PPG Teslin®

White Paper

Static electricity in the workplace

Static electricity is an ever-present issue for label printers and converters. As many know from experience, static can cause detrimental effects to a print run, resulting in costly quality problems. The phenomenon also presents a safety issue that can cause electrostatic shock to personnel. It can even ignite vapors in solvent-based inks and coatings.

In this paper, a leading global paint and coatings manufacturer learns the importance of label material selection in helping make workplaces safer ... and more productive.

What problems are caused by static electricity?

Three significant problems caused by static electricity in the workplace include electrostatic attraction and repulsion, shocks to operators, and fire risk. Electrostatic attraction/repulsion is one of the most widespread issues in the plastics, packaging and paper industries and can result in product issues such as sticking, repelling each other, and attracting dust. All of these elements ultimately lead to loss of productivity and profits. Shocks to operators, although not fatal, are becoming an increasing concern as health and safety issues gain prominence and can result in operator errors. Fire risk is critically important in industries where solvent materials are used. Static charge on material can cause a spark discharge which can ignite the solvent and create a fire.

Additional dangers of static build-up with pressure-sensitive labels used in digital presses

When labels are processed through digital laser printers, they are charged through an electrostatic process that causes print toner to adhere to the label surface. When printed labels are peeled, that action can generate static charge (tribocharging), which has the potential to ignite vapors in industrial environments in which chemicals, solvents and flammable materials are present.

Real-world example

In 2017, an employee working at a global paint and coating manufacturer was filling 5-gallon pails of primer using an automated filling device. As pails were filled, the employee sealed the lids and applied a vinyl self-adhesive label to each pail, discarding the label backing into a wheeled trash bin nearby.

While mopping the floor with a cleaning solution, the employee contacted the wheel of the cart with the mop head, generating a static spark that jumped from the wheel and ignited the solvent in the cleaning solution, setting the mop head on fire.

Although the fire was quickly extinguished, an investigation later determined that the voltage from the wheeled trash bin was generated by the electrostatically charged label backings it contained.

Corrective action

After making this determination, the paint manufacturer immediately engaged its label management vendor and an independent testing center to identify the label stocks that would generate the lowest amount of electrostatic voltage during label application.

Head-to-head static testing

The company turned to a process safety management firm that helps businesses in preventing explosions, fires and accidental material releases, to conduct static testing of PPG TESLIN® substrate, vinyl and PET label materials.

Label peel test

First, a label peel test was conducted to determine the electrostatic charge build up when an electrically isolated label set is peeled off from its backing and placed in a Faraday Cage under different conditions of relative humidity. The specific charge density calculated was then compared with maximum surface charge density (charge per unit area of 2.7x10-5 Coulomb/m2) in free space.

When peeled from their backings, vinyl labels can become electrostatically charged to 29% of the maximum charge density possible (2.7x10-5 C/m2) at ambient humidity environments, and PET labels can become charged to 30%. The same test of *Teslin* labels showed that they only become electrostatically charged to 0.065%. The charge on both the vinyl and PET labels can give rise to incendive electrostatic discharges under ambient and low relative humidity conditions.

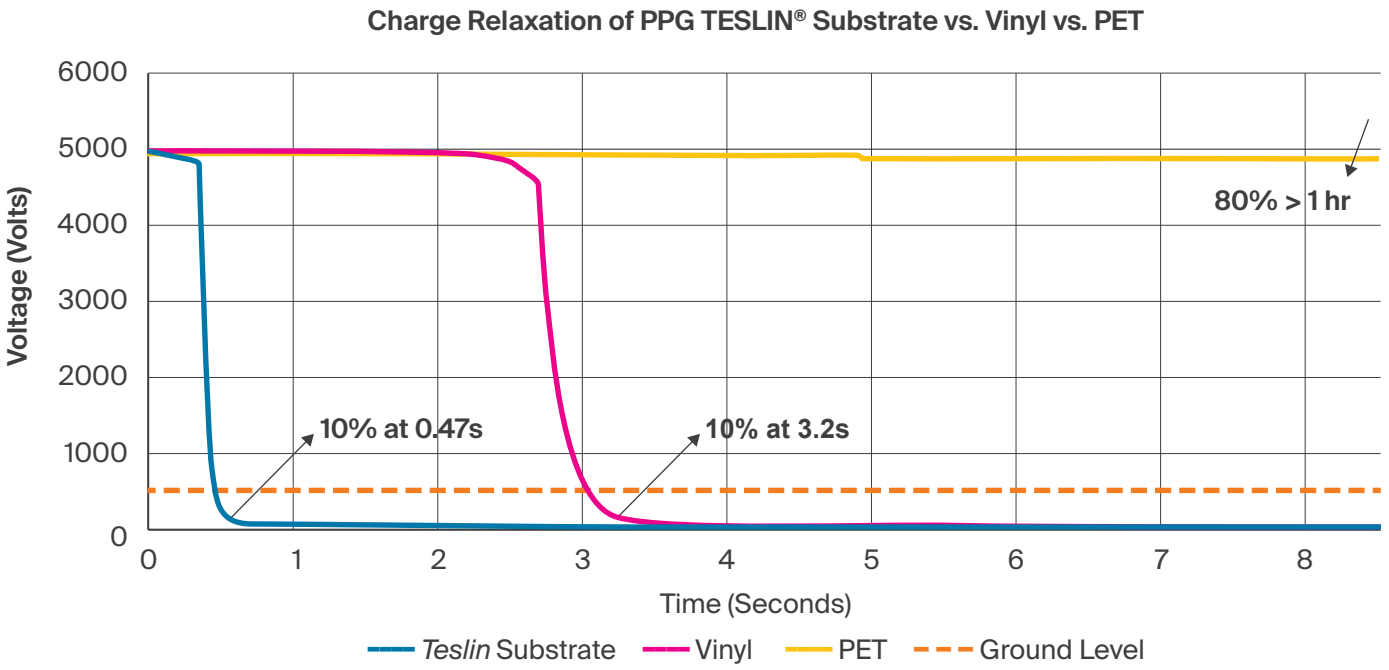
		Results		
Test	**Substrate**	**Ambient RH**	**Low RH (16 %)**	**Comments**
Label Peel Test / Charge Density (ASTM D4470) (Coulomb/m2)	PPG *Teslin* label w/ backer	0.0000000175	0.00000965	Not highly chargeable at ambient RH but highly chargeable at low RH
	Vinyl label	0.0000073	0.0000088	Highly chargeable at both ambient and low RH
	PET label	0.00000752	0.0000093	Highly chargeable at both ambient and low RH

This test was performed in accordance with ASTM D257 and conforms to the ISO 17025:2017 standard.

Surface resistivity test

A second test comparing charge relaxation (decay) time of PPG TESLIN® substrate, vinyl and PET was conducted to measure the time needed to dissipate the electrostatic charge from the surface of the materials to ground (earth).

At 71% relative humidity, in less than 0.5 seconds *Teslin* substrate dissipated more than 90% of its starting charge of 5000V. Both PET and vinyl held approximately 100% of their starting charge of 5000V over the same amount of time and showed minimal tendency to dissipate their charge. Although vinyl eventually dissipates its charge, it takes more than 3 seconds and does not meet the static dissipative definition of an electrostatic material.



This test was performed in accordance with MIL-STD-3010C, test method 4046.

Conclusion

Based on the results of the testing, the paint manufacturer selected *Teslin* label material for its ability to dissipate static and accommodate laser printing. The third-party testing supported the safety benefits gained by switching to *Teslin* labels, and showed that vinyl and PET labels are highly chargeable and pose a significant safety threat. By switching to *Teslin* label material, the company increased worker safety and diminished the risk of fire by reducing static during label-peeling and application in its production facilities.

To learn more

For more information about *Teslin* labels, please visit **teslin.com/TryLabels**.

WE PROTECT AND BEAUTIFY THE WORLD™

At PPG, we work every day to develop and deliver the paints, coatings and materials that our customers have trusted for more than 135 years. At the center of PPG's mission is a commitment to 'protect and beautify the world'. PPG TESLIN® substrate helps fulfill this purpose for our customers by reducing static in the workplace. Part of PPG's Specialty Coatings and Materials business, *PPG Teslin* substrate is a durable, secure and highly printable synthetic paper that excels in labeling projects and other applications demanding a tough, high-performance material.

Manufactured by PPG in Barberton, Ohio, *PPG Teslin* substrate contains micropores that absorb inks, toners, adhesives and coatings, locking them into its structure for long-lasting durability and security with no additional processing or expense. This unique characteristic makes *PPG Teslin* substrate ideal for applications that require printed data to remain on labels, such as brand protection, tamper-evident security, medical/pharmaceutical and in-mold applications. It is also perfect for chemical product labels that are compliant with the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals and British Standard 5609 (BS 5609).

To learn more, visit **www.teslin.com**.

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