

Carpet to Carpet; the weave of the future?

At Avery Dennison, we have pledged to deliver innovations that advance the circular economy and reduce environmental impact. Let's talk about our concept for alternative carpet assembly: manufacturing a true cradle-to-cradle solution.

Flooring: Alternative Carpet Assembly

The advantages of Avery Dennison performance flooring tapes are virtually endless. From sustainable assembly and ease of installation (and de-installation) to the use of low waste liners, the effects on a healthy indoor air climate and – perhaps most importantly – the overall degree of recyclability. Because we don't just talk sustainability.

Sustainability means focusing on the future. It is assessed by criteria that include the eco-friendliness of the production process, the use and durability of materials and the right attention for what comes next – the renewability of those materials at end-of-life.

In this brochure, we'll look into several examples of the progress in sustainable solutions on the manufacturing side, including our concept of manufacturing a true cradle to cradle carpet assembly solution befitting the circular economy.





Sustainability

Cradle to Cradle

‘Cradle to Cradle Certified’ or C2C is the global standard for products that are safe, circular and responsibly made. For over a decade, C2C has been helping leading brands, retailers, designers and manufacturers across the value chain to innovate and optimize materials and products according to the world’s most advanced science-based measures.

Cradle to Cradle Certified assesses the safety, circularity and responsibility of materials and products across five categories of sustainability performance: material health, product circularity, clean air and climate protection, water and soil stewardship, and finally social fairness – related to human rights and a fair and equitable society.

Product circularity has become increasingly important in the carpet industry – enabling a circular economy through regenerative products and process design.

Carpet Recycling

Recycling in the carpet industry is hardly a new thing. Preserving natural resources and contributing to reducing climate change has been part of the agenda for a while now.

It has resulted, for instance, in carpet take-back programs: collecting used flooring to either find a second life for it, or recycling its materials altogether in environmentally, socially and financially responsible ways. Nowadays, it is not uncommon for flooring materials to be reintroduced into supply chains and even become new floors.

In addition to using sustainable materials, the manufacturing process has become eco-friendlier as well – especially when opting for wool or recycled nylon yarn. The most sustainable materials are not only durable, but also renewable and even biodegradable, while the situation is further improved by implementing environmentally friendly production methods. In other words: using recycled water and adopting reusable tools and byproducts – cones, dyes, pallets – in a production process powered by renewable energy.

Sustainable Production

Although recycling may be defined as the action or process of converting waste into reusable material and generally comes at the end of a product's life cycle, our efforts in sustainability start at the very beginning. Which is why we reenvisioned our entire production process.

As a part of that, recyclability of materials has taken a step. One of the major challenges in carpet recycling is the fact that carpets can consist of hundreds of components. The process of separation can be costly, which in turn has led to the development of mono materials.

It's been a while since producers relied solely on synthetic materials – in other words, materials made up of multiple parts – to manufacture carpet. The days of those complex sets of materials, irreversibly glued together, are behind us, as recyclability asked for a different approach. The industry has undergone substantial technological advances, with many producers having switched to using a single material, offering obvious advantages when it comes to end-of-life and recycling.



Material Science

A trend following on from that has been to use the same material for both carpet face and backing, further avoiding the costly process of separation and purification. In this way, the approach of a mono material takes the recyclability of a carpet a long way further.

New technologies have offered the freedom to manufacture carpet from fully circular mono materials such as polyester (PET), polypropylene (PP) and polyamide (PA6, PA66).

When it comes to true recyclability, the industry however is still looking for that silver bullet that offers a true cradle to cradle solution: or rather, carpet to carpet.

Carpet to Carpet

In all the examples of sustainable solutions, there is one common factor: dependence on recyclable materials. When PET of used plastic bottles is converted into plastic flakes and then into soft fibers to form PET-felt backings, they can later on be down-cycled into materials for vehicle interiors or noise-absorbing materials. However, if you use PET, or PP, or any of the common solutions out there, it is still necessary to recycle at the carpet's end-of-life. Moreover, while PET and similar solutions are fully recyclable, additional processing is required in many cases to maintain its properties.

In other words, the industry is struggling with which source material to use, which is why we decided to focus on a carpet-to-carpet solution.



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Backings applied to carpet fiber for the assembly of carpet tiles and roles are generally different materials bonded or melted together, which makes it hard to separate at end-of-life for recycling purposes. However, assembly with thick synthetic rubber-based transfer tape allows a secure bonding of the fibers with several types of backings. Heating up the assembly sufficiently allows for clean separation. It allows for recycling, full on. Which got us thinking: what if you use transfer tape as a bonding method for the backing material?

PSA Transfer Tapes

Our transfer tape portfolio consists of pressure-sensitive adhesives (PSAs) of different coat weights and strengths pre-applied to liners, then covered with a special release liner. We use these PSAs for their myriad of advantages, as they offer a variety of benefits compared to other alternatives, be it glue-down, click-and-lock, or free-floating installation methods.

PSAs hold two surfaces together solely by surface contact, which is achieved by firm initial external pressure. These dry adhesives require no activation with water, solvent or heat, and firmly adhere to many dissimilar surfaces with minimal pressure. The release liner protects the adhesive until it is removed. In other words, these general-purpose tapes add value in a variety of ways, helping manufacturers solve their bonding issues.

Ideal for mounting, framing, bonding and laminating, transfer tapes offer good conformability and adhesive wet-out. PSA tapes can be used for bonding materials such as plastic, paper, metal, glass, and wood, including some of the low surface energy type materials like Polyethylene, and Polypropylene.

They allow for tremendous ease of use by way of DIY-friendly peel and stick installation, offering permanent, removable and repositionable options. Specific skills and tool sets are redundant, while fast installation and the absence of cure time reduce downtime.

Moreover, they too offer huge advantages in terms of sustainability and recyclability.

First of all, PSAs are lower in VOC emission compared to liquid adhesives, resulting in less exposure to harmful substances throughout the value chain – there are no health risks during and after installation. Usage of raw materials for production is sustainable as well, reducing waste. The concept of using PSA tape as backing offers huge potential. Transfer tapes are suitable for many applications – and many application environments.

Now, we're looking to add full recyclability of carpet to that list.

Carpet to Carpet

If you return carpet to carpet, you avoid dependency on the aforementioned recyclables. Which is why adhesive layers are summoned to not only bond during assembly, but also debond during recycling. Avery Dennison offers adhesive technologies that allow for temperature-related debonding on demand.

Some of our high-performance transfer tapes are being used in an alternative carpet assembly process where tape features as mechanical bonding for carpet-backing.

Looking one step further, at the polymer for which more often than not classic petrochemicals are used, there too is a move towards bio-based, organic solutions. For instance, certain rubbers already contain resins from pine trees as bio-based substitutes. At the same time, the customer is willing to go the extra mile. With some natural alternatives for insulation for instance, you need double layers to achieve the same results, but necessary investments are made if green results can be achieved. The drive towards more natural materials – like bamboo and cork for flooring, or wood fibers and sheep's wool for insulation – is matched by advancements in tapes. If carpet specialists introduce new materials, new substrates, it brings new challenges. We have the toolkit to take them on.

Performance Tapes

Avery Dennison Performance Tapes is a world-class operation focused on developing and manufacturing high performance pressure-sensitive adhesives and tapes for a broad range of applications in automotive, appliances, electronics, building and construction, specialty industrial and personal care segments.

The organization has 50 years of experience in supplying standard and customized pressure-sensitive materials designed to deliver innovative solutions for customers' needs across the globe. Worldwide manufacturing facilities ensure a global presence supported by local sales, technical and customer service throughout the regions.



For more information on our bonding tapes and adhesive solutions, please visit our [flooring page](#). Our technical experts are here to show you how to work with your materials successfully during every phase of your application. You can count on us to approach any challenge with genuine curiosity and care.

Contact your Avery Dennison sales representative or visit tapes.averydennison.com



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For more information on technical performance and printing recommendations, please refer to the respective datasheets. Please note that the Avery Dennison product range and service offering can be subject to changes. For an accurate overview, please check our website label. averydennison.com or contact your local Avery Dennison sales representative.

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