



Automotive Technical Data Sheet

Usage of 3M™ Acrylic Foam und 3M™ Acrylic Plus Tapes

General Information

Description

Based on its excellent performance properties 3M™ Acrylic Foam and Acrylic Plus Tapes are used for a wide range of Automotive attachment applications. A special advantage is the clean, quick and economical processing in comparison to other attachment methods. In general 3M™ Acrylate Tapes show an adhesion build up with time.

To get full benefit of the 3M™ Tapes the following points are essential.

Surface Condition

Before using 3M™ products, make sure that the surface is clean and dry, free from dirt particles, oil, silicon layers or other contamination.

Surface Cleaning

For surface cleaning you can use following agents:

- | | |
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| ◆ Standard (Dust, Fingerprints, etc.): | Isopropanol / Water (50% / 50%) and / or
3M™ HPW 2011 (High Performance Wipe) |
| ◆ Oily surfaces or surfaces containing release agents: | Methyl Ethyl Ketone (MEK) |
| ◆ Wax Residuals: | Petroleum Ether (n-Heptane...) |
| ◆ Rubber/EPDM Cleaning: | Heptane; 3M™ Adhesive Cleaner |

The use of the name cleaning agents above depends on the surface material to be cleaned.

When using solvents and chemical agents, please do follow the safety recommendations from the supplier.

Use clean, lint-free, one-use towels for surface cleaning. You can reach good cleaning results by using a 3M™ High Performance Wipe (HPW) 2011.

Application on clean surfaces should happen shortly after cleaning, in order to avoid dirt collection (dust / fingerprints)

Surface Tensions (examples)

Abbreviation	Material	Surface Energy (mN/m)	
PTFE	Polytetrafluor-Ethylene	18	Low Surface Tension
Si	Silicone	24	
EPDM	Ethylene-Propylene-Diene-Rubber	26	
PP	Polypropylene	29	
PP EPDM	Polypropylene / Ethylene-Propylene-Diene-Rubber	30	
ABS PC	Acryl-Butadiene-Styrene / Polycarbonate	30	
CFK	Carbon Fibre	30	
GFK	Glass Fibre	30	
PE, HDPE	Polyethylene	31	
PBT	Polybutylene-Terephthalat	32	
ABS	Acryl-Butadiene-Styrene	35	High Surface Tension
PA	Polyamide	<36	
PMMA	Polymethylmethacrylate	<36	
EP	Epoxy	<36	
POM	Polyacetal	<36	
PVA	Polyvinyl Alcohole	37	
PS	Polystyrene	38	
PVC	Polyvinyl Chloride	39	
PET	Polyester	41	
PUR	Polyurethane	43	
PC	Polycarbonate	<46	
PE	Polyphenylene	<47	
SBR	Styrene Butadiene Rubber	48	
Al	Aluminium	840	
Cu	Copper	1100	

Surfaces tensions vary according to substrate formulation and substrate supplier. Therefore choice of tape must be approved for each application.

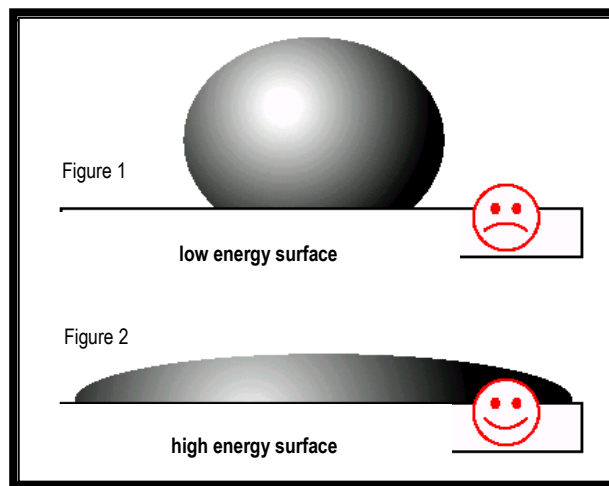
Mechanical Surface Treatment

In case the mentioned cleaning agents do not provide an adhesive friendly surface condition (e.g. in case oxides or form release agents are present or in case of special powder painted materials) abrading with 3M™ Scotch-Brite 7447 can be a solution.

Before starting the abrading process the surface needs to be cleaned with suitable cleaning agents. In addition after the abrading process cleaning steps needs to be repeated to remove the swarf.

Material Check regarding Adhesion Adequacy

To determine whether a surface is adhesion friendly or not, “water drop test” could give an indication. To carry out the test please clean the surfaces and wet the joint partner with water. In case you see water drops like in figure 1, the surface could be difficult to bond (low surface energy). In case the water is flowing and you see a thin water film like in figure 2, usually the surface is easy to bond (high surface energy).



Special attention before bonding to low surface energy substrates like:

- Polyolefines (Polyethylene, Polypropylene)
- Rubber (EPDM etc.)
- Powder Paints

Sufficient adhesion forces to PE/PP materials can be obtained by using e.g. Acrylic Foam™ Tapes with a special additional adhesive film (TX-1). An alternative solution to achieve an adhesion friendly surface could be a Corona-, Plasma-, or Flame treatment of the surface or the use of a special primer.

In addition heat active Acrylic Foam™ Tapes provide very good adhesion properties to PE/PP and a wide range of EPDM-materials.

In general for each application a suitable surface preparation needs to be evaluated.

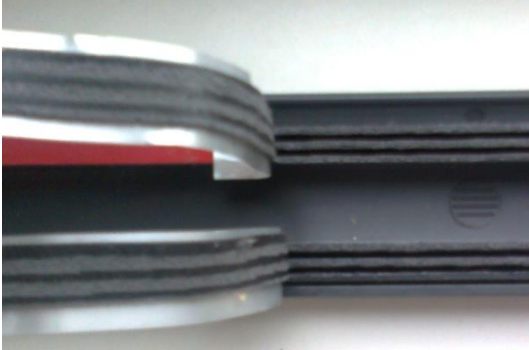
Bonding to Glass

In general 3M™ Acrylic Foam and Acrylic Plus Tapes show very good adhesion properties to glass surfaces and usual black ceramic glass prints. As a general rule glass bonding is sensitive against humidity. To avoid a sub-surface migration of water the use of a special glass primer is essential (e.g. 3M™ Silane Primer 4299).

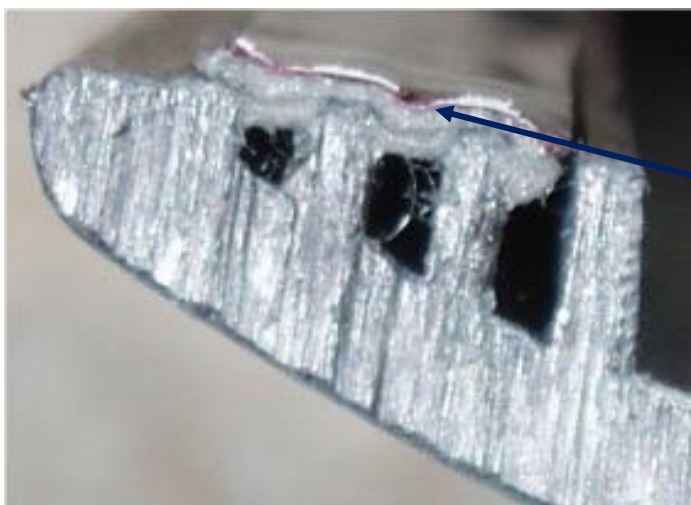
Ribbed Designs

Add-on-part construction and costs are reasons for ribbed surface in automotive market.

Therefore 3M recommend following usage guide for ribbed design in combination with Acrylic Foam and Acrylic Plus Tapes:



- ◆ Verifying contact pressure / wet-out by TekScan Test and optimization of pressurization parameter for manual roller or application tools.
- ◆ Chose thicker and / or more rigid tape, to create complete wet-out for all bonding parts. Softer tapes could flow through ribs, so contact area could be minimized.
- ◆ Maximize rib width (some successful applications have 2.5mm ribs with 4.5 mm outside ribs)
- ◆ Primer usage can maximize adhesion properties. Surface treatment like flame treatment can round ribbs, therefore contact between parts could be reduced.
- ◆ Accurate position of tape and fitting of add-on-parts must be ensured for long term bonding quality.
- ◆ Ribbed surface must be calculated as big as possible, to achieve optimal bondage. Also gaps between ribs must be small to demonstrate good wet-out.
- ◆ The edge of the tape must be supported. Tape placement tolerances must be considered to avoid unsupported edges of the tape, which can lead to liner removal issues.
- ◆ The top of the rib should be flat, not curved or pointed. Strong structures and paint overspray could prevent full tape wet-out.



Blister,
less contact to bond



Temperature

Process window for temperature (material- and ambient air temperature) is between + 18°C and + 40°C. Especially condensation needs to be avoided, e.g. in case the tape or the taped parts are delivered from cold storage rooms to the production line. During application, add-on parts and tapes must have the same temperature. For applications processed beyond the recommended application temperature window we assume no liability.

Pressure

The quality of the bond directly depends on the contact of the tape to the substrate. A short and high pressure (i.e. with a scraper, a pressurizing roll or a special static pressure device) leads to a first efficient contact between tape and surface. The needed type, level and time of the pressure depends on the material itself (thin- or thick-walled etc.) and on the geometry/fitting accuracy of the parts. Rule of thumb: approx. 10 – 50N/ cm²

A simple check is the so called “Wet-Out Test”. To carry out the test the surface of the substrate is inked before the bonding process is started (e.g. using a simple Board Marker non drying ink). In a second step the taped part is bonded to the substrate. Then the part is removed including the tinted tape. The colored tape shows the area where the part was in contact with the substrate.

Initial and Final Adhesion

Depending on the adhesive system and the substrate it can take up to 72 hours until the final adhesion is achieved. By use of a higher pressure and/or warming the part possibly the final adhesion can be achieved within a shorter time frame. Reason is that these actions lead to improved flow properties of the visco-elastic tapes. (Attention: Deformation and elongation of the part create reset forces. Due to this fact a warming of the part is only recommended in special cases.). The fitting accuracy of the parts is essential for optimal quality bond.

Temperature Durability

3M™ Acrylic Foam and Acrylic Plus Tapes have, depending on the load, the following permanent temperature resistances:

- ◆ AFT tapes without additional adhesive (i.e.: GT 6008, GT 6012): - 40°C until 120°C, short term 160°C
- ◆ AFT tapes with additional adhesive (i.e.: GTE 6212, 5402): - 40°C until 90°C, short term 120°C
- ◆ Acrylic Plus tapes (i.e.: ST 1200, PT 1100): - 40°C until 90°C, short term 120°C

Shelf Life

Requirement is a storage in the non-opened original carton, temperatures between + 4°C and + 38°C and relative humidity between 0 and 95%. Acrylic Foam and Acrylic Plus Tapes have the following guaranteed shelf life starting with date of manufacturing:

- Products with **non**-siliconized film liners: 36 months
- Products with siliconized film or paper liners: 24 months
- Level wound rolls must be stored under lay flat conditions



Tabbing Tapes

In general it is distinguished between self-adhesive and heat activable tabbing tapes. The self-adhesive tabbing tape 5300 is recommended for all Acrylic Tapes with non siliconized film liners.

When film liner is both-sided siliconized the self-adhesive tabbing tape 5699 is used.

Regarding heat activable tabbing tapes and available products 5081 and 5082. These tapes can be used for all film liners, in case of siliconized liners the silicone needs to be removed in advance of the tabbing process. 3M™ offers systems to apply heat activable tabbing tapes.

Usage of splices

Device for automatically liner release and 3M™ with heatactive splices must be used with raised release forces.(appr. 20 N)

Important Notice

All statements, technical information and recommendations herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed. Please ensure before using our product that it is suitable for your intended use. All questions of liability relating to this product are governed by the Terms of Sale subject, where applicable, to the prevailing law.

