap with no tension.



Image above is an Ideal Closure® from Crown Closures

TECHNOLOGY CORNER HOW IT WORKS

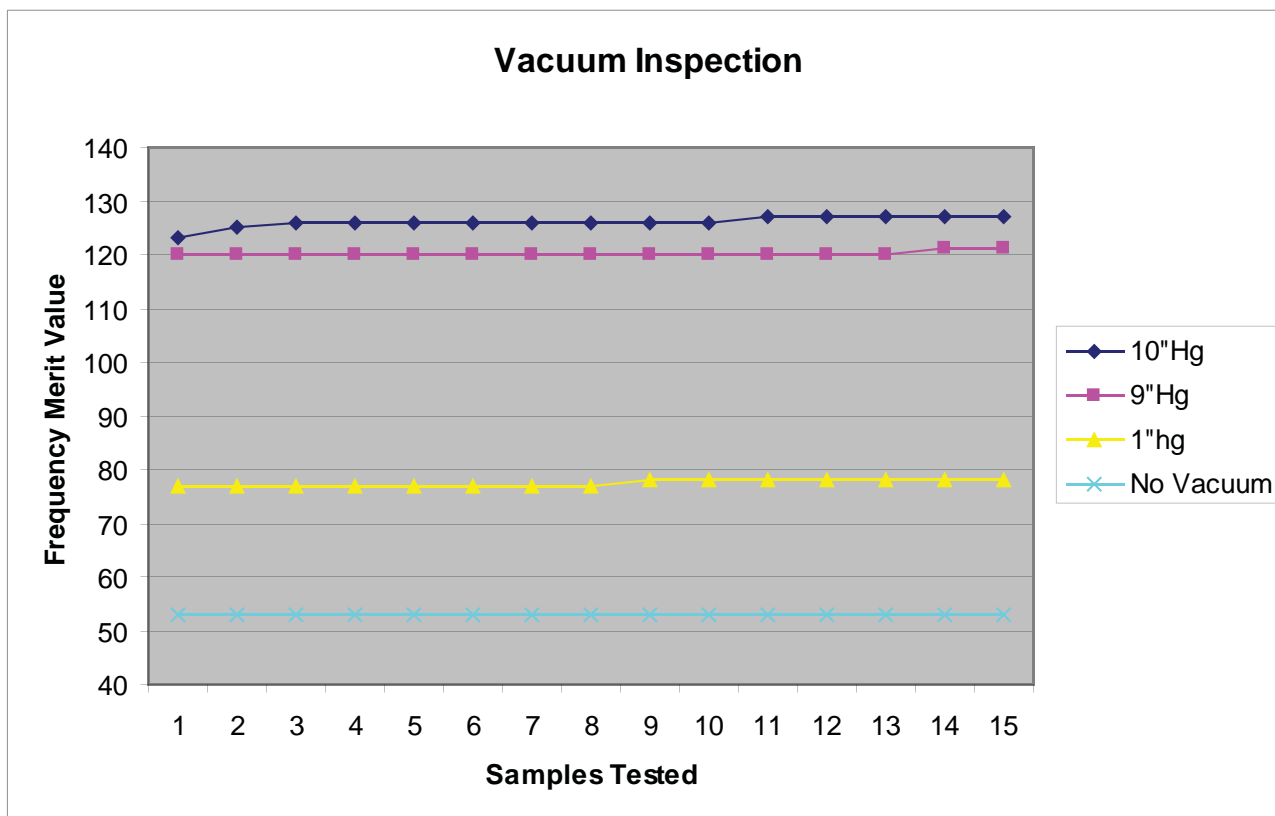
The TapTone Acoustic Sensor measures pressure or vacuum in containers that do not have a measurable lid deflection - such as beer bottles, coffee bricks, plastic jars with composite closures and milk-based drinks in steel cans. The acoustic sensor works by applying a "tap" to the top of each container. The tone response is directly proportional to the pressure or vacuum inside the container. The frequency of the tone is measured and compared to user-set reject limits. Containers outside the limits will be rejected. The acoustic sensor is used on metal lids or crowns where the product does not touch the lid.



APPLICATION NOTE



Vacuum Inspection Test: Sample Containers were made by manually drawing vacuum in each container using a vacuum pump. Samples were made with vacuum levels ranging from 0" Hg to 10" Hg (0-5 psi). The samples were then tested fifteen times each using a TapTone acoustic sensor. The graph below shows the merit value difference between a container with no vacuum or very low vacuum and a container with the target vacuum level of 9"-10" Hg (4.5-5 psi).



The TapTone acoustic system is capable of detecting low vacuum and no-vacuum containers with composite closures.