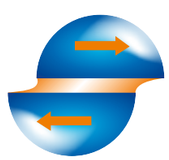
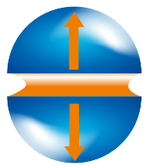
Adhesive joint load types

There are essentially four load types:



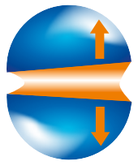
Shear forces

- The forces act parallel to the adhesive surface.
- They are more frequent than tensile forces.



Tensile forces

- The forces act perpendicular to the adhesive surface.



Splitting forces

- The forces are not evenly distributed over the adhesive surface but are concentrated on one line.
- Both components are rigid.

Peeling forces

- The forces act solely on the edge of the bonded surface, so only a small bond area can resist them.
- At least one component is flexible.

- **Shear and tensile forces** are generally unproblematic, as the force is applied over the entire adhesive surface.
- **Splitting and peeling stresses** should be avoided by design, as the force introduction only acts on a small part of the adhesive surface.

For this reason, the use of 3M™ industrial adhesive tapes under splitting or peeling loads should be agreed in advance with the responsible 3M contact person.

Industrial adhesive tapes, adhesives and labelling systems

3M Deutschland GmbH
Carl-Schurz-Straße 1, D-41453 Neuss

Telephone: +49 2131 88 19 258
Email: kleben.de@mmm.com
Website: www.3M-Klebtechnik.de

3M (Switzerland) GmbH
Eggstrasse 93, CH-8803 Rüschlikon

Telephone: +41 4350 896 58
Email: 3M.PAS.ch@mmm.com
Website: www.3M.com/ch/kleben

3M Austria GmbH
Kranichberggasse 4, A-1120 Wien

Telephone: +43 1417 00 61
Email: kleben.at@mmm.com
Website: www.3M.com/at/kleben

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Processing information for 3M™ industrial adhesive tapes

3M adhesive tapes are used in many industrial sectors due to their high performance. A particular advantage is the economical, fast and clean processing compared to other fastening systems – both manual and automated.

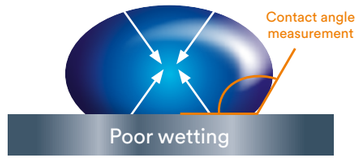
To take full advantage of the benefits of 3M adhesive tapes, please follow the processing instructions below.

The materials to be bonded must have good structural integrity.

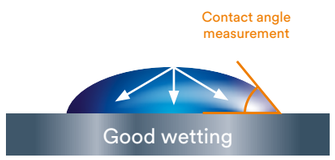
Because the following rule applies: The strength of a bond is only as good as the internal strength of the materials to be bonded.

Bonds with the following materials are critical:

- Polyolefins (polyethylene, polypropylene)
- Rubber (EPDM, etc.)
- Powder-coated materials
- Silicones
- PTFE



1. **Low-energy surfaces** (difficult to bond)



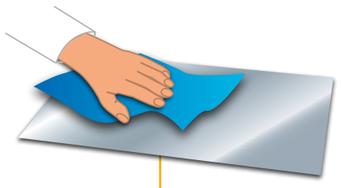
2. **High-energy surfaces** (easy to bond)

To determine if a surface is well-suited for bonding or not, the surface energy can be measured by means of wetting angle measurement or corresponding test inks:

- If droplets form, as shown in Figure 1, caution is advised: low-energy surface.
- If the liquid wets the surface and does not form droplets, as in Figure 2, it can be assumed that the surface is easy to bond or is of high energy.

Processing information for 3M™ industrial adhesive tapes

1. Cleaning/Drying



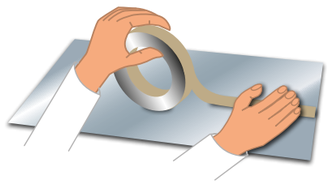
Surface cleaning

The surfaces must be dry, free of dust, oil, oxides, release agents and other contaminants. Cleaning agents that do not leave any residues and do not attack the substrate are suitable.

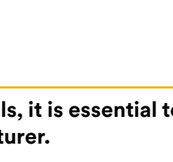
The following cleaning agents can be used, for example:

- technical cleaning agents (without additives such as silicones, fragrances, etc.)
- isopropanol/water (50/50)
- heptane or ethanol
- acetone or MEK

2. Application



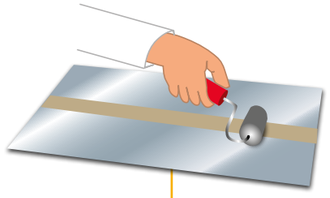
Ensure that the protective cover (liner) is completely removed

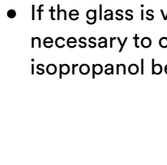


Mechanical surface cleaning

- If a good bond strength cannot be achieved even after cleaning, then the surface can be slightly sanded with 3M™ Scotch-Brite™ 7447.
- Before sanding the surfaces, they should be cleaned with suitable cleaning agents.
- After sanding, a second cleaning is necessary to remove the sanding dust.
- In the case of plastics and paints, compatibility with solvents must be checked (stress cracking, absorption of solvents).
- The entire cleaning and preparation process can be fully automated.

3. Fixation pressure





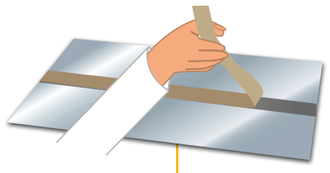
Pretreatment of glass surfaces

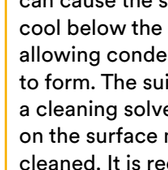
- Glass surfaces are characterized by the fact that, due to their chemical structure, they very easily bind (absorb) moisture on the surface, which can hinder the formation of adhesive strength.
- For this reason, we strongly recommend the use of 3M™ Silane Glass Primer before applying the adhesive tape.
- This enables a permanent bond and prevents moisture infiltration between glass and adhesive in outdoor applications.
- Silane Glass Primer is applied in a very thin layer to the optically clear, clean surface.
- If the glass is very dirty, it is necessary to clean it with isopropanol beforehand.

When using solvents and chemicals, it is essential to observe the safety regulations of the manufacturer.

Use clean, lint-free disposable wipes to clean the surfaces. Cleaned surfaces should be bonded quickly to prevent re-contamination (dust/fingerprints).

4. Removing the liner



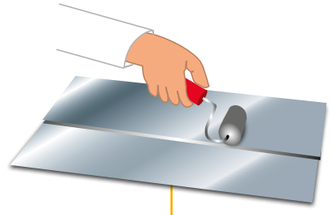


Temperature

- The most favorable processing temperature (object and ambient temperature) is between +15°C and +25°C.
- In particular, the formation of condensation should be avoided, e.g., when the materials to be joined are transferred from cold storage rooms to warm production rooms.

The object temperature should be above the dew point so that no condensation forms on the surface.
Cleaning with acetone can cause the surface to cool below the dew point allowing condensation to form. The suitability of a cleaning solvent depends on the surface material to be cleaned. It is recommended to ensure that the solvent does not damage the substrate to be cleaned.

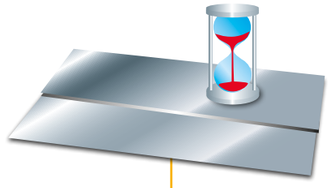
5. Joining, fixation pressure



Fixation pressure

- The strength of the bond is directly dependent on the contact between the adhesive and the surfaces to be bonded.
- Short, high pressure application (e.g. by means of a scraper, pressure roller or pressure device, etc.) ensures good surface contact.
- The type and level of the pressure depends on the material (thin-walled or thick-walled, etc.) and on the geometry of the components. Standard value: approx. 20 N/cm².

6. Waiting for build-up of final bond strength



Final adhesive force

- Depending on the adhesive system, the dwell time until the final adhesive strength is reached can be 72 hours.
- The final adhesive strength can be achieved more quickly by pressure and/or heating, as these additional measures result in better flow behavior of the viscoelastic adhesives.