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# Give Your Identity Staying Power

*The Right Adhesive Helps Ensure a Lasting Impression*
*What enviroment will your nameplate, label or decal have to endure?*
*Sunlight? Rain? Ice? Heat? Cleaning chemicals? Solvents?*
*Or even a persistent finger pulling at the corner?*

*All of these environmental extremes and stresses will challenge the staying power of your nameplate, label, or decal. Trust the experts at Mcloone to solve your toughest challenges with adhesives and substrate combinations that are tested and proven to deliver lasting performance.*

*Mcloone Whitepaper Series*
*(Adhesives)*

# Introducing a Sticky Subject

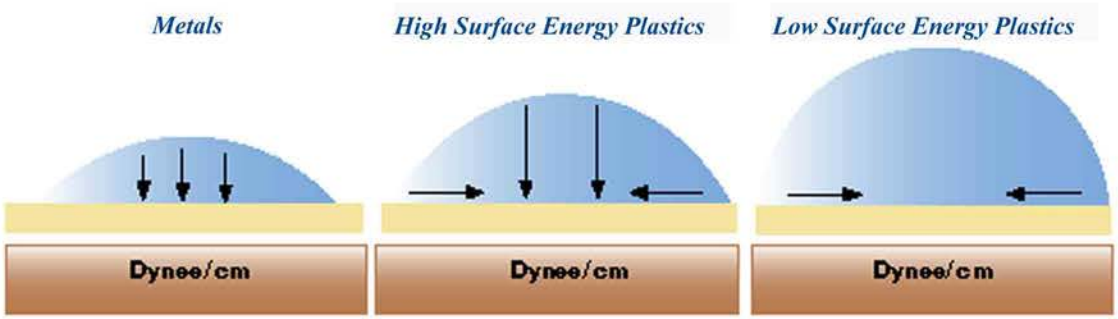
## What is an adhesive?

**An adhesive is any substance that is capable of holding materials together by a surface attachment that resists separation. Adhesives include organic and inorganic compounds such as cement, mucilage, glue, paste, polymers, and epoxies.**

## What are adhesive forces and how do they make things stick?

**The cohesive forces between liquid molecules create the physical phenomenon known as surface tension or surface energy. Because the surface molecules do not have other molecules on all sides of them, they cohere or stick more strongly to those in direct contact with them on the surface. This energy forms a surface "film" which makes it more difficult to move an object through the surface than to move it when it is completely submersed. A low surface energy plastic has a hard-to-stick-to surface similar to Teflon®-coated cookware. Adhesion is the force of attraction between two substrates, and the strength of the attraction is determined in part by the surface energy. The higher the surface energy, the greater the attraction; the lower the surface energy, the weaker the attraction.**

*Surface Energy Chart*




| Metals | | High Surface Energy Plastics | | | | Low Surface Energy Plastics | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1103 | Copper | 50 | Kapton® | 42 | ABS | 37 | PVA | 36 | Polystyrene |
| 840 | Aluminum | 47 | Phenolic | 42 | Polycarbonate | 36 | Acetal | 33 | EVA |
| 753 | Zinc | 46 | Nylon | 39 | PVC | 31 | Polyethylene | 29 | Polypropylene |
| 526 | Tin | 45 | Alkyd Enamel | 38 | Noryl® | 28 | Tedlar® | 18 | Teflon® |
| 458 | Lead | 43 | Polyester | 38 | Acrylic | | | | |
| 700-1000 | Stainless Steel | 43 | Epoxy Paint | 38 | Polane® Paint | | *Powder Coated Paints | | |
| 250-500 | Glass / Porcelain | 43 | Polyurethane Paint | 50 | Fiberglass | | | | |

*These values are provided as a guide. Modifications in formulations can substantially alter surface energies. Kapton®, Tedlar® and Teflon® are registered trademarks of Dupont. Noryl® is a registered trademark of General Electric. Polane® is a registered trademark of the Sherwin-Williams Company.*

**Broad range of surface energy.*

*Surface Tension is measured in dynes/cm, the force in dynes required to break a film of length 1cm.*

*Surface energy (the equivalent of surface tension) is stated in ergs per square centimeter.*

*For example: Water at 20 C has a surface tension of 72.8 dynes/ cm compared to 22.3 for ethyl alcohol and 465 for mercury.*

# Stick with Mcloone for a Durable Identity

## FREE Samples

*Let us send you some samples of the adhesive and substrate materials you are considering for your nameplate, label, or decal. Test it for yourself in the environment in which they will be applied, used, and required to perform over the life of your product.*


| | |
|---|---|
| *Address:* | *75 Sumner Street, La Crosse, Wisconsin 54603* |
| *Toll Free:* | *800.624.6641* |
| *Local:* | *608.784.1260* |
| *Fax:* | *608.782.3711* |
| *E-mail:* | *sales@mcloone.com* |
| *Website:* | *www.mcloone.com* |


*Mcloone is recognized as one of the world's leading providers of high-quality identification graphics. We supply our customers with metal labels and nameplates, vinyl decals, self-adhesive vinyl labels, doming, asset tags, metal signs, and Lexan®/polycarbonate identification graphics. Our graphic products are used by top brands to label, display and package their products. Mcloone's ISO 9001:2000 certification ensures you of the highest quality and complete satisfaction.*

## What factors will affect my adhesive choice and its performance?

There are many considerations when choosing the ideal adhesive and substrate combination. The following factors will influence the choice of the right adhesive or overlaminate for your self-adhesive label, product nameplate, or decorative decal:

- ~ Temperature
- ~ Ultraviolet light
- ~ Chemicals
- ~ Humidity
- ~ Motion, vibration, peeling, and other physical stressors
- ~ Adhesion (how effectively the adhesive maintains its bond to):
  - 1) the label/nameplate/decal material
  - 2) to the substrate, to which the label/nameplate/decal will be attached
- ~ Ability or need to reposition the graphic after initial application
- ~ Time (active use life or expected endurance of bond)
- ~ Cost considerations

## What can Mcloone's adhesive expertise do for your identity?

Mcloone's adhesive expertise and high-speed lamination capability will give you the right solution for your application and save you money on your self-adhesive (pressure-sensitive) nameplates, labels, and decals. We use 3M and Avery adhesives because of their consistent, proven performance in a wide range of environments. And to protect your nameplates and custom decals until they are ready to apply, we provide overlaminates, with pre-masks, to protect the finish during the manufacturing and shipping processes.

## Finding the Perfect Combination

*Your Mcloone Customer Care Representative will guide you through the process of choosing the right adhesive for your application. The answers to the following questions will be gathered during the quote process:*

1. *What is the bond area and shape?*
2. *What bond strength is needed?*
3. *What physical forces will affect the bond?*
4. *Will the bond be exposed to high or low temperatures?*
5. *Will the bond be exposed to mechanical shock and vibration?*
6. *Will the bond be exposed to water and/or chemicals?*
7. *What are the requirements for storage conditions and shelf life?*

*There may be other application and environmental factors that apply as well. While some applications are more challenging than others, you can trust that Mcloone will always find the right solution to give your identity the staying power it needs.*

*Mcloone's Customer Care team has the answers you need. Call us at 1-800-624-6641 and let's talk about your adhesive application needs.Your Mcloone Customer Care Representative will guide you through the process of choosing the right adhesive for your application.*

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## Ready? Set? Stick!

### ~ Surface preparation gives you the best performance ~

*Although not always required, surface preparation will give you the strongest bond. Depending on the substrate, surface prep may include removal of oils, greases, paints, oxide films, dust, mold release agents, rust inhibitors, or other contaminants. The amount of surface preparation needed will likely depend on the performance you demand from your adhesive and the cost of surface preparation.*

*There are three primary ways to prepare the surface. They may be used alone or in combination for greater effectiveness.*

***1) Degreasing:*** *Use solvents such as acetone, isopropanol, or proprietary cleaners including hot alkali solutions. Surfaces should be free of rust, paint, mill scale etc. Greases, oils, mold releases etc. can generally be removed with EPA-approved environmentally safe organic solvents or proprietary cleaners.*

***2) Chemical cleaning or etching:*** *Ideal for preparing metals for superior adhesion.*

***3) Abrasion:*** *Helps remove mill scale, oxide films, and some anti-rust treatments. Paints and oxide films can be removed by sanding or sandblasting followed by solvent cleaning.*

*TRY THIS... A simple test for surface cleanliness is to place a few drops of water on the area to be bonded. If the water spreads in a continuous film, then the surface is sufficiently clean. If the water beads up, surface preparation may be needed to achieve the strongest bond possible.*

### ~ Time to remove the liner / backing and apply your identification graphic ~

*Exposing the adhesive to the open air can attract airborne contaminants to the adhesive and may reduce the performance. As a rule, the less chance for contamination, or the less time the adhesive is exposed, the better the bond will be. That's why we recommend that the liner be removed immediately before application.*

### ~ Why doesn't the adhesive feel sticky? ~

*Some high-performance acrylic adhesives tend to be firm and dry to the touch. They are designed to bond materials other than skin. The natural oils and moisture of skin can vary from person to person and affect the "thumb appeal" or how sticky the adhesive feels to the touch.*

### ~ Check the temperature before you apply ~

*Temperatures inside your manufacturing facility, service center or product warehouse can vary depending on the season, sunlight exposure, and heat generated by equipment. For the best results from your adhesive, it's important to apply your nameplate, label or decal when the ambient (air temperature of the environment) and substrate surface temperatures are between the minimum and maximum application temperature specified for that adhesive.*

## ~ Allow time for the adhesive to bond ~

*When you apply your nameplate, label, or decal to the substrate the time it takes to bond will vary depending on the adhesive.*

### Consider this example of a foam tape adhesive's bond strength:

- *~ 60% bond strength immediately after application*
- *~ 75-80% after 24 hours*
- *~ 95% bond strength achieved after 72 hours*
- *~ The bond will continue to build over time*

*Allow time for the adhesive to cure properly at the recommended temperature before moving the product for shipment or into a warmer or colder storage environment.*

*Your Mcloone Customer Care Representative will provide you with all the information you need about proper bonding times and temperatures for your specific adhesive and its application.*

## ~ Application Tips ~

- *~ Try a test application to perfect your application technique.*
- *~ If the surface has been recently prepped or cleaned, be sure it is completely dry.*
- *~ Use a squeegee for smooth, even application of large labels or decals.*
- *~ A masking tape hinge(s) may be used to hold a large nameplate or decal in the proper position before applying pressure to make it stick.*
- *~ Firm, even pressure over the entire graphic is the key to achieving a good bond.*
- *~ A rolling action while applying pressure helps avoid air entrapment behind the adhesive.*
- *~ A soft cloth or cotton gloves used when applying pressure-sensitive labels will prevent skin oils from smearing the finish of high gloss graphics.*
- *~ To prevent edge lifting, smooth from the top down or center out, giving extra attention and pressure to the edges.*
- *~ On uneven surfaces or over rivets, a heat gun or hair dryer can warm the label or decal to help it conform to the surface irregularity.*
- *~ Surface contamination is the most common reason for poor adhesion.*

## Storage, Cleaning & Maintenance

*Proper storage and maintenance of your nameplates, labels, or decals before and after application will help ensure they give you the performance you expect.*

*Store unused identification graphics in a temperature-controlled environment (72°F ± 5°) that is free from excessive airborne dust and out of direct sunlight. Apply your graphics within the specified shelf-life.*

- *Rolls of graphics inside a shipping carton should be stored horizontally; rolls, which have been removed from the shipping carton, should be suspended horizontally via a rod or pipe through the roll core.*
- *Sheets and individual graphics can be stored either flat or stacked.*

*Use a cleaning solution with a pH range of 3-11 (within mild acid or mild alkaline limits). The solution should be non-abrasive and free of strong solvents. Spray or wipe on solution with a soft brush, rag, or sponge over the entire surface of the film to be cleaned. Rinse with clean water and allow to air dry.*

### Please note:

*These recommendations are intended as a source of general information only and are giving without a guarantee. Ask your Mcloone Customer Care Representative for specific recommendations for your material and application. You should also independently test cleaning agents and methods, prior to use, to determine their suitability.*

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# Glossary

**Acrylics:** *A group of synthetic, thermoplastic resins derived from acrylic esters. Acrylics have superior optical clarity, strength, and durability. Some demonstrate remarkable adhesion to a variety of substrates and cure quickly. They generally have limited resistance to temperatures and/or chemical extremes.*

**Adhesive:** *A substance that holds two surfaces together by means of a chemical or mechanical bond. Adhesion defines the state of holding two surfaces together by means of those forces.*

**Bonding:** *Joining two surfaces or materials by an adhesive. For bonding to occur, specific temperature and times may be required.*

**Bond Strength:** *Measurement of the load applied in tension, compression, flexure, peel, impact, or shear needed to break an adhesive bond.*

**Break:** *Failure of an adhesive bond when subjected to excessive loads and/or extreme environmental conditions, such as high or low temperatures, aggressive solvents, etc. Break can also occur as the result of inadequate joint design or contamination of the surfaces to be boned by oils, grease, particulates and so on from insufficient adhesive.*

**Catalyst:** *A chemical that speeds up the cure process of an adhesive.*

**Curing:** *Sometimes called hardening or setting. A chemical reaction that changes the properties of a material. Curing may involve a physical change from a liquid to a solid state. Fully cured materials exhibit maximum physical, thermal and chemical performance.*

**Dyne:** *A unit of force in the centimeter-gram-second system equal to the force that would give a free mass of one gram an acceleration of one centimeter per second.*

**Epoxy:** *A family of heat-setting polymers used as adhesives, sealants, and coatings. Qualities include high physical strength, superior chemical resistance, high temperature stability, and strong dimensional stability.*

**Failure, Adhesive:** *The breaking of an adhesive bond resulting in the breakdown of bond strength and the separation of the adhesive and the substrate.*

**Failure, Cohesive:** *The breaking of an adhesive bond resulting in separation within the adhesive layers.*

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# Glossary

**Fillers:** *Inert materials added to an adhesive to improve ease of application and/or some specific performance property such as strength, durability, hardness, dimensional stability, or other characteristics. Also called a modifier or extender.*

**Flow:** *Movement of an adhesive during application and the bonding process that occurs prior to the onset of cure.*

**Inhibitor:** *A substance added to an adhesive to slow down the bonding time. Useful to prolong the storage or working life (repositionability) of some adhesives.*

**Laminate:** *A product made by bonding together two or more layers of material with adhesive.*

**Load:** *The degree or level of force that a bond or joint can sustain or the force applied to a joint or bond.*

**Peel Strength:** *An adhesive's resistance to be pulled away form a bonded joint. Measured by the stripping force applied at a predetermined angle and rate.*

**Penetration:** *The process whereby an adhesive enters an adherent that is measure by depth over time.*

**Plastic:** *A synthetic polymeric material made up from organic compounds. Also a malleable material capable of being pushed into different shapes.*

**Polymer/Polymeric:** *A complex compound formed when simple molecules combine to form higher molecular weight molecules. Polymers include acrylics, ABS, nylons and styrenes, epoxies, phenolics, and silicones.*

**Pressure Sensitive:** *A type of adhesive which forms a bond upon application by physically pressing the adhesive layer against the substrate, involving no heat or catalyst.*

**Substrate:** *The surface or material upon which an adhesive is applied and to which it is expected to adhere.*

**Surface Energy/Tension:** *A physical phenomenon created by the cohesive forces between liquid molecules. Typically measured in dynes/cm, the forces in dynes required to break a film of 1 cm. length. May also be stated as surface energy in ergs per square centimeter.*

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# Glossary

**Surface Preparation:** *Physical and/or chemical pretreatments to enhance the adhesive strength of an adhesive.*

**Tack:** *The adhesive quality that allows the formation of a bond immediately after contact between the adhesive and the substrate. Also the "stickiness" of an adhesive that is not yet completely dried.*

**Tensile Strength:** *The maximum stress a material can withstand without tearing when stretched under tensile load.*

**Thermoplastic:** *Polymeric materials that are temperature sensitive and will repeatedly soften as the temperature increases and harden as the temperature decreases.*

**Thermosetting:** *Polymeric materials that harden when exposed to high temperatures and pressures, but do not soften or re-melt upon further heating. The hardening that occurs upon heating is due to a largely irreversible chemical reaction.*

**Thinners:** *Volatile liquids added to an adhesive to modify consistency and/or flow.*

**Wet-out:** *The physical contact between the adhesive surface and substrate. It is a function of the physical properties of the materials, pressure, time, temperature, and the adhesive's chemistry. Bond strength continues to build over time as the adhesive cures because the wet-out continues with time.*

**Wicking:** *The flow of an adhesive into a restricted opening.*