

# Weathering the outdoors

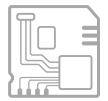
How durable label materials can improve product safety and create peace of mind for OEMs

*Developing competitive products for outdoor use means bringing tougher, better, longer-lasting goods to market. Original equipment manufacturers (OEMs) must constantly push the limits of durability in their outdoor products to keep up with industry trends, including the increasing proliferation of outdoor equipment.*

As products are designed to last longer, the labels on them must last longer as well.

Outdoor labels must stay affixed for the life of a product and remain legible to convey product information such as lot numbers, barcodes, safety warnings and warranties. If labels peel off easily, lose their color, become illegible, scratch or fade due to environmental exposure, essential information is lost.

How can OEMs find affordable outdoor labels that will last and give them peace of mind? It begins with understanding how durable labels are developed, tested and selected for outdoor applications.

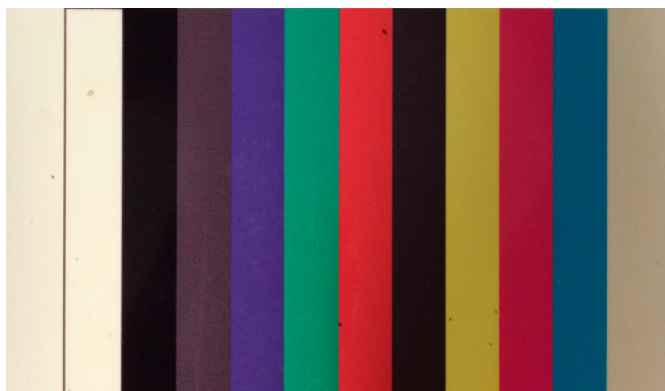
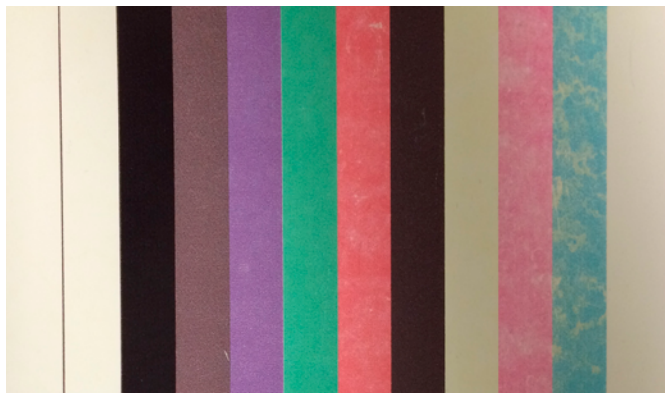


## Application considerations

Minimum outdoor labeling requirements are determined by industry standards — such as UL 969 (Marking and Labeling Systems) or BS 5609 (Labels for Marine Use). However, many OEMs develop performance specifications beyond these standards. Makers of tractors, for example, often specify differing requirements for outdoor label applications depending on the label location on the equipment, the substrate that it is applied to, the process for applying it and the conditions that it will experience.

Different application conditions demand specific label performance properties. To select the right materials for a labeled part, it is critical to understand the intended application. Among the many variables OEMs need to consider are:

- > **The substrate** a label will adhere to, which dictates and determines surface texture, shape, and surface energy that labels encounter
- > **Performance properties** such as outdoor weathering resistance, which includes UV exposure, high humidity, temperature extremes and even marine conditions
- > **Printing technology and ink systems** used during the production of labels
- > **Overlaminate and varnishes** applied to printed labels, which are employed to protect inks and facestocks from UV light, common chemicals and abrasive conditions.



**Image 1:** Exterior-exposed digitally printed inks without overlaminate protection (top) and with overlaminate protection (bottom).

To prolong color retention in outdoor applications, light-sensitive inks must be protected from sunlight. An effective method is to apply a protective transparent laminate to the label (IMAGE 1). Overlamine films help extend label durability by absorbing and reflecting portions of UV and visible light that may damage the film and cause the color to fade. They also protect printed labels against the effects of humidity, ozone, chemicals and abrasion.

## Testing to specific conditions

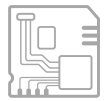
There is no one-size-fits-all test for outdoor labels. The label construction must be specified, tested and approved separately for each application. Label materials perform differently when they are applied to different substrates — such as aluminum, steel or polypropylene — or when they are combined with a protective overlaminate film or coating. As a result, it is essential to test the performance of all of the label components working together, using production-intended parts to simulate the planned application and durability.

Many laboratories — independent or operated by OEMs or material manufacturers — conduct conditioning tests for outdoor labels based on industry standards and end-user specifications.

For example, UL 969 mandates 750 hours of accelerated weathering tests, but OEM specifications may require several thousand hours of conditioning tests to simulate the end-use environment. The most common conditioning tests include:

- » Accelerated weathering
- » Climate cycling
- » Water resistance
- » High humidity exposure
- » Oven aging and freezer aging
- » Salt spray exposure
- » Immersion in chemicals or cleaners

Tests may last weeks or months before labels are evaluated for adhesion, legibility, color retention, abrasion resistance and other properties. As a result, OEMs may pay tens of thousands of Euros and wait several months to receive test results — sometimes without knowing if the tests or materials are right for their application.



To accelerate this process, OEMs should consider partnering with a label material supplier for their testing needs. An experienced supplier has the expertise to perform the necessary testing and is familiar with a wide range of materials and tests. That allows the supplier to recommend materials and testing that will meet end-use specifications as effectively as possible and help label converters develop new label solutions.

For example, Avery Dennison has made substantial investments over the last three years in the expansion of its accelerated weathering laboratory, which offers durable label testing as a service to converter customers and their end-user customers. The lab's advanced technology simulates years of weathering and sunlight exposure in just a few months.

## Pushing durability further

Outdoor label requirements are constantly evolving to cover extended durability and keep pace with product innovation. Meeting these tougher performance specifications requires more specialized materials, which often come at a higher cost to OEMs. The key to controlling costs is to select materials precisely suited to a specific application.

By understanding how different variables impact label performance, OEMs can keep pushing durability to new limits with label materials that are cost-effective, long-lasting and tough enough to meet their stringent requirements. >

**Avery Dennison is committed to developing cost-effective products to meet even the toughest durability challenges. Contact your sales representative to discuss a durable label solution for your outdoor application needs.**



## 8 end-use considerations for outdoor labels

- > What substrate will the label be affixed to?
- > What are the adhesion requirements?
- > What ink and printing process will be used to print the label?
- > Will overlaminates or varnishes be applied?
- > How many years will the label be exposed to outdoor conditions? In what climates and application angles?
- > Will the label be exposed to chemicals, cleaners, pollutants or fuels?
- > Does the product need to comply with any known standards?
- > Will the labels be exposed to abrasion or other mechanical stress?

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Label and  
Packaging Materials

**North Asia**  
5th Floor, Hongye Park  
1801 Hongmei Road,  
Xuhui District 200233,  
Shanghai, China  
+86 21 33951888

**South Asia Pacific and  
Sub-Saharan Africa**  
460 Alexandra Road  
#28-02/03  
Singapore 119963  
+65 6430 7000

**Europe**  
Willem Einthovenstraat 11  
2342 BH Oegstgeest  
The Netherlands  
+31 85 000 2000

**Latin America**  
Rodovia Vinhedo-  
Viracopos, KM 77  
CEP 13280-000  
Vinhedo - SP, Brazil  
+55 19 3876-7600

**North America**  
8080 Norton Pkwy  
Mentor, OH 44060  
800.944.8511