

September 23, 2020



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## Film Usage In Exterior Environments

### Technical Bulletin

This technical bulletin is meant to address questions surrounding the use of polymer-based decorative films in an outside environment.

#### Background

Deco Technologies has been laminating various polymer-based films (vinyl, PET, acrylic, etc.) to various metal and other substrates since 2001. Throughout this time, many customers have purchased laminated sheets and coils for the specific purpose of using the materials outside. Applications are generally decorative architectural shapes and forms. To date Deco, and to our knowledge our customers, have never had a warranty claim for field failure.

#### Environmental Definitions

It is important to note that the definition of "exterior" has two very distinct sub-categories; direct UV and shrouded settings.

Direct UV as its name implies, is an environment where direct sunlight impacts the surface for significant portions of the day throughout the installed lifetime of the product. This is an environment that not only has ultraviolet energy hitting the surface, but is also exposed to other weathering elements such as snow, rain, ice, etc. some of which can sit and /or slide on the surface causing mechanical abrading of the decorative paint or film layer. Surface temperature fluctuations can also cause differential expansion within laminated products where the surface expands at a greater rate than the core material underneath due to sunlight energy exposure. Though not usually significant on polymer based laminates due to the film layer being thin and pliable, it can be a significant contributor to failure with other types of laminated products. (HPL to MDF, etc.)

The other sub-category of the term "exterior" is shrouded environments. These are applications such as soffits, overhangs, panel and lineal ceiling systems, etc. This environment is much less demanding on the laminate as there is negligible UV and mechanical processes to harm or fade the surface. Temperature fluctuations are also more even and stabilized as there is no direct sunlight impacting the surface of the material.

#### Decorative Film Definitions

There are many different polymers used in the decorative film industry. Most are vinyl based, but there are other polymers such as PET, olefin blends, acrylics, etc. that are used for specific applications. By definition, all are plastic and as such are hydrophobic and will not absorb or adsorb moisture/water making them suitable for use in areas that may have high humidity or

rain exposure. Films, much like paints, contain pigments and plasticizing agents that are prone to fading or degrading in certain conditions. Also like many paints, additives can be added to the films during the manufacturing process to inhibit the UV degradation process. Due to the added cost, most films are not made with these stabilizing additives except on a special order basis. Deco offers these direct sunlight capable films when the application requires it, but generally suggest using the non-UV films as they are less expensive, generally look better aesthetically, and hold up just as well in humid environments.



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### **Deco's Laminate Experience**

Deco has laminated materials for both types of exterior environment for nearly twenty years. We consider all vinyl based polymer films acceptable for shrouded setting applications as we have never witnessed a field failure in this application regardless of film brand. While understanding the film manufacturer's reluctance to warrant the product for exterior use, Deco believes the risk in shrouded settings is minimal that a failure due to fading or scuffing/abrading will occur within the product lifetime. If the application will see significant direct sunlight exposure, we would highly recommend specifying one of our films that have been specifically engineered to withstand the harsh environment this type of exposure brings.

### **Conclusions**

Film based laminates have been used for almost 50 years in outdoor settings and play a significant role in exterior architecture. While the final decision to use a film-based product rests with the client, Deco Technologies holds the opinion that plastic films used in a shrouded exterior setting see no significant differences throughout their life compared to similar interior applications.