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GUIDELINE FOR SUSTAINABLE USE OF ADHESIVE TAPES

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Introduction

The European adhesive tape industry supports the policy initiatives set out in the **European Green Deal (EGD)** with its intrinsic focus on innovation, green technologies and transparency. As multifunctional bonding mechanisms, tapes lie at the heart of many of the sustainably evolving products and technologies that touch our lives in fundamental ways, contribute to the circular economy not only by recycling but in several R's from the [R-strategies](#) and allowing us to improve the way we live, eat, work, travel, and keep safe.

Adhesive tapes can perform a variety of functions at once, meaning that products can be made thinner, lighter, and using fewer, and more sustainable materials. They are being developed to stand up to the toughest environmental conditions, to be durable and reliable, to realise manufacturing efficiencies and to facilitate recycling and repair. They empower instruments that generate alternative forms of energy, means of faster and easier communication, products that make homes more efficient, and vehicles that function, are repaired and disassembled more sustainably. Both in manufacturing and the applications themselves, adhesive tapes enable the reduction of carbon emissions, energy use and waste generation.

The result is good for the people and our planet!

The purpose of this guideline is to give information about the **sustainable use of pressure sensitive adhesive tape**. This guideline aims to optimize the use and reduce waste by avoiding the inefficient use of tapes.

Understanding Tapes

Adhesive tapes can broadly be defined as strip-shaped articles composed of a carrier* material coated on one or both sides with adhesives, optionally covered by one or more release liner(s). In simple terms, tapes are articles formed with a combination of adhesive and a backing material or embedded reinforcement material (in the case of double-sided tape).

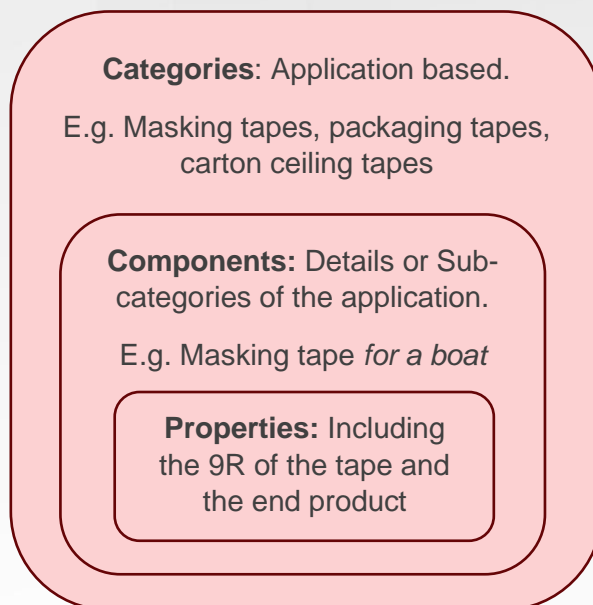


Tapes are often the **hidden driver of product innovation** in many applications and industries. They are virtually invisible and weightless functional sheets that make the production and assembly of designs possible. In addition to offering a sophisticated attachment method, tapes are customizable and provide unique benefits such as sealing, dampening, shielding, and insulating.

**Carrier-free tapes also exist*

While a tape manufacturer can aim to create new tapes for new applications, the end user needs to understand the limitations of tapes to use them efficiently. With the knowledge of limitations, comes the knowledge of the capability of tape. This will help the end user to choose tape as an application that will create less waste across the duration of the application. Therefore, understanding tapes is important to make the right decision to use tape.

Choosing the Right Category of Tape



What type of tape do we need? Do we need to bond two surfaces, close a carton box, shield an area from paint, or help us open a packaged good? The purpose of tape is important to **pick the right product category**. Each category of tape has different specifications that help them be used sustainably on an application. Picking the wrong category of tapes will lead to the inefficient use of tapes and other items used in that application, which may generate waste on multiple levels. For example, while installing air ductworks, using packaging tape instead of aluminium foil tapes or fibre glass mesh tape is going to create tape waste at a sooner timeline, while creating energy waste during the working process of the whole system and create material waste due changing parts or reinstallation of the system sooner.

Within sustainability measures, the purpose of tape is not limited to only category of tapes. Each category of tape has variety of tapes to choose from, which differ in-terms of their chemical and physical properties, helping overcome different problems.

Choosing the Right Tape

Once the right category of tape is chosen, the next step is to choose the right tape within that category. This depends on the conditions and requirements of where and how that tape product will be used. For example, the chosen category is masking tape to paint a boat. For this application, the masking tape needs to have low adhesion thickness, solvent resistance, be easily removable and possibly need to be UV resistant. Even within the right category, if the operator chooses a basic masking

tape, assuming due to costs, it will create problems with the application, and therefore, creating waste on multiple levels.

Technical requirements need to be analysed to pick the right tape with the necessary technical specifications. That being said, there can still be multiple choices to pick from.

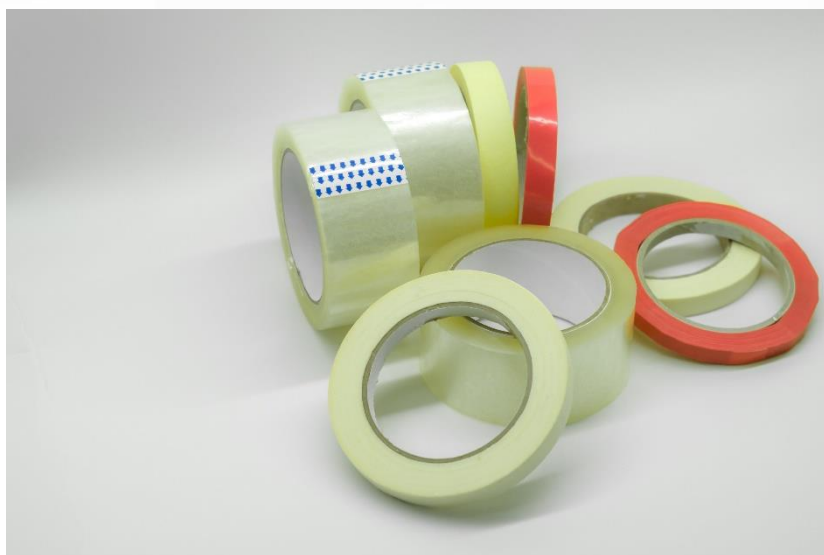
Properties of tapes

Adhesive Property of Tape

This subject title should be considered after picking the right product category and process of application. A single type of tape may have variations with different adhesive properties. Each variation will be sustainable to use for different purposes. **Adhesive properties will determine the performance of that tape.** While identification of required performance is usually set, it can sometimes be as general as “Tape should stick well”. The identification of tape should be based on the material surface where the tape will stick to, the climate it will be used in and will face during the period of its usage, sticking application method, duration of tape application and physical properties required in the project. To understand the properties of tapes, it is advisable to read the specifications of the product in the product itself, the packaging or the document that is provided by the supplier.

Physical Dimension of Tape

Determining required **dimension of tape** is important to generate less waste. Tapes are produced in units of m^2 , calculated by the width and length of the product. It seems simple as the consumers decide the width and length of the tape that they want. This specification should be determined based on the application; Wrongfully using narrower tape will result in failure of the tapes function; Wrongfully using wider tape will cause unnecessary tape waste.



Also, the thickness of the tape (given in microns) can seem irrelevant with non-technical tapes, but it is important. There are two main reasons for it; First, thickness of tape will affect the performance of the tape. Second, thickness of the tape is an input to determine the amount of tape waste generated which is calculated by weight; Thicker the tape, heavier it is compared to its type.

While the **thickness of the tape** is determined by the tape manufacturer, length and width of the tape is determined during converting process by the consumer. While there are standard measures for both inputs, they can be customized as well. Width and length of a tape affects the usability of the product. For example, in automatic packaging line, consumers prefer longer tapes, up to 1500m, so the machine stops less frequent, therefore avoiding bottleneck in the production line. Whereas in the production line, for example in the case of white goods, tapes used for corner protection or to keep the door of a refrigerator closed, would be shorter so it fits in the hands of the operator.

Dimension of tapes should be decided based on adhesive properties, use of application and capabilities of the application tool if there is one in use.

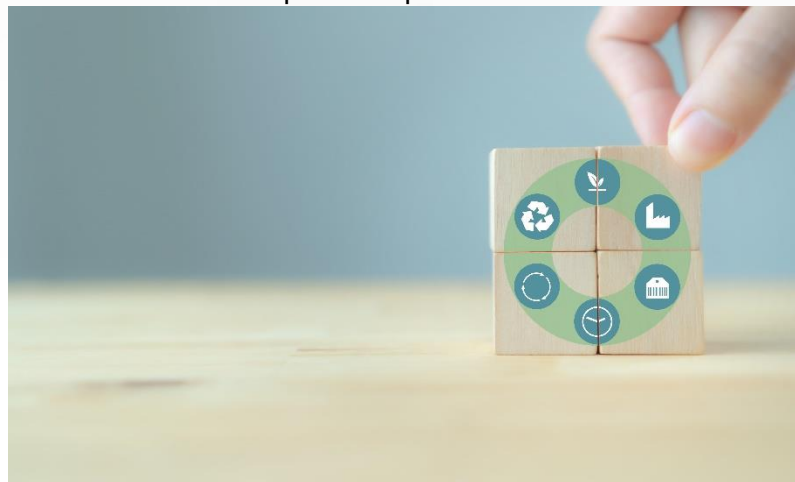
Knowing Physical Properties of Tape

Physical property of a tape will decide how well it will perform for the given task and usually depends on the backing of the tape. This is important for both, technical and non-technical tapes. When the physical properties of tape do not match the requirements, it will fail creating unwanted waste.

Physical properties of tapes are also important to determine the recyclability of the product. Different materials require different methods of recycling and affect the recycling of the material they are used on. For example, in recent years, car manufacturers are choosing technical tapes for certain parts which can go into recycling process with the part they are on.

Eco-Design of Tapes

Tape manufacturers are continuing to work on **eco-design of tapes** in order to decrease the environmental impact of tapes.



As part of the flagship sustainability project (AFSP), AFERA has taken several steps to facilitate the eco-design process. These include the following:

- **ISCC Plus guidance paper:** Reducing the consumption of fossil feedstock is an important tenet of a low-carbon circular economy. To support this transition, the industry is moving towards sustainable alternatives like recycled and bio-based feedstocks. This certification covers both the production process and the product and is meant to prove that high requirements of sustainability are met.

- **Colour harmonisation of paper release liners:** Paper release liners come in various colours – from white, yellow, and light brown to dark brown. While the colour of the release liner has no bearing on performance, it does impact the end-of-life recycling options (open-loop or closed-loop). This is explained in Afera’s position paper, “Colour of paper release liner of adhesive tapes: Impact on material circularity”, which aims to boost material circularity.
- **Product carbon footprint tool:** Afera and the German Adhesives Association, IVK are jointly collaborating with Sphera, a specialized provider of sustainability consulting services to develop the sector-wide tool for harmonized PCF calculation of adhesives and adhesive tapes. With the availability of harmonised PCF data across the supply chain, companies will be able to track their Scope 3 emissions, aiding their efforts to reduce GHG emissions.

Updates on what tape manufacturers are doing regarding this topic can be found on [Afera Website](#)

Handling of tapes

Application of How to Place the Tape

Process in tape application is how the tape is applied during its use. It can be **manual, semi-automatic or automatic**. Manual application is where the user applies the tape by hand or using handheld tools. Semi-automatic application is where the user uses a basic tool to apply the tape. Automatic application is where a more complex design of tool is being used to apply the tape without the needed of an operator.



Understanding the application process is important because it can change the technical specifications of the tape and the amount of tape used.

Between these three application processes, automatic application is more complicated and requires better analysis of tape selection. The aim of an automatic application, especially in industrial manufacturing sectors, is to accumulate high output with greater efficiency, having **great effect on sustainability** of the whole

process. Due to this requirement, choosing the right tape with the right technical properties is very important.

In some instances, tools that will be used in an automatic application are designed around a certain tape. For example, the design of the machine that can be used with water activated tapes and standard BOPP packaging tapes are different. Another example is the difference in pick/place head design of robotic systems that can place certain technical tapes in difference size/shapes on surfaces.

Manual and semi-automatic applications are less complicated due to their **flexibility of customisation**. These applications have a wider range of tapes to choose from. The potential problem, especially with manual application is the unnecessary amount of tape being used. This issue surfaces especially with operations that require unskilled human labour, such as during packaging and painting jobs. The potential waste of used tape amount is minimised with the help of tools in semi-automatic applications. Certain hand tools also help minimising the amount of tape being used.

Machines & Tools

There are many different kinds of tools and machine that can be used to prepare tape for an application or apply tape to a surface. These tools can be hand-held manual tools, such as floor tape applicators or tape stations on desks, or they can be semi-automatic and automatic machinery, such as case sealers and robotic taping machinery.



Tools and machines help with the **precision of sizing the tape and correct bonding of the tape**, therefore allowing sustainable use of tapes. Whatever the tool and machine that is chosen for the application, right method of using them should be learned from their suppliers. These methods include, how to use the tool/machine and how to maintain them. While using a tool or machine, dismissing maintenance can

affect the performance of the tape negatively, which will affect the waste generated, and will risk safety of the user.

Storage of Tapes

Generic conditions for ideal storage of tapes are:

- Protected from dust
- Protected from direct sunlight and/or heat source
- Protected from extreme temperatures
- Protected from humidity, placed in dry place.
- Protected from physical damage
- With separators if need (such as for double sided tapes)

In the case of tapes being transported in a packaging that can be reused (like carton boxes), it is ideal to leave them in their own packaging for storage. These packaging methods are designed by the tape manufacturer/converter to **extend the shelf life of tapes**. Tapes should not be left at random places in the operating areas. Unattended tapes have high risk of external physical damage that affects the performance of the tape.

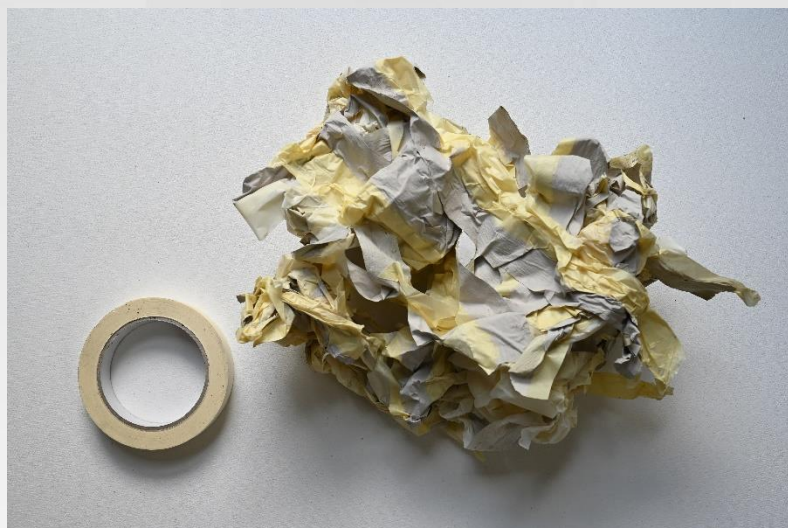
Another common mistake occurs while opening boxes i.e., cutting deep with box cutters. There are incidents where the individual end up stretching/surface cutting the tapes on the top layer, which in turn causes breakage of the tapes. For specific instructions follow the manufacturer's advice.

Waste management

Waste Generated from the Use of Tape

After usage, pressure adhesive tapes generate waste of different materials. These are:

- **The backing of the tape:** This is the layer of the tape to which the adhesive is applied. E.g., Masking tapes have a backing of paper and plastic film packaging tapes usually have a BOPP-based backing.
- **The core of the tape:** In certain formats of tapes, the core is the material that the tape is re-winded around. This material can be plastic or paper, depending on the technical specifications and the usage of the tape.
- **Release liner:** This is the sheet used for specific tapes such as those that are converted by die-cutting method where the tape comes in unique shapes and sizes on sheet of release liner, or they are used for double sided tapes. Please see [AFERA's sustainability story](#) to learn more about release liners recycling.
- **Packaging of the tape:** This can come in different formats, from shrink films wrapping the roll, to fibre packaging of the tape. Some packaging of the tapes may include labels on them.
- **Adhesives:** They represent a significant part of the tape, which after usage may either stay on the surface or on the backing.



There are other types of waste that maybe generated from the use of tape, such as parts of the tools that are used to apply tape to the surface. An example for this would be hand-held tape tools that requires their blades to be renewed after certain amount of time.

Management of Waste from the Application of Tape

As with any consumer products, once the waste is generated, recycling is an effective method of waste management. The first step is to enable separation of the type of waste. Depending on the type of products, **different tapes will require different ways of recycling.**

Mechanical recycling is an established process and is predominantly used in the case of high-quality **mono-material waste streams**. The process is sensitive to contaminants, the presence of which affects the quality of the recycled material. An important issue is the separation of the various parts; tape, core, release liner, and packaging.

A recent focus area is the separate collection of release liners from other waste, such as paper or plastic. This separation will help recycle release liners of tapes more effectively to be reused in the supply chain of the tape industry. Afera is working on organizing the **recycling of release liner waste** together with relevant waste collectors and recyclers.

In the case where the tape is still on the application surface, such a double-sided tape on a metal/fabric piece, the tape should be removed from the application surface before it is thrown away**.

As of today, multi-material and/or contaminated waste streams largely end up in landfills or are incinerated. However, with the development of **advanced chemical recycling** processes, such waste streams can also be recycled. Several technologies are clubbed together under the umbrella term of “chemical recycling”. These include pyrolysis, gasification, depolymerization, etc. In comparison to mechanical recycling, chemical recycling is still at a nascent stage, but rapid advances are taking place in this sector. Investments are expected to ramp up once the policy framework regarding chemical recycling technologies gets clarified. This will enable the set-up of more commercial-scale advanced recycling plants.

In the context of the tape industry, test runs to process **mixed tape waste** using pyrolysis are being analysed and the role chemical recycling can play is part of the ongoing discussions in the Waste Management workstream of AFSP.

*** For the end of every process that generates waste, please follow the local rules and regulations, these will provide better information on how to manage tape waste and what becomes of the tape waste.*

Conclusion

While adhesive tapes make up a relatively low proportion of the total weight or volume of a finished product, they can make a significant difference in terms of **overall sustainability performance**. With this guidance document, we aim to provide a better understanding of the different types of tapes and their properties and share best practices for efficient and sustainable use of tapes.



The overall goal is to support the eco-design of products, reduction of waste, and to enable sustainable end-of-life solutions that promote **circular use of materials**.