

## Twelve Month Assessment of ZORK SPK closure for use with Sparkling Wine: Ref PR07252L

Since June 2008, Provisor has been extensively testing the performance and suitability of the ZORK SPK closure for use with sparkling wine, building a significant body-of-knowledge on the performance of the SPK closure. A summary of the results associated with testing conducted by Provisor are presented in this brief report. The following testing has been conducted:

- Shelf-life trials, including –
  - Sensory evaluation: 12 month – 1 trial
  - Chemistry: volatile acidity (VA), SO<sub>2</sub> and browning (OD<sub>420</sub>) – 1 trial
  - CO<sub>2</sub> retention – 2 trials
- Oxygen Transmission Rate (OTR) testing
- Leak testing
- Warehousing trials, including –
  - 4-high pallet test assessed on a CO<sub>2</sub> loss and visual impact basis
  - Rough pallet handling review
- Transportation trials with ZORK SPK as the simulated bottom layer on a multi-wheeled truck on a return trip to Brisbane

In all test scenarios the ZORK SPK closure performed comparably to the traditional cork and muselet closure. Specifically the testing produced the following results:

- The ZORK SPK retained, without leaks or significant degassing, both wine and carbon dioxide as effectively as traditional cork and muselet closures in shelf-life trials and in transportation trials;
- The chemical and spectral properties of the wine including the sulphur, VA, carbon dioxide and apparent browning were statistically similar to wine sealed with a traditional cork and muselet closure in shelf-life trials;
- The ZORK SPK closure demonstrated similar protection from oxygen ingress to the cork closure on average but was less variable;
- Sensory evaluation identified no statistically significant differences between wine sealed under a ZORK SPK closure and a traditional cork and muselet closure;
- Transport and storage testing showed the ZORK SPK closure to be less likely to exhibit superficial damage than the cork and muselet closure;

The following table presents recent test results:

Test	Main results and findings
Shelf-life	Sensory Evaluation at 12 months shows no statistical difference between closure types.
	Free and Total Sulphur, VA and Browning (OD <sub>420</sub> ) statistically the same as cork and muselet at 12 months
	Carbon Dioxide Retention similar to cork and muselet closure. 15% loss in carbon dioxide concentration over 12 months.
Oxygen Transmission Rate (OTR)	Similar to traditional cork and muselet. Mean OTR 0.049cm <sup>3</sup> .closure <sup>-1</sup> .day <sup>-1</sup> reported on a 100% O <sub>2</sub> basis
Leakage	No leakage evident even at elevated temperatures of 40°C.

Warehousing	The ZORK closure exhibited less superficial damage under simulated warehouse conditions. No statistically significant difference in leak and carbon dioxide retention statistically between SPK and cork and muselet.
Transport	The ZORK closure exhibited less superficial damage. No statistically significant difference in leak and carbon dioxide retention statistically between SPK and cork and muselet.

Provisor has also completed a streamlined cradle to factory gate carbon life cycle assessment of the ZORK SPK closure. The ZORK SPK closure exhibits approximately 40% less<sup>1</sup> greenhouse gas emissions than those associated with the traditional sparkling wine closure which is made up of a technical cork, wire muselet and foil covering.

Yours sincerely,



Dr. Darren Oemcke  
CEO

Dated: 18<sup>th</sup> August 2009

Inspiration to Application

<sup>1</sup> Estimated by Provisor using the sum of an 8.77 gram technical cork, steel and tin (muselet) emissions from the Australian Data Inventory Project and an estimation of foil emissions based on Aluminum production in Australia. Provisor has not completed a detailed life cycle assessment of the traditional cork and muselet closure.