Double-sided tapes as a true alternative to conventional fastening methods

great to work with

Introduction

We manufacture adhesive solutions with more than a century of experience and our employees are equipped with a deep understanding of adhesive technologies and applications. Our years of experience have given us the opportunity to test our adhesive tapes against other types of fastening systems during the assembly process. In today's manufacturing environment different assembly methods exist:

- Welding
- Mechanical fasteners (bolts, rivets or screws)
- Liquid (structural) adhesives
- Double-sided tapes

Based on our comparison, the advantages of double-sided tapes are clear. Let's have a closer look into pressure sensitive double-sided tapes as a viable alternative to conventional fastening methods:

Why a double-sided tape is pressure sensitive:

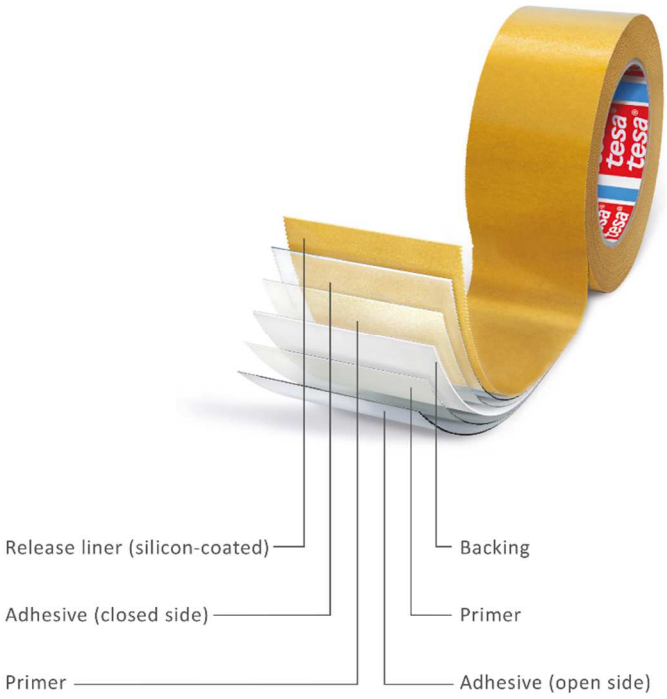
A pressure sensitive adhesive (PSA) is a permanently tacky substance that adheres to a given surface when light pressure is applied. It maintains a fine balance between adhesion (holding power of the adhesive on external substrates) and cohesion (holding power of the combined internal components of the adhesive). PSAs do not require a chemical reaction, heat or humidity to develop adhesion forces. Our double-sided tapes should be applied at a constant speed and pressure. For optimal results we recommend a uniform pressure, applied with an automatic or manual roller.

Construction of our double-sided tapes

Our double-sided tapes consists of three main components:

Backing

The backing is relevant for some of the main features of a double-sided tape. For rough surfaces thicker foam tapes come into play. Thinner filmic tapes can be used for transparent bonding requirements and tesa® ACX^{plus} tapes are able to dissipate stresses thanks to their viscoelastic behavior.



Liner

The liner covers the adhesive system and is an important element for the application and removal process. At tesa we do have paper and filmic release liners with a variation of different features.

Adhesive System

The proper choice of the adhesive system depends on how the double-sided tape is to be used: the kind of surfaces which are to be bonded, how long the bond is supposed to last, and whether it is an indoor or an outdoor application.

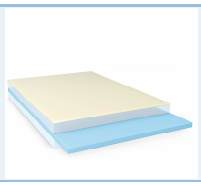
Our double-sided adhesive systems provide excellent quality and can be clustered as follows:

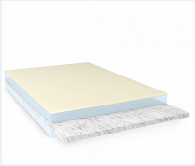
Adhesive Systems	Attributes
Pure acrylic ▪ Especially suitable for outdoor applications and applications at elevated temperatures	▪ Good adhesive strength on polar and pretreated non-polar surfaces ▪ Very good at elevated temperature ▪ Aging resistance ▪ Resistance against environmental conditions
Tackified acrylic ▪ Versatile adhesive with a well-balanced performance on a wide variety of surfaces for permanent applications	▪ Very good adhesive strength on polar, good on pretreated non-polar surfaces ▪ High initial adhesion power ▪ Aging resistance ▪ Resistance against environmental conditions
Synthetic rubber (SiS) ▪ Suitable for a variety of surfaces but offers limited aging and temperature resistance	▪ High immediate adhesive bonding strength ▪ Good shear resistance ▪ Very good bonding on polar and non-polar surfaces
Natural rubber ▪ Extremely sticky for use on rough surfaces	▪ High immediate adhesive bonding strength ▪ Very good bonding on polar and non-polar surfaces ▪ Preferred for use in indoor applications

Double-sided tapes can be split into thin or thick bonding systems

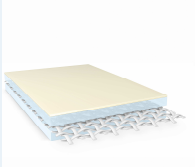
Thin tapes consist of a backing and two layers on each side of either rubber or acrylic adhesive. The backing of a thin double sided tape can be made of Polyester (PET), Polypropylene (PP) or Polyvinylchlorid (PVC). Non-woven, paper or cloth carrier also function as a backing for double-sided tapes.

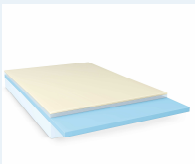
Our thin double-sided tapes can be categorised by the following groups:

Filmic tapes	Attributes
	▪ High tensile strength ▪ Well suited for the production of die-cuts ▪ Suited for high-speed manufacturing processes

Non-woven tapes	Attributes
	▪ Flexible and extremely conformable ▪ Easily hand tearable, yet tear resistant ▪ Cushioning features

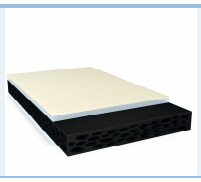
Paper tapes	Attributes
	▪ Flexible ▪ High temperature resistance ▪ Hand tearable

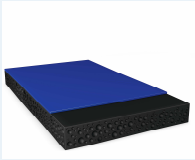
Cloth tapes	Attributes
	▪ Flexible ▪ High temperature resistance ▪ Thick backings are abrasion resistant

Differential tapes	Attributes
	▪ Differential adhesive coating weight on both sides of the backing ▪ Strongly differing peel adhesion

Transfer (without backing)	Attributes
	▪ Flexible and extremely conformable

Our thick tapes either have a PE foam or Acrylic Foam backing between two layers of either rubber or acrylic adhesive. Thicker double-sided tape have a very high bonding strength and therefore be used for demanding exterior applications. Our thick double-sided tapes can be grouped as follows:

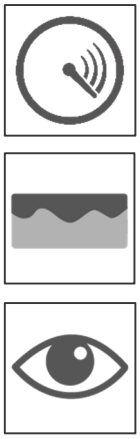
Foam tapes	Attributes
	▪ Compensation of tension, gaps and irregular surfaces ▪ Shock absorption ▪ Sealing function against dust and moisture

tesa® ACX^{plus}	Attributes
	▪ Viscoelasticity / Stress dissipation ▪ Bonding power ▪ Temperature and weather resistance

The advantages of double-sided tapes are clear

From an overall perspective, welds and liquid adhesives are the strongest assembly methods available. However, if strength is not the decisive factor they do have several limitations.

Welding is known as an expensive process as it requires specialized, skilled labor and intensive time depending on the size of the bonding area. Equipment, gas and energy is needed which in combination with labor and time are increasing costs. Welded joints are often not aesthetically pleasing and not suitable for high-end applications where design is an influencing component. Many times the joints must be cleaned up by grinding and polishing, which adds to an additional process step and cost factor.

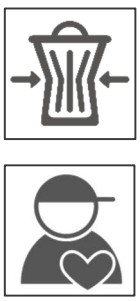


Our double-sided tapes do not require additional equipment, tools or energy and therefore reduce complexity at the factory workshop. They are very fast to use and speed up any assembly process.

Irregular or uneven surfaces can be compensated and no extra after-work process is needed. Thus our customers achieve an improved visual appearance which in fact supports freedom of design.

Before the element that is assembled with a liquid adhesive can be moved and processed further, the liquid adhesive must achieve a handling strength which may take from seconds to hours. They cannot be easily dissembled for rework and add to the number of chemicals in a factory. Those chemicals do play a role when looking into a healthy and clean working environment on production side.

Both, liquids and double-sided tapes, require a multistep application process, as contamination of substrates must be avoided. Therefore, cleaning of the substrates is essential for both bonding methods and cannot be avoided.

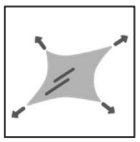


A double-sided tape does not require any additional support material and creates even less waste material. Clean production sides with less wastage are an underlining aspect for a safe work environment. Our double-sided tapes help to achieve a fast application process as no curing time is needed and any element can be moved directly to the next process step. A continuous production process is therefore guaranteed and no equipment for special storage conditions is required.

As liquids, double-sided tapes do compensate for irregular or uneven surfaces. An advantage of double-sided tapes over liquids is the usage of thinner product layers which makes the gap between the bonded surfaces as small as possible.

Even flexibility in adjusting the materials with a tape is possible if the liner is not fully removed and supports an efficient production process.
As no curing time is needed a faster assembly speed is guaranteed.

Using mechanical fasteners such as bolts, rivets or screws is also established in the market. Nonetheless single joint stress is an issue to keep in mind as stresses caused by shock or vibration are not dissipated. Single joint stress points are created which can result in failure of the joint with the result of material breakage, as the entire force is concentrated on the single joint, i.e. rivet. A certain level of preparation such as drilling holes is always necessary. Holes drilled for fasteners can be the starting point for corrosion as the material is damaged. As fasteners are always visible a clean finished surface is not possible and due to the preparation process this fixation method is time consuming.



Bonding with a double-sided tape does not damage the material and therefore reduces the risk of corrosion. It can be seen as virtually invisible fastening and helps to keep surfaces smooth and clean. In fact, a tape also has a sealing function and protects against environmental elements or dust.
Double-sided tapes are perfect in compensating tension as well as stress. Forces on the joint are distributed over the entire length of the joined surfaces. Our acrylic foam tapes are able to accommodate material expansion and contraction caused by temperature extremes. It even allows for different expansion and contraction values of differing substrates bonded, such as plastic to metal.
Shock absorption is one of the key product features of our double-sided tapes and sounds that are caused by vibrations are eliminated by the noise-dampening properties of our products.

Our double-sided tapes can be used on a wide range of surfaces including metal, glass, paper, stainless steel, polycarbonate and many more. At tesa, mutual trust and cooperation goes far beyond the implementation of adhesive tape solutions. Our consultants and application engineers guide the way to the efficient and economic use of our double-sided tapes in all manufacturing steps.

The result: double-sided tape solutions that are perfect for any technical application.

The benefit: the best customer-specific solution that meets all requirements.