

## **Geon Performance Materials**

### **The Value of Geon™ Vinyl**

- Vinyl Basics
- Vinyl in the Value Chain
- Geon Vinyl: Products, Services and Solutions
- Vinyl: A Responsible Choice



### **Vinyl Basics**

Vinyl, also known as Polyvinyl Chloride or PVC, is an extremely versatile polymer manufactured from two chemical building blocks – chlorine, obtained from salt, and ethylene, derived from either natural gas or crude oil. Vinyl Resin, as it is often referred to in its neat form, is compounded with various additives and colorants to make a blend of ingredients in the same way sugar, eggs and yeast are added to flour to make bread.

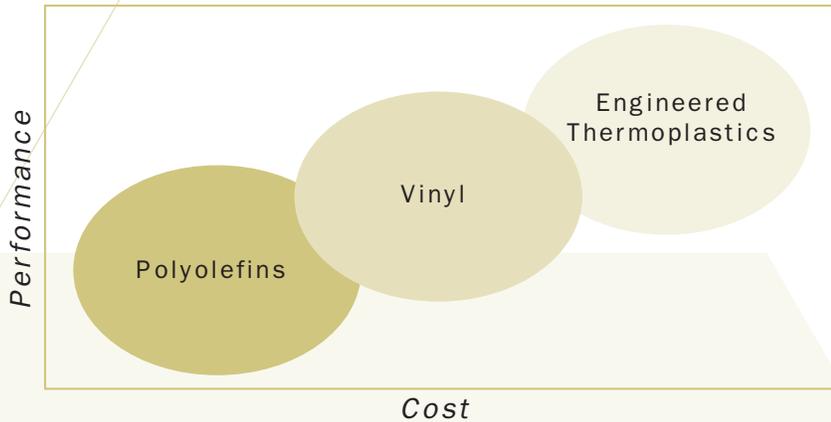
Vinyl can be extremely rigid or highly flexible; transparent or opaque; black, white, or wildly colorful. Vinyl is available in several forms ranging from liquid “plastisols” to pellet or powder “compounds.” Vinyl compounds are processed into useful articles via profile or sheet extrusion, calendaring, thermoforming, injection molding or blow molding processes. Vinyl Plastisols, in which the vinyl particles are saturated with plasticizer, are commonly used with casting, coating or dip or slush molding processes.

Vinyl is used in nearly every industry and tens of thousands of applications across the globe.

- **Appliances** – Washer/Dryer Consoles, Dishwasher Consoles, Ice-Maker Housings, Blender Lids
- **Building & Construction** – Windows, Pipe Fittings, Fencing
- **Electrical & Electronics** – Wall Boxes, Wiring Devices, Outdoor Enclosures, Connectors
- **Healthcare** – Medical Bags, Tubing, Device Housings
- **Industrial** – Irrigation Fittings, Point-of-Purchase Displays, Furniture Trim
- **Packaging** – Bottles, Film
- **Transportation** – Automotive Aftermarket
- **Wire & Cable** – Apparatus & Cord Sets, Building Wire, Power Wire, Telecom Wire

# Vinyl in the Value Chain

Vinyl compounds are an excellent alternative to engineered thermoplastics which may be over-engineered for the necessities of end-use or where polyolefins lack the physical properties required by the end-use. Vinyl compounds are also ideally suited to replace metal where design changes allow part consolidation and where corrosion resistance is a concern. The core characteristics of vinyl, such as inherent flame resistance, weatherability, and relatively low energy consumption, are combined with a wide array of performance enhancing possibilities to make vinyl a solid economic and environmental choice.



Why Vinyl?	Core Benefits
<b>Inherent Flame Resistance</b>	<p><b>Enhanced part performance</b> – Rigid vinyl’s inherent flame resistance enables the compounds to achieve UL flammability ratings without the use of additives which may bloom to surface affecting part appearance.</p> <p><b>Safety without added cost</b> – Many rigid vinyl compounds offer flammability performance at a much lower cost than comparable alternatives such as PC+ABS</p>
<b>Chemical Resistance</b>	<p><b>Reduced field failures</b> – Reduce failures due to chemical stress cracking from detergents, foods, oils, cleaners and many other common chemicals</p>
<b>UV Resistance</b>	<p><b>Reduce warranty claims, enhance image</b> – Parts look newer longer due to outstanding resistance to discoloration and yellowing, indoors or outdoors</p>
<b>Impact Resistance</b>	<p><b>Enhanced in-service performance</b> – Fewer part failures due to impact during shipping or use</p>
<b>Superior Aesthetics</b>	<p><b>Unparallel design flexibility</b> – Available in an amazing array of colors, opacities, gloss levels, and textures</p>
<b>Agency Approvals</b>	<p><b>Proven track record with regulatory compliance</b> – Agency approvals with FDA, USP VI, UL, CSA, IEC, and RoHS</p>



# Geon Vinyl: Products, Services and Solutions

Whether it's flexible or rigid, powder or pellet, PolyOne has a Geon™ Vinyl solution to fit your need. In addition to our line of core and specialty vinyl compounds, we offer custom solutions designed to help you meet the challenges of today's dynamic marketplace.

Geon™ Vinyl Compounds	Key Characteristics
<b>Geon™ Vinyl Rigid Molding Compounds</b>	Molding compounds for a variety of indoor and outdoor applications; major markets include fittings, appliance, electrical, and packaging
<b>Geon™ Vinyl Rigid Extrusion Compounds</b>	Extrusion compounds for a variety of indoor and outdoor applications, such as window accessories, furniture and sheet
<b>Geon™ Vinyl Flexible Compounds</b>	Elastomeric performance and durability for a wide range of markets and applications, including wire & cable and medical
<b>Geon™ Vinyl Extrusion Dry Blends</b>	Powder compounds suitable for extrusion with twin-screw extruders; major markets include fencing, decking and windows
Geon™ Vinyl Specialty Compounds & Alloys	Key Characteristics
<b>Geon™ HC Vinyl Healthcare Compounds</b>	Flexible and rigid compounds that meet healthcare's need for FDA, USP Class VI, and sterilization
<b>Geon™ Non-Phthalate Flexible Compounds</b>	Non-phthalate solutions for flexible vinyl compounds
<b>Geon™ CPSIA-Compliant Compounds</b>	Products conforming to the Consumer Product Safety Improvement Act for use in children's products
<b>Geon™ HTX™ Ultra Higher Heat Alloys</b>	Extends performance advantages of rigid vinyl to higher use temperatures
<b>Geon™ CPVC Compounds</b>	Provides higher use temperatures, improved chemical resistance, and lower smoke generation than vinyl
<b>Fiberloc™ Vinyl Glass Composites</b>	Combines inherent properties of vinyl with the strength and stiffness of glass – excellent metal replacement
<b>Geon™ Vinyl Cellular Compounds</b>	Lightweight extrusion products for a cost effective way to replicate the look and feel of decorative wood
<b>DuraCap™ Vinyl Capstock Compounds</b>	Proven weathering co-extrusion layer for a wide range of exterior building solutions

PolyOne's technical team knows the manufacturing challenges our customers face. Our support ranges from thorough processor training seminars to high-level part design, manufacturing support, and agency approval assistance.

PolyOne's Service Offering	Provides Benefits to Manufacturers
<b>Field Technical Service</b> – Industry-leading technical service support for tool design, start-up and production optimization	<b>Reduce manufacturing costs and start-up time</b> – Tool debug and equipment audits  <b>Shrink scrap rates</b> – Processing seminars focus on equipment and procedure optimization
<b>Design Services</b> – PolyOne's In-House Design Team can assist in designing parts and conducting computer simulations to optimize tooling design	<b>Reduce time to market</b> – Computer modeling to reduce new-tool design time and rework
<b>Color Technology</b> – Our color experts can color match deep saturated colors as well as special effects like metallic and pearlescent finishes	<b>Differentiate</b> – Create unique products to fill market niches  <b>Reduce manufacturing costs</b> – Eliminate secondary operations like painting
<b>Regulatory Coordination</b> – UL, NSF, FDA and more. Resources to aid with new product approval.	<b>Reduce regulatory overhead</b> – Efficient regulatory coordination and approval support

# Vinyl: A Responsible Choice

From water bottles to washing machines; from safety gloves to IV tubing, vinyl is a safe and environmentally sound choice. Here are a few reasons why.

- **Vinyl consumes less energy** - Vinyl resin production consumes 20% less energy than the production of many other polymers.
- **Vinyl consumes less fossil fuels** - While most polymers come 100% from fossil fuels, vinyl has a smaller carbon footprint because it is more than half chlorine derived from common salt. Worldwide production of vinyl accounts for only 0.3% of all oil and gas consumed globally.
- **Vinyl meets or exceeds regulatory guidelines** - Government agencies and certifying bodies have extensively studied the use of products made from vinyl and have approved its use in many products for over half a century.
- **Vinyl is safe for children** - PolyOne has a full line of Geon Vinyl compounds that meet the requirements of The Consumer Products Safety Improvement Act (CPSIA), which governs the use of lead and certain phthalates in articles intended for use by children aged 12 and under.
- **Vinyl can be safely recycled, landfilled, or incinerated**
- **Studies show vinyl is safe and environmentally acceptable** - Recent studies by the European Commission and the U.S. Green Building Council have shown that vinyl products are as safe and environmentally acceptable throughout their lifecycle (from extraction of materials to recycling/disposal) as other commonly used materials. These studies concluded vinyl has a relatively low impact on the environment compared to alternative materials and offers a number of benefits to those materials.

**Product choices often vary by region due to differences in regulatory and agency requirements, availability and other key factors. Please contact your nearest sales office for assistance in choosing the right solution for your locale.**

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