



ADHESIVES & COATINGS

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UV Pressure Sensitive Adhesives

UV curable pressure sensitive adhesives (PSA's) require proper application in order to achieve optimum results. They cannot be expected to be a "drop in" for solvent based, hot melt, or waterbased pressure sensitive adhesives. Craig offers a complete line ranging from low to high tack. The following information should provide a basic guideline for applying and getting the best performance from Craig's UV curable PSA's. Please be aware that all information contained in this document refers to room temperature PSA's, meaning they can be applied at room temperature without any heating. There are other types of UV PSA's such as warm and hot melt.

APPLICATION

UV PSA's may be applied via flexo, roller coat, slot die and screen printing depending on the adhesive. When printing via flexo (using a doctor blade) or screen, these adhesives may foam. Conventional defoamers cannot be added because they decrease the adhesive properties. If foaming is noticed, try heating the pan slightly to help remove air that has been introduced during the application.

For low tack and removable PSA's, suggested coating weights are from 0.2 to 0.5 mils depending on the properties desired from the finished product.

For medium to high tack, suggested coating weights are 0.5 mils and up. Please be aware that higher coating weights require more "curing power". This may be achieved by adding more lamps, increasing the wattage of the lamps, changing to a deeper penetrating bulb, or by slowing down press speeds. For proper cure and optimum adhesive results, one or more of these methods may be required.

IMPORTANT NOTES

UV PSA's work best when used on less porous substrates such as films and coated papers.

Before running these products on a live job, it is recommended that they be tested for the specific application for which they were meant. Aging tests should be performed for adhesive-to-release coating and substrate compatibility as well as different coating weights, cure speeds, and finished application surfaces.

Due to the nature of UV PSA's, standard test methods such as sheer and peel strength to stainless steel, etc. may not be indicative of the results obtained on other substrates, especially paper.

When using UV curable PSA's, refer to Technical and Material Safety Data Sheets for more specific handling, safety, and application information or contact a Technical Service Representative.

QC RECOMMENDATIONS

The best way to monitor PSA performance is quantitatively with an instrument designed to measure various parameters. The most common are peel strength, loop tack, and shear adhesion.

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Of these, the most widely used by printers is peel strength, typically at 180 degrees. Peel strength will give indications of the degree of cure; both under and over cure. We understand that equipment designed for this purpose can be costly, so other methods will be discussed as a rudimentary means of gauging adhesive performance.

➤ **Measuring Peel Strength Quantitatively**

- While the best machine is one designed for adhesive testing, other testers have been used. These include both manual and mechanized test stands with force gauges attached.
- It is best to take measurements immediately off press and then again in 24 hours. Establish control values at each time frame.
- Tests are typically performed at room temperature (25°C or 77°F), but QC controls can be established at other values. **PSA's must be measured at the SAME temperature each time to get an accurate correlation. Higher temperatures will soften the adhesive causing the peel strength to be lower. Conversely, lower temperatures will cause the adhesive to be "harder", which could increase or lower the peel strength depending on the adhesive.**
- Peels are typically measured at 180 or 90 degrees with 180 being the most common. You may determine which best demonstrates properties needed for your application.
- Sample sizes are typical 1" wide by 12" long. Again this can be adjusted to suit your needs. Be aware that smaller samples do not give results that are as accurate and consistent.
- The sample is usually attached to a special stainless steel plate. These can be purchased through adhesives testing material manufacturers. The plate must be cleaned with a solvent such as Acetone or MEK between each test. Make sure there is no previous adhesive residue, oily fingerprints, or other contaminants on the plate before using.
- Peel strengths can be measured on other materials, such as the substrate on which it is intended to bond, if desired. If the bond is permanent, or destructible, you will not be able to get an accurate measurement of peel strength. See note below.
- The speed of the machine is usually 12 inches per minute, but can also be varied as long as the same setting is used each time.
- Take at least three measurements of each sample and average the results. If one result is considerably different than the other two, perform a fourth measurement.
- **Please note that peel strengths for aggressive, or permanent, adhesives cannot be accurately measured on some paper substrates. If the adhesive is strong enough, then the paper will tear. When this happens, your peel strength measurement will show a spike and the remainder of the reading you get will be related to the paper strength. This could happen with some films as well. This is referred to as a destructible bond and is generally considered a success for the adhesive. Peel strengths may also be difficult on rigid substrates. You will notice a sporadic and zippy sounding peel. This will also give you various peaks of high and low peel strength leading to inconsistent results.**
- A Craig technical representative can help you establish procedures that fit your needs.

➤ **Measuring Peel Strength Qualitatively**

- When a quantitative peel strength value cannot be obtained such as when the adhesive is permanent, or destructive, then it can be measured qualitatively.

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- This simply means that it passes or fails by destroying the substrate. For films, you will get film tear. For paper, you will have fiber tear. You should look for this property immediately off press. Even though this product will post cure and cold flow to a stronger bond over time, you should not count on this phenomenon as an indication of adequate bond strength.
- If desired, you may also use qualitative measures for non destructive applications. This has to be carefully controlled because it is highly subjective. You must achieve the desired minimum bond strengths immediately off press. DO NOT count on post cure or cold flow to happen. See below.

➤ **A Word of Caution**

- Most UV PSA's will develop a post cure in which they will continue to crosslink for a few hours after being cured.
- They will also cold flow. Cold flow is a phenomenon in which the adhesive will "fill in" voids between itself and on substrates. Temperature can affect this by either speeding it up under higher temperatures or slowing it down under cooler temperatures.
- Both of these will increase bond strength when the coating is properly cured.
- If not properly cured, bond strength will be weak and may continue to degrade over time, especially on paper. This could be accelerated under higher temperatures (i.e. in the summer months).
- Craig recommends aging your finished products at 120°F for at least 36 hours. This will generally give an indication of what you will see long term. If your construction will be subjected to temperatures higher than this, you may see further deterioration. Your final product should be tested under the maximum temperatures that you expect them to be subjected. To date, all room temperature UV PSA's will undergo further polymerization as temperatures approach 140°F. This could lead to bond deterioration.
- The best records of quality control are long term ones. Keep samples of each job and go back to them at least quarterly to check for any changes. Realize, however, that samples stored at your facility may be kept under tighter environmental controls than ones that are shipped across or out of country. You must anticipate all environments that your product will be subjected to and perform appropriate testing.
- UV PSA's printed on paper may show changes up to eight weeks, especially if they were improperly cured.

➤ **Evaluating the Adhesive in Conjunction with a Release Coating**

- UV PSA's can be used with various pre-coated release liners, UV Cationic curable release coatings, and some UV free-radical curable release coatings. Please discuss your particular application with a Craig Technical Representative.
- To determine if a particular release liner or release coating is suitable for long term aging with your UV PSA, it is necessary to perform elevated temperature aging tests. See above under "A Word of Caution". Alternatively, you may send them to Craig to perform tests.

****If you have any questions or are in doubt about anything mentioned in this document or other wise related to our UV PSA's, please contact your Technical Sales Representative.****

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