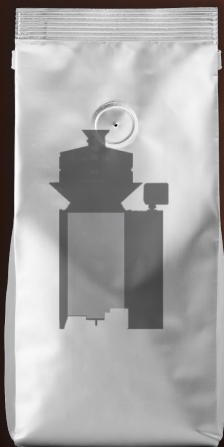


# COFFEE FLOW PACK GUIDE

— —  
A FRESH APPROACH  
TO IMPROVE QUALITY  
OF PACKAGED COFFEE



- Preserve aroma and freshness
- Make the flavor last
- Extend shelf life
- Maintain a premium experience
- Protect brand reputation

Dansensor®  
AMETEK®



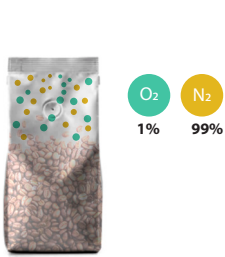
## IF YOU WANT TO OFFER A PREMIUM COFFEE EXPERIENCE YOU NEED PREMIUM QUALITY CONTROL

Calling all coffee flow packers!  
This paper is an informational guide with insights to help you achieve the best possible quality of your MAP packaged coffee. It offers an overview of the critical points within quality control that require careful and methodical testing and monitoring. The coffee market is overly competitive, and consumers are increasingly aware of their preferences in terms of flavor. When expecting premium quality, an experience of bitterness or stale flavor will likely affect the their decision to

repurchase. Therefore, it is natural for coffee packers to look for new improved methods in both off- and online quality testing, especially when introducing new production lines or start-up projects. We believe that testing and monitoring is the only safe way to ensure a consistent coffee experience and this guide will offer you a way to save time and make your quality control more reliable.

Learn back and enjoy a cup of your premium coffee.

# COFFEE PACKAGING CONTROL EVOLVES AROUND THREE CRUCIAL POINTS



## Controlling the residual O<sub>2</sub>

Headspace is referred to as the inside atmospheric volume of a package, that is not occupied by the coffee product itself. This volume usually consists of oxygen, carbon dioxide and nitrogen. It is analyzed by measuring the volume and proportion of residual gasses coming from the coffee beans within the package. The purpose of headspace analysis is to make sure that the mix of the residual gasses are correct. This will ensure the longest possible shelf life.



## Degassing the package

After roasting, several chemical reactions take place such as the formation of CO<sub>2</sub> and other volatile gases inside the beans. They will release gases several days after roasting and reach the optimal level of CO<sub>2</sub>. However, the gasses cannot escape from inside the bag which will cause the entire coffee bag to balloon with the risk of rupture. To avoid this, a degassing valve is usually added to the bag. It's a one-way valve that allows the CO<sub>2</sub> (and other volatile gasses) to escape without letting in any harmful O<sub>2</sub>.



## Ensuring package & seal integrity

Ensuring integrity of your coffee means avoiding any leaks in packaging or sealing. Leaks will expose the coffee to O<sub>2</sub> which will cause the coffee to become stale or by worst allowing microbiological growth, oxygen or moisture ingress into the packaging, which will spur mold development. Consequently, testing for leaks and improperly sealed packaging is necessary to ensure a premium coffee experience.

### PREMIUM QUALITY CONTROL DEPENDS ON:

- OPTIMAL HEADSPACE GAS MIX
- PACKAGE DEGASSING
- PACKAGE AND SEAL INTEGRITY

# ANALYZING AND CONTROLLING THE HEADSPACE GAS MIX

## Why is controlling residual O<sub>2</sub> critical?

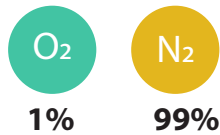
Once the coffee is introduced to oxygen (O<sub>2</sub>), flavor and aroma starts to degrade as solubles start to oxidise. To avoid this, you need to create a headspace atmosphere that excludes O<sub>2</sub>. This is the first condition if you want to offer a consistent premium coffee experience.

## How to control residual O<sub>2</sub>

The way to reduce and control the O<sub>2</sub> is to replace

it with Nitrogen (N<sub>2</sub>). This is done by "flushing" the package with N<sub>2</sub> until the desired level is reached. To control this flushing process, you need to use a gas mixer. The process is known as Modified Atmosphere Packaging (MAP) and is used in a variety of food and beverage products.

To test if the level is correct, you need to use a reliable headspace analyzer.



As the odorless, inert Nitrogen gas (N<sub>2</sub>) is flushed into the package it will replace the oxygen and allow the coffee to keep its freshness with a longer shelf life.

## KEY POINTS OF AWARENESS

- Coffee leaves little or no tolerance for O<sub>2</sub>. Keep the level inside the package below 1% to avoid oxidation.
- To control and ensure the headspace gas mix you need methodical measuring with highly instruments.
- The chemical release of CO<sub>2</sub> or O<sub>2</sub> from roasted coffee may impact the residual O<sub>2</sub> level.
- After flushing the bags with N<sub>2</sub> some O<sub>2</sub> will still remain in the package. The chemical reaction between the coffee and the O<sub>2</sub> may continue to build up CO<sub>2</sub> level.

# PERFORM VALVE TESTING TO MAKE SURE THE DEGASSING IS CONSISTENT

## Why is valve testing critical?

Fresh whole beans will release CO<sub>2</sub> inside the package for several weeks after roasting, which can cause a sealed package to burst and the coffee to deteriorate. The degassing valve is designed to prevent this. But since so much is depending on the functionality of the valve, it is necessary to test the performance of the valves regularly.

## How do you perform a valve test?

Usually, two types of valve tests are performed to ensure the quality of the valve: The *valve leak test* and the *valve release test*.

### *Valve leak test*

This test is to detect if the valve is leaking and thereby allows O<sub>2</sub> to enter the package.

### *Valve release test*

This test is to measure whether the degassing valve will open and release at the desired pressure level. This is done by simultaneously measuring pressure and flow. And by being able to measure when the flow rate increased relative to an increase in pressure.



The degassing valve helps keep the coffee fresh by allowing volatile gases to escape the bag, while also keeping other gases from entering the package.

## KEY POINTS OF AWARENESS

- Degassing causes the bag to inflate or bloat. Besides ruin the appearance it can eventually cause the package to burst open or leak.
- An inflated coffee package will likely not hold its vertical position on the shelf.
- Using a degassing valve allows the coffee to be packaged immediately after roasting.

# LEAKS AND SEAL INTEGRITY TESTING THE WHOLE PACKAGE

## Why is leak testing critical?

Leaks and improper sealing expose your coffee product to O<sub>2</sub> which causes deterioration. Proper leak testing reduces the risk of defect packaging and ensures the premium experience of your coffee and hence your brand reputation. It also reduces material waste and consequently time-consuming process of re-packing the coffee.

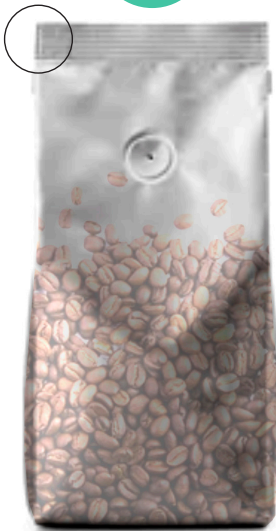
The package integrity can be compromised in several ways. Either as a downright hole in the package, or a compromised seal caused by coffee bean particles between the package and sealing.

A defective seal can also be caused by a misaligned seal heating element. A *leak and seal integrity test* helps you pinpoint and solve the problem and restore the packaging process.

## How do you perform a leak test?

There are several ways to perform a leak test. Traditionally, coffee packers used a water bath to leak test. This is still a valid method, especially if you want to know the exact *location* of the leak. But a modern vacuum needle- based leak tester is a faster and yet reliable option.

O<sub>2</sub>



Leak and seal integrity is the essence of quality control.

## KEY POINTS OF AWARENESS

- Leaks as small as a human hair can reduce shelf life and cause the coffee to go stale.
- Sealing issues often require the packaging engineer to re-configure the thermal sealing machine.
- Leak testing is usually done offline which is time consuming. Moving leak testing at-line ensure a more efficient packaging flow.

# EFFICIENCY AND QUALITY CONTROL ARE NOT MUTUALLY EXCLUSIVE. THEY SUPPORT EACH OTHER.

## **Efficient testing is efficient quality control**

Not many coffee packers would take the risk of leaving out quality control. But just like coffee is offered in different quality and price tags, quality control can be approached in different ways. There are efficient – and less efficient ways of testing and analyzing.

Running 3-4 separate tests off the line is time consuming, inefficient and disruptive to the packaging process.

When flow packing coffee it is essential to operate a systematic and efficient process without compromising on the quality of your packaged coffee. The way to achieve this is through methodical procedures and highly reliable instruments that can give you results you can trust.

Your quality control is only as good as the reliability of the results you are getting.

## **WHAT WE'VE LEARNED BY STUDYING FLOW PACKAGING LINES**

- Coffee produced in flow-pack requires a highly reliable instrument, capable of on-line or at-line testing to ensure high uptime.
- To maximize uptime, the instrument should be fast and easy to use, allowing the operators to concentrate on the line.
- Testing at the factory floor ensures faster response time if something goes wrong in the packaging line e.g. in the sealing process.
- Instruments used for analysis and testing, must be built to withstand the harshness of the factory floor, such as high temperature, coffee dust and vibrations.

# INTRODUCING DANSENSOR® MULTICHECK 2 THE ALL-IN-ONE HEADSPACE, VALVE AND LEAK TESTING SYSTEM

## **FAST AND RELIABLE COMBINED HEADSPACE AND TESTING FOR COFFEE PACKAGING**

By combining a headspace gas analyzer, leak detector and valve tester in one unit, the Dansensor® MultiCheck® 2 helps you achieve fast, consistent, and reliable quality control of your MAP packaging process.

## **INCREASE THE UPTIME OF YOUR PACKAGING LINE AND AVOID TIME CONSUMING TROUBLESHOOTING**

Equipped with specialized filters and sensors for coffee applications, it ensures the integrity of your MAP packaging, preserving your product's flavor and aroma and your brand's

reputation. In addition, you reduce the risk of human error and improve traceability with dependable data capture and real time data transfer.

## **FOUR TESTS IN ONE**

With the ability to conduct four tests in one – headspace gas analysis, leak detection, valve leak and valve release – the Dansensor MultiCheck 2 is 50% faster, takes less space, and is more user friendly than its predecessors.

The Dansensor MultiCheck 2 is designed for easy maintenance with a self-rinse program and replaceable filters, to preserve the accuracy of your measurements and ensure uptime

## **Dansensor® MultiCheck 2, developed specifically for coffee packers, gives you multiple benefits**

- Complete MAP quality control for coffee packaging
- Protects your brand and product
- Maximizes uptime with quick and reliable package testing
- Easy to use
- All-in-one integrated solution for faster procedures
- Reduces risk of human errors
- Saves you time troubleshooting



# LET'S HAVE A QUALITY COFFEE MEETING



## **Ensure the safety of package systems and the products they protect**

Packed products experience many potentially damaging forces from production until they end on the shelves. Therefore, it is vital to test your package in real-world conditions to ensure a package with the highest integrity.

A sub-category of quality control, package integrity testing encompasses testing of leak, seal strength, burst, and the permeability of barriers. These tests are used to protect your product against recalls and secure the best possible shelf life.

## **Proven solutions and technology**

At AMETEK MOCON we are a leading supplier of packaging integrity testing equipment which detects leaks and pinpoints seal integrity challenges. With our package integrity equipment, we help packaging

designers, brand owners, production managers and manufacturers deliver safe products quickly and cost effectively. With more than 50 years in the business, we have solid experience meeting the needs of the food & beverage industry, as well as the medical and pharma industries where contamination poses a safety and health risk. We are experts in MAP and can advise on all applications where physical stresses, microbiological growth and chemical exposure create challenges with shelf life and customer satisfaction.

## **We'd like to hear from you**

AT AMETEK MOCON, our support, service, and application teams are available to assist you. Get in touch to learn more about how our solutions can support your packaging integrity testing process taking you one step ahead of the competition.

[CLICK HERE!](#)

**Get in touch with a MAP expert**



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