

DuPont™ Tedlar®

polyvinyl fluoride film

Release Film Applications

Description

DuPont™ Tedlar® polyvinyl fluoride film has outstanding mechanical properties; inertness to a variety of chemicals and solvents; and anti-stick properties that make it an excellent release film for epoxies, phenolics, polyesters, and rubber compounds. Tedlar® does not contain silicones, which can cause adhesion and delamination problems in

finished parts. Tedlar® also has good temperature resistance. In most applications, Tedlar® can withstand temperatures in excess of 177°C (350°F) for several hours. Tedlar® release films are available in 25 and 51µm (1 and 2 mil) thicknesses as clear, translucent, or opaque white film and in several surface finishes, as shown in **Table 1**.

Table 1
Physical Properties of DuPont™ Tedlar® PVF Release Films

Property	TTR10SG3	TPC10SM3	TMR10SM3	TWH10SS3	TWH20SS3	TST20SG4 TTR20SG4
Nominal Thickness, µm (mil)	25 (1.0)	25 (1.0)	25 (1.0)	25 (1.0)	51 (2.0)	51 (2.0)
Gloss	High	Medium	Medium	Satin	Satin	High
Color	Clear	Translucent	Translucent	White	White	Clear
Specular Gloss 60°	65	17	8	15	22	65
Surface Roughness min, avg, µm (µin)	0.18 (7)	0.39 (15)	0.64 (25)	0.25 (10)	0.21 (8)	0.25 (10)
Tenacity, min* MPa kpsi	90 13	62 9	62 9	83 12	62 9	62 9
Web Strength* N/m, width lb/in, width	2275 13	1575 9	1575 9	2100 12	3150 18	3150 18
Elongation (MD) min, %*	95	115	100	75	110	125
Approximate Yield m ² /kg ft ² /lb	28.6 140	28.6 140	28.6 140	24.4 119	12.2 60	14.3 70

*Room temperature

Applications and Film Types

Printed Circuit Boards

Within the broad family of DuPont™ Tedlar® PVF film products, a variety of films have been specially formulated to serve the needs of the printed circuit board industry. Whether the application is in laminate production, mass lamination, or multilayer fabrication, these Tedlar® release films provide outstanding release from phenolic and epoxy resins as well as copper and caul plate surfaces, either hot or cold.

TPC10SM3 is a widely used release product for FR-4 epoxy-glass systems. Besides its ease of release, high tensile strength, and tear resistance, the film imparts a matte finish to the cured resin surface. This is accomplished by the addition of inert pigments to the film during manufacture to achieve a desired surface roughness. The resulting transfer of this texture from the Tedlar® to the resin surface enhances the adhesion of legend inks, protective masks, and additional layers of resin or prepreg to the laminate. TMR10SM3 is offered where an even rougher surface texture is desired and also provides a broader operating range due to its higher thermal stability.

The above Tedlar® printed circuit release products are designed to minimize plate scumming and to withstand normal epoxy and phenolic press cycles and temperatures without embrittlement or charring.

Films such as TTR20SG4 and TMR20SM3 are frequently used for release in the manufacture of flexible or rigid-flex printed wiring boards due to their conformability, toughness, and inertness to bonding adhesives. All Tedlar® films can also be obtained with one side treated to accept adhesives or other bonding materials for the fabrication of specialty release laminates.

Molded Parts

Aircraft manufacturers and their subcontractors use TTR10SG3 and TTR20SG4 in hand lay-up and vacuum bagging operations for curing epoxy and polyester prepreg parts where inspection of the part before or after application of heat and pressure is desirable. When it is essential to be able to tell if all the release film has been stripped from the part, a pigmented film may be preferred. Of the standard types of Tedlar®, TTR20SG4 has the best formability for this operation.

Tapes and perforated Tedlar® are available from converters for special applications.

Electrical Applications

Electrical equipment manufacturers have used a variety of Tedlar® films to contain resin overflow during autoclave curing of motor windings and coils. Most popular among these films have been TWH20SS3 and TTR20SG4 because of their high tensile strengths. TWH10SS3, TTR10SG3, TPC10SM3, and TMR10SM3 are used in applications where a thinner film is suitable.

Uses in the Rubber Industry

Transparent TTR10SG3 and TTR20SG4, as well as translucent TPC10SM3 and TMR10SM3, are often used as substrates for screen-printed transfer labels to identify rubber hoses and fan belts. Tedlar® film has a higher use temperature than triacetate and is not affected by moisture, unlike nylon films. For this reason, TMR10SM3 is frequently used as a release film to prevent sticking to the mandrel during steam curing of fan belts. The rubber industry has found TTR10SG3 to be a good processing aid in the resurfacing of rubber laminating and printing rolls. TWH10SS3 is used in patching and vulcanizing kit manufacturing.

Precautions

Static

In unwinding, sheeting, or handling operations on thin plastic films, static charges can be built up. Static discharges across the film result in “etching” the surface, making it susceptible to sticking in those areas. It may be necessary to add commercial static eliminator bars or grounded metallic tinsel to the handling equipment for control of static discharge. TPC10SM3 and TMR10SM3 have the least tendency toward static buildup.

Thermal Degradation

Thermal degradation of Tedlar® PVF film results in embrittlement, browning, and finally, charring of the film. Acidic conditions catalyze the degradation. If press plates become contaminated with charred Tedlar®, repeated use will cause repeated charring. If charring occurs, press plates should be cleaned thoroughly and given an alkaline rinse of a dilute water solution of sodium carbonate or sodium bicarbonate.

Catalysts and Resins

Tedlar® is being successfully used with a wide variety of epoxy resins. However, the presence of boron fluoride type complex catalysts in the final cure cycle can cause sticking and, at higher temperature conditions, decomposition of the film.

Disposal

Reference a current Safety Data Sheet or Article Information Sheet for guidance on the appropriate measures for disposal.

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CAUTION: Do not use in medical applications involving permanent implantation in the human body or contact with internal body fluids or tissues. For other medical applications, see "DuPont Medical Caution Statement," H-50102.

CAUTION: Tedlar® is not approved for use in ultralight aircraft wings.

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