

# Coffee Valve Effectiveness

## An Independent Case Study

Erratic one-way coffee degassing valves on the market identified, tested, and confirmed by independent study.

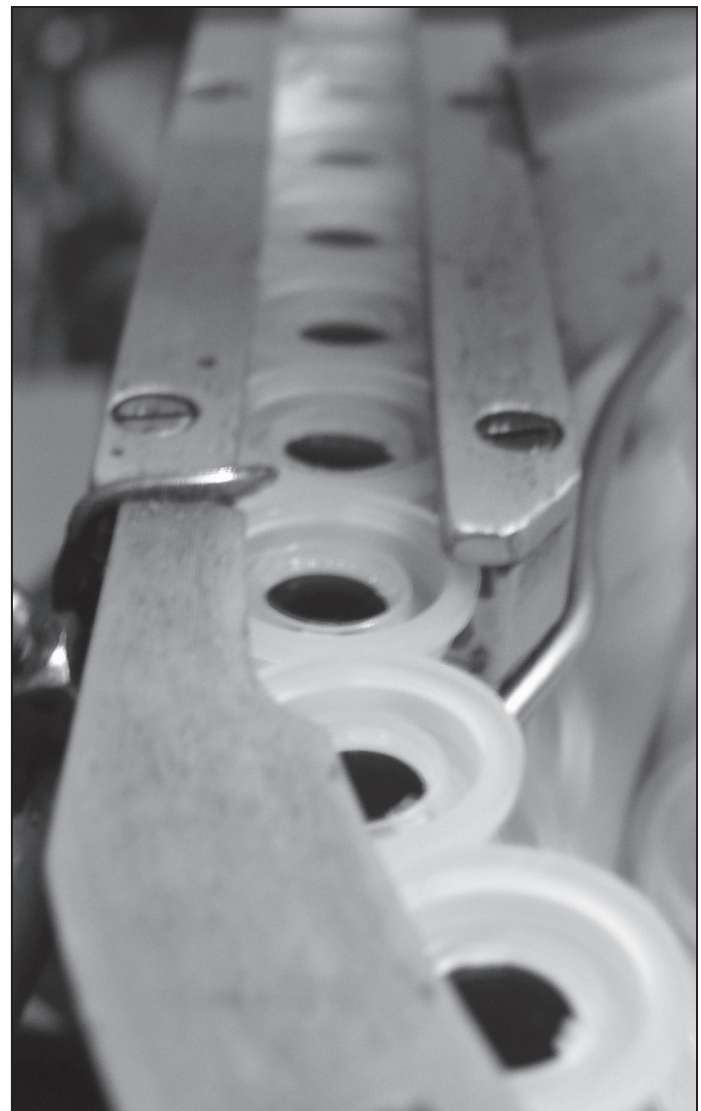
- A. A new independent laboratory study confirms some coffee roasters are using high barrier packages that do not preserve coffee.
- B. This is serious problem because high barrier bags are designed with top notch laminates to keep roasted coffee as fresh as possible.
- C. Various valves on the market are non-functioning one-way degassing valves.

### Overview

The specialty coffee regiment in North America has enjoyed significant growth over the past 10-15 years. This was not an accident. The coffee roasting community worked diligently to get good coffee into the hands of consumers. Americans found they liked it and are willing to pay for it. This hard-won revelation was supported by the development of packaging that allows roasters to create good coffee and then preserve its flavor over the many miles and months it takes to get it into people's cups. In the beginning, a relatively small group of roasters and vendors for the roasting community tested different high barrier laminates combined with various one-way valves. After significant debate (and the debates continue!), the market slowly established, through trial and error, the "best economically feasible practice" for packaging and preserving coffee: the air tight "foil valve bag" with one-way degassing valve. This package has served the roasting community well for some time. Recently, however, we believe there is reason for concern regarding erratic behavior and failure of some one-way valves which, without some roasters even knowing it, is causing stale coffee to be delivered to some consumers.

It is agreed that in order to preserve coffee, it must be protected from oxygen. Oxygen chemically reacts with the delicate, volatile flavors in fresh roasted coffee to degrade it quickly. An article in the August 2005 Tea & Coffee Trade Journal quotes "two of our most knowledgeable experts in the field" as saying that "ground coffee left exposed at room temperature begins to stale within 24 hours, whole beans within 5-7 days..."<sup>1</sup> There are pundits that claim staling is faster, but the broad facts are not disputed: fresh roasted coffee needs to be packaged in a way that protects it from exposure to oxygen.

We noticed over the past few years new "one-way valves" used in the market that appear to cut corners on design issues which we believe compromise one-way valve effectiveness. In other words, valves allow oxygen into the package at high rates. We also noted many of the design issues resolved years ago when the one-way valve



PBi One-Way Valves on an automated one-way valve applicator feed track.



was first introduced by Goglio Luigi Milano have been taken for granted, QC was marginalized, and valve effectiveness reduced.

To explore our suspicions, we decided to start a study of new valves versus PBi valves and several other established valves. We started casually, and as with so many projects one study led to another before we got really serious.

## Valve Test Overview

PBi sells barrier bags and one-way degassing valves. Some who read this will discard the report; labeling it biased propaganda because it comes from one particular manufacturer of one-way degassing valves. We acknowledge the naysayers; regardless we decided to press forward because:

- a. We live and breathe the details of package integrity.
- b. We are committed to and allied with the coffee industry.
- c. We want the best for coffee roasters and for package integrity.

We invested in an outside, independent laboratory to mimic tests conducted at PBi to ensure objectivity. It is our hope this report will bring awareness to a problem that affects all of us who want the best for the coffee industry. We also hope it will help the coffee roasting community provide the coffee buying public with the same fresh flavor they enjoy “off the roaster”. Regardless of the packaging or the supplier of one-way degassing valves, PBi wants fresh coffee delivered to the consumer.

## Test Procedure and Results

Unacceptable oxygen exposure (due to faulty one-way valves) is happening to numerous roasters today. Internal tests conducted at Pacific Bag and confirmed by an outside, independent laboratory show that despite their best efforts, some roasters have products on the market that are exposed to the harmful effects of oxygen. The culprit behind the problem, in many cases, is non-functioning, one-way degassing valves.

The one-way degassing valve functions as a check-valve to allow

carbon dioxide gas, naturally generated from fresh roasted coffee for up to several weeks, to escape out from the package while not allowing oxygen to penetrate in. The valves are a simple and economical invention, but they are also a precision instrument which is the linchpin of protection in a modern “foil valve bag” coffee package. Without proper discipline in design and manufacture of the valve, it will not function properly.

Oxygen is invisible. Oxygen can only be measured with a relatively expensive piece of equipment (approximately \$3,000 - \$4,000 USD) which many small to medium size roasters do not have. This makes the problem of non-functioning valves tricky to identify and leads some roasters to use malfunctioning valves without knowing it. Those roasters who have the equipment know that a low oxygen measurement of 1-4% should be maintained for several months in a functioning coffee package. We use this fact as part of our procedure to determine the performance of one-way degassing valves. By ensuring complete package integrity (e.g. impervious seals, no pinholes, etc.) and measuring the oxygen content in bags over time, we can determine if a one-way valve is performing properly.

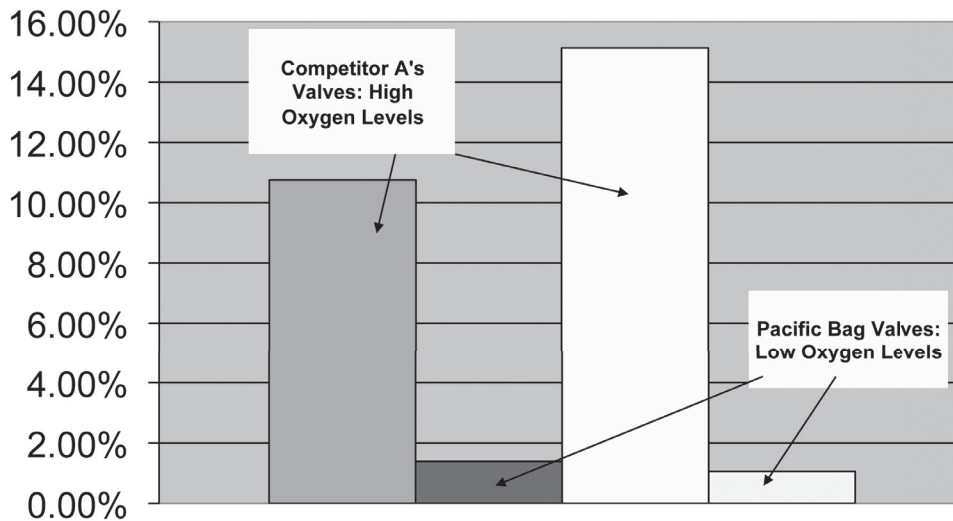
## Test Procedure Used For Our Tests

Our studies show there are numerous established and functioning, or “true,” one-way degassing valves on the market including those manufactured by Pacific Bag, Inc. Unfortunately, our studies also show that there are other products, touted as “one-way” degassing valves which consistently allow significant amounts of oxygen to penetrate packages. As an example, we conducted various tests on degassing valves supplied by a competitor known for supplying coffee packs, plus valves to smaller and medium-size coffee roasters (named Competitor A for this study). We noted over repeated internal studies that packages with Competitor A’s valves showed oxygen levels of 10% to 20.9% O<sub>2</sub>. Independent testing commissioned by Pacific Bag examined actual packages on the market from Competitor A and Pacific Bag. After eliminating any possibility of seal leaks or holes in the bags, the bags with the Competitor A’s valves measured an average of 10.8% oxygen while bags with Pacific Bag valves measured an average of 1.4% oxygen. The high oxygen level of 10.8% in Competitor A’s packages show that the degassing valves are allowing oxygen into the package.

	No. of Bags tested*	No. of Bags with greater than 5% Oxygen	% of Bags with greater than 5% Oxygen	Average %O <sub>2</sub>
Independent Study of Competitor A Valves	15	9	60.0%	10.75%
Independent Study of PBi Valves	15	1	6.7%	1.39%
Summary of Internal Tests on Competitor A Valves	49	46	93.9%	15.13%
Summary of Internal Tests on PBi Valves	2645	28	1.1%	1.06%

\* *Note: We obviously have tested more PBi one-way valves than other degassing valves, but we believe the diversity of samples and consistency of the results warrants our conclusions.*

## Average %O<sub>2</sub> with PBi Valves vs. Competitor A's Valves



- Independent Study of Competitor A's Valves
- Independent Study of PBi Valves
- Summary of Internal Tests on Competitor A's Valves
- Summary of Internal Tests on PBi Valves

As we see it, good coffee = more coffee = more pounds sold in specialty = PBi will benefit!

## Summary of Bags Purchased on the Open Market & Tested for %O<sub>2</sub> by an Independent Laboratory, 2/06

Competitor A's Valves Bag Description	% O <sub>2</sub> Reading	Water Tank Leak Test (12 psi)
Competitor A's Valve - Roaster A, Pkg #1	12.40%	leak tested/no leak found
Competitor A's Valve - Roaster B, Pkg #2	0.06%	no test
Competitor A's Valve - Roaster C, Pkg #2	19.90%	leak tested/no leak found
Competitor A's Valve - Roaster D, Pkg #3	11.00%	leak tested/no leak found
Competitor A's Valve - Roaster D, Pkg #4	0.69%	no test
Competitor A's Valve - Roaster D, Pkg #5	0.00%	no test
Competitor A's Valve - Roaster E, Pkg #1	19.80%	leak tested/no leak found
Competitor A's Valve - Roaster E, Pkg #2	19.20%	leak tested/no leak found
Competitor A's Valve - Roaster E, Pkg #3	16.70%	leak tested/no leak found
Competitor A's Valve - Roaster E, Pkg #5	0.00%	no test
Competitor A's Valve - Roaster F, Pkg #1	17.30%	leak tested/no leak found
Competitor A's Valve - Roaster F, Pkg #2	19.70%	leak tested/no leak found
Competitor A's Valve - Roaster I, Pkg #2	4.45%	leak tested/no leak found
Competitor A's Valve - Roaster J, Pkg #1	0.00%	no test
Competitor A's Valve - Roaster K, Pkg #1	20.10%	leak tested/no leak found

## Summary of Test with Competitor A's Valve

Number of Bags Tested .....	15.00
Number of Bags with Defective Valves .....	9
Average %O <sub>2</sub> in Total Number of Packages.....	10.75%



PBi Bag Description	% O <sub>2</sub> Reading	Water Tank Leak Test (12 psi)
PBi Valve - Roaster M, Pkg #1	0.18%	no test
PBi Valve - Roaster M, Pkg #2	0.00%	no test
PBi Valve - Roaster M, Pkg #4	0.58%	no test
PBi Valve - Roaster M, Pkg #5	0.17%	no test
PBi Valve - Roaster N, Pkg #1	0.00%	no test
PBi Valve - Roaster N, Pkg #2	2.75%	no test
PBi Valve - Roaster N, Pkg #3	0.00%	no test
PBi Valve - Roaster N, Pkg #4	1.85%	no test
PBi Valve - Roaster N, Pkg #5	0.00%	no test
PBi Valve - Roaster P, Pkg #1	0.00%	no test
PBi Valve - Roaster P, Pkg #2	0.00%	no test
PBi Valve - Roaster P, Pkg #3	1.22%	no test
PBi Valve - Roaster R, Pkg #5	13.40%	leak tested/no leak found
PBi Valve - Roaster S, Pkg #1	0.26%	no test
PBi Valve - Roaster S, Pkg #2	0.44%	no test

## Summary of Test with Pacific Bag Valves

Number of Bags Tested . . . . . 15  
 Number of Bags with defective Valves. . . . . 1  
 Average %O<sub>2</sub> in total number of Packages. . . . . 1.39%

Other valves that show erratic results and higher than desirable oxygen levels in internal tests are competitive models produced in South Korea and China, as well as the pressure-sensitive adhesive type. The coffee roasters who use these products (and who rely on their packaging supplier to ensure that their one-way degassing valves are functioning) are unaware that their coffee is not protected from oxygen. This puts them at a disadvantage against their competitors who are delivering fresh coffee to the market. The presence of erratic performing valves and the stale coffee that results, also dilutes the efforts of the roasting community to maintain the “special-ness” of specialty coffee. This special quality is a key factor in the growth of the specialty coffee market and stale coffee on the market is a set back in the progress made over the last few decades. Finally, and worse yet, coffee roasters with erratic performing valves are unknowingly disappointing their customers even though they have made every effort to delight them.

We welcome further discussion in this study and on this topic and would be glad to share the details and data from our various studies.

For more information on the studies we conducted or anything else in the article, contact Bill Walters, Technical Director, Pacific Bag, Inc.

### Endnotes

<sup>1</sup> Tea & Coffee – August 20, 2005 issue



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