



# TapTone

## APPLICATION NOTES

News and information from Teledyne TapTone, a leader in the package inspection industry.

### Leak detection in low pressure PET water bottles

**Tested:** Low pressure PET water bottles

**Tested with:** TapTone 4000-FS Force System

The purpose of this test was to prove the effectiveness of the TapTone 4000-FS Force System in testing low pressure PET bottles pressurized with Liquid Nitrogen Gas (LN2). Leaking and low pressure containers can result in reduced production line efficiencies, transportation problems and customer dissatisfaction ruining your brand image. Over pressurized bottles will also impact production line efficiencies. Bulged bottle bases can fall over on the conveyor and swelled body walls can cause case packer and tray wrapper jams. The TapTone 4000-FS was specifically designed to handle containers with internal pressures ranging from 0.5 psi up to 140 psi. By applying a special designed sensor for low pressure applications the TapTone 4000-FS is a non-destructive leak inspection system that will test 100% of your containers on-line at production line speeds and provide measurement accuracy within 0.5 psi.



### TECHNOLOGY CORNER *How it works*

Detects leaks and low pressure in aerosol containers, LN2 dosed beverage containers, and carbonated beverage containers. Parallel belts transport the container past a sensor that measures the tension on the sidewall of the container. This action allows the system to measure the pressure inside the container. Utilizing DSP technology, the controller analyzes the measurement and assigns a merit value to each container. If the merit value is outside of the acceptable range, a reject signal activates a remote reject system.



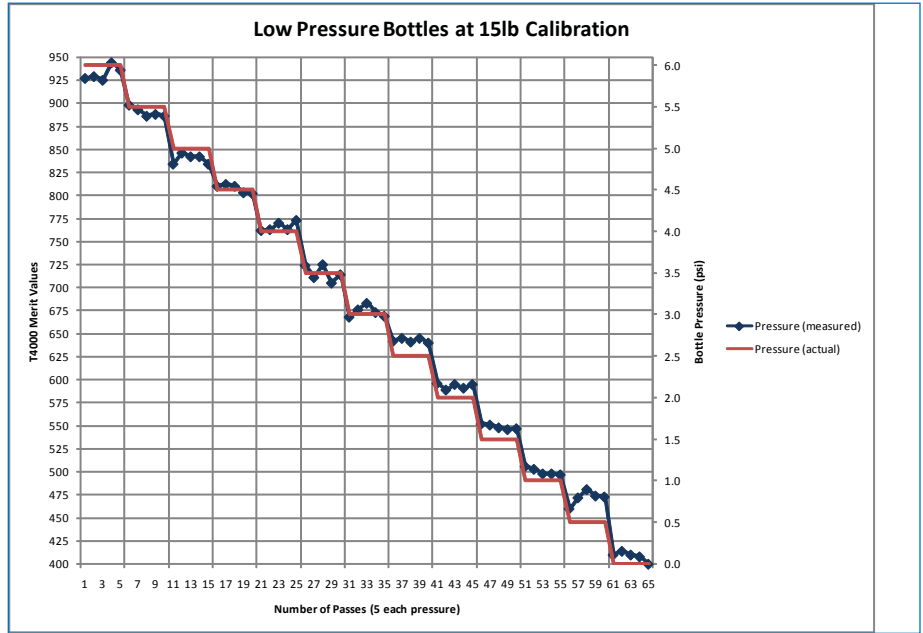
T4000-FS Force System. All stainless steel construction and highly sensitive pressure detection make it the perfect solution for testing low pressure PET bottles.



## TEST

Lightweight, low pressure PET bottles were supplied by leading manufacturers. The goal was for Teledyne TapTone to evaluate the bottles with the TapTone 4000-FS system to determine if the bottles could be reliably tested to an accuracy of 0.5 psi. All bottles from the test that fell outside the acceptable range of 2 psi to 4 psi were to be identified and removed from the line.

To simulate the desired internal pressure, the cap for each bottle was modified to incorporate a pressure fitting that would accept regulated air to simulate the LN2 dosing process. Bottles were pressurized at 0.5 psi increments ranging from 0 psi to 6 psi ( $\pm 0.1$  psi). Each bottle was passed through the T4000-FS system five times to generate the data shown in the graph. For this test the TapTone Force sensor was calibrated to 15 lbs. At 0.5 psi the system measured significant noise in the measurement due to difficulties applying very low pressures with the cap fitting, but was still able to differentiate between 0.5 psi and 1 psi. At 1.0 psi and higher the noise in the measurement was minimized and the dark line (measured pressure) showed a very good linear measure compared with the actual pressure in psi (shown in red).



\* Merit value is a calculated number determined using an algorithm to compute a resultant from a set of data values. Test results achieved in the test laboratory may be different from results seen in the production environment.

## SUMMARY

The TapTone 4000-FS was successful in differentiating the internal pressure of low pressure PET water bottles designed for sustainability with a degree of accuracy of 0.5 psi in our lab study. Bottles below 2 psi and above 4 psi can be reliably rejected from the production to ensure production line efficiency and customer satisfaction.



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