



GEON® CONNECTED SOLUTIONS

VINYL APPLICATIONS FOR
MOLDING & EXTRUSION

OPTIMIZING DATA AND POWER APPLICATIONS FOR A CONNECTED WORLD

The world is becoming more connected every day. The Internet of Things (IoT) and its disruptive technologies are not only changing the way we live and work, they're driving economic transformations. At the heart of these changes are intelligent devices that provide rapid collection, transmission and processing of data. From smart cars to smart homes, and intelligent buildings to smart grids, we are surrounded by network devices that transmit information to deliver personalized consumer experiences, improve business productivity and ensure network stability.



- Data components such as sensors, connectors and actuators collect or help accelerate the speed and optimize the quality of data transmitted via both wired and wireless networks over long distances. Network interface device enclosures and cell tower antenna caps protect these important elements.
- Power components such as insulators, enclosures and motion control accessories protect electrical systems that support data transmission and processing.

The Internet of Things has the potential to create an economic impact of \$2.7 trillion to \$6.2 trillion annually by 2025.

Source: McKinsey Global Institute, "Disruptive technologies: Advances that will transform life, business, and the global economy" http://www.mckinsey.com/insights/business_technology/disruptive_technologies

As larger numbers of devices become connected, the technology required to do so becomes more sophisticated. Designers are aiming to reduce development time for complex components and address costs without allowing performance levels to suffer.

Choosing the right material for the application can significantly influence all of these goals and more. For example, the right material can increase design freedom, enable part consolidation, reduce total system costs, deliver specialized properties and support regulatory compliance.

Data and power component manufacturers are finding success

by replacing over-engineered material solutions and traditional metal with rigid vinyl. GEON® rigid vinyl formulations from GEON deliver an attractive performance-to-cost ratio. Our large product portfolio offers a number of specialized properties to meet specific application needs.

REPLACE METAL AND OVER-ENGINEERED SOLUTIONS

As excellent alternatives to metal and over-engineered polymer solutions, GEON® rigid vinyl formulations offer both injection molding and extrusion grades that:

- Enhance design freedom and enable part consolidation versus metal
- Eliminate secondary operations such as painting with pre-colored formulations
- Solve issues of metal corrosion and degraded performance in exterior applications with weatherable formulations
- Offer good aesthetics and provide weatherable color hold
- Reduce the risk of part failure with supporting data on weathering performance
- Are F1 rated by Underwriter Laboratories (UL) for both ultraviolet (UV) and water immersion requirements
- Avoid the need for flame retardant (FR) additives with vinyl's inherent flame retardance
- Deliver targeted properties without the costs of unneeded functionality
- Reduce total system costs
- Support sustainability goals with recyclability and a lower contribution to greenhouse gases

MATERIAL OPTIONS FOR INJECTION MOLDING OR EXTRUSION

- Vinyl (PVC)
- Vinyl alloys
- Chlorinated Vinyl (CPVC)
- Glass-reinforced vinyl composites

BENEFITS OF GEON RIGID VINYL

In exterior applications such as enclosures, cell tower antenna caps, motion control accessories and others, GEON's GEON rigid vinyl provides excellent weathering performance, supported by years of data. These materials also resist chemicals, heat and abrasion. For even higher use temperature, flame retardance and chemical resistance, we recommend our HTX alloys or CPVC formulations.

GEON™ Fiberloc™ specialty engineered vinyl composites with glass fiber reinforcement withstand temperature fluctuations with a low coefficient of expansion, while delivering sound and vibration damping properties.

Design and processing benefits of GEON rigid vinyl products include part consolidation and the elimination of secondary operations required by metal parts, such as assembly and painting. Our materials also reduce scrap rates, because vinyl does not require flame retardant additives, which can cause bloom issues in injection molding.

Finally, our non-toxic vinyl materials can be safely recycled, incinerated or landfilled to meet sustainability mandates.

Unlike metal, which corrodes, GEON molded vinyl formulations provide outstanding weatherability while eliminating secondary operations and enabling part consolidation.



FLEXIBLE MOLDING PRODUCT TABLE

Product Description	Type	Temperature Rating °C	SG	Tensile (psi)
JKF100L	Flexible Molding	60	1.41	2400
JJF102L	Flexible Molding	75	1.39	1800
W3400L	Flexible Molding	75	1.39	2200
W9400L	Flexible Molding	105	1.28	2900
WR4181B	Flexible Molding	60	1.39	2100
Y594B	Flexible Molding	105	1.33	1900

RIGID EXTRUSION PRODUCT TABLE

Product Description	Type	SG	Tensile (psi)	Drop Impact
L6182	Rigid Extrusion Interior	1.42	6490	4.5
8700X	Rigid Extrusion Interior	1.38	6100	1.5
8700A	Rigid Extrusion Interior	1.38	6200	1.0
L6256	Rigid Extrusion Interior	1.4	6130	1.5
L6105	Rigid Extrusion Interior			1.5
EE105	Rigid Extrusion Interior	1.5	7500	1.5
87548	Rigid Extrusion Transparent	1.33	7700	4.0
87564	Rigid Extrusion Transparent	1.33	7800	2.0
06935	Rigid Extrusion Exterior	1.46	6000	4.0
87416	Rigid Extrusion Exterior	1.45	6400	4.5
85857	Rigid Extrusion Exterior	1.46	6200	4.5
E6950	Dry Blend Interior	1.4	6800	5.0
E7455	Dry Blend Exterior	1.45	7000	4.5
E7364	Dry Blend Exterior	1.46	6700	5.5
E7370	Dry Blend Exterior	1.46	6500	4.5

Hardness 15 second delay	Agency Listing	Suggested Applications	Enhanced Characteristics
85 A	UL	Plug molding; Strain relief	UL 94 V-O
73 A	UL	Plug molding; Strain relief	UL 94 V-O
77 A	UL	Plug molding; Strain relief	Good low temperature performance; UL 94 V-O
35 D	UL	Plug molding; Wire nuts	Good electrical properties; UL 94 V-O
60 A		Plug molding; Strain relief	Good low temperature performance
82 A		Plug molding; Strain relief	

Melt Temp (°C)	Agency Listing	Suggested Applications	Enhanced Characteristics
360-380			High impact, Low gloss; Thin and thick walls
360-380	UL	Electrical raceway	Very good sizing; High melt strength; Low gloss; High impact; Thick walls
360-380	UL	Conductor and insulator covers	Excellent sizing; High melt strength; Low gloss; High impact; Thick walls
360-380	UL	Motion control accessories; Crimp tubing	High impact; Higher gloss; Thin walls
	UL		Increased flex modulus
375-390	UL		UL 94 V-O
360-380			General purpose; Glass clear transparent; High impact
360-380			General purpose transparent with slight blue tint; UV
360-380	UL/CSA		Excellent weatherability in white; High impact; Thick walls
360-380	UL		Excellent weatherability; High impact; Thin walls
360-380	UL	Motion control accessories	Premium weatherability—best for non-white colors; High impact
380-400	UL		Interior dry blend; High impact
380-400	UL/CSA		High gloss
380-400			Medium gloss; Exterior dry blend; High impact
380-400	UL/CSA		Low gloss; Exterior dry blend; High impact

RIGID MOLDING PRODUCT TABLE

Product Description	Type	Tensile (psi)	Flexural Modulus (psi)	Notched Izod Impact	Heat Distortion Annealed 264 psi
M3500	Rigid Molding Interior	6700	360000	12	167
M3800	Rigid Molding Interior	6000	340000	12	164
M3900	Rigid Molding Interior	5500	330000	14	164
M4300	Rigid Molding Transparent Interior	7900	400000	16	163
M4810	Rigid Molding Transparent Interior	6500	350000	13	157
M4820	Rigid Molding Transparent Interior	6500	350000	13	160
M5200	Rigid Molding Exterior	6500	370000	20	172
M5240	Rigid Molding Exterior	6200	350000	14	169
M5700	Rigid Molding Exterior	6200	340000	7.9	169
M7500	Rigid Molding Exterior	5800	278000	4	
M6215	Rigid Molding Alloy Interior	6400	340000	5	185
M6829	Rigid Molding Alloy Exterior			7	
66311	Rigid Molding Alloy Exterior	6000	380000	15	174
M6307	Rigid Molding Alloy Exterior* *color dependant	4300	260000	14	165
NB6602	Rigid Molding Exterior				
MC280	Rigid Molding Interior	8200	490000	1.9	214
MC550	Rigid Molding Exterior	7060	401000	2.4	196
EE105	Rigid Molding Interior CPVC	7500	350000		221
80510	Rigid Molding Composite Exterior	9000	550000	1.7	168
80520	Rigid Molding Composite Interior	11500	800000	1.9	169
80530	Rigid Molding Composite Interior	12500	1250000	1.9	169
83510	Rigid Molding Composite Exterior	8000	600000	1	167
83520	Rigid Molding Composite Exterior	9500	900000	1.2	169
83530	Rigid Molding Composite Exterior	11000	1200000	1.2	169

Melt Temp (°C)	Flow	Agency Listing	Suggested Applications	Enhanced Characteristics
395	Medium	UL	Electrical boxes	Medium flow; High impact; UL 94 V-0/5VA; 85°C RTI
395	High	UL/CSA	Battery jar lids; Sensor housings	High flow; High impact; UL 94 V-0/5VA
395	High	UL/CSA	Electrical floor outlets; Exit signs	High flow; Good low temp impact; UL 94 V-0/5VA; 90°C RTI
395	Normal	UL	Motion sensor windows	High impact
395	High	UL	Connectors; Motion sensor windows	High flow; High impact; FDA medical; USP VI
395	High	UL		High flow; High impact; Interior; UV stable
395	Normal			
395	Normal	UL	Cable raceways; Powered outdoor housings; Connectors; Outdoor electrical posts; NID boxes	High impact; UL 94 V-0/5VA; 90°C RTI
395	High	UL	Cell tower antenna caps	High flow; Thin walls; Large parts; UL 94 V-0/5VA
395			Exterior lighting fixtures for darker, richer colors	
400	High	UL/CSA	Multipurpose	172°F HDT; Interior; Medium Impact; High Flow; UL94 V-0/5VA; CSA V-0/5VA
	High	UL	Multipurpose	181°F HDT; Interior; Medium Impact; High Flow; 80°C RTI; UL94 V-1
400	High	UL	Specialty; Enclosures; NID boxes	Excellent low temp impact; Exterior weatherable; High Flow; UL94 V-0/5VA; UL F1
395	High	UL	Enclosures; NID boxes	Best low temp impact; High flow; UL94 V-0/5VA; UL F1
	High	UL	NID boxes	105°C RTI; UL94 V-0/5VA; UL F1
405	Medium			221°F HDT; Interior
400	High	UL	Custom molding applications	212°F HDT; Exterior; Improved processing
405	Medium	UL	Track lighting	RTI 105°C; UL94 V-0/5VA
395	High	UL/CSA	Multipurpose	10% Glass Filled; Interior; High Flow; UL94 V-0/5VA; CSA V-0/5VA
395	High	UL/CSA	Multipurpose	20% Glass Filled; Interior; High Flow; UL94 V-0/5VA; CSA V-0/5VA
395	High	UL/CSA	Multipurpose	30% Glass Filled; Interior; High Flow; UL94 V-0/5VA; CSA V-0/5VA
395	High	UL/CSA		10% Glass Filled; Exterior; High Flow; UL94 V-0/5VA; CSA V-0/5VA
395	High	UL/CSA		20% Glass Filled; Exterior; High Flow; UL94 V-0/5VA; CSA V-0/5VA
395	High	UL/CSA		30% Glass Filled; Exterior; High Flow; UL94 V-0/5VA; CSA V-0/5VA

GLOBAL SERVICES

When you work with GEON®, you have access to a world-class, global formulator that offers a full breadth of solutions and services. In addition to our vinyl, specialty engineered polymers and film and sheet products, we offer colorants, additives and design and testing capabilities. With GEON, you can simplify your supply chain, accelerate your speed to market and lower your total system costs.

COLOR CAPABILITIES

Add color to your cables without impacting performance. Our OnColor™ pre-formulated colorants or color masterbatches are available in a wide palette. They are designed to Munsell's National Electrical Manufacturer's Association (NEMA) standards with performance exceeding J1128 and ISO 6722 requirements for demanding automotive applications. These products also meet many standard wire and cable specifications, including RAL color matching, the International Electrotechnical Commission (IEC) standards, the British Standard (BS) and the Association Française de Normalisation (AFNOR) Certification.

In addition to our stock color or masterbatch formulations, GEON can create a custom color concentrate or masterbatch that meets your specific needs, including temperature, aging, and shrinkage requirements.

REGULATORY ASSISTANCE

As excellent alternatives to metal and over-engineered polymer solutions, GEON rigid vinyl formulations offer both injection molding and extrusion grades:

- Many of our materials are compliant with the European Union's Restriction of Hazardous Substances (RoHS) and Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) regulations
- We offer materials listed with UL and the Chemicals Safety Audit (CSA), including elevated RTI-rated products and products for plenum-rated applications
- We can help you demonstrate support for Leadership in Energy and Environmental Design (LEED) and Green Globes environmental certifications by providing Environmental Product Declarations and Health Product Declarations
- Our products are backed by our No Surprises PledgeSM (see page 10) attesting to compliance with global regulations and quality and safety standards

TESTING AND ANALYTICAL SERVICES

Our wholly owned subsidiary and independent contract laboratory, Polymer Diagnostics, Inc. (PDI), provides technical assistance, and testing and analytical capabilities to help design new products, analyze material performance problems, and diagnose material failure mechanisms. Whether you need data for chemical analysis, rheology, mechanical or physical properties testing, weathering or fire science, the analytical chemists at PDI provide confidential, rapid, accurate and cost-effective standardized test results that accelerate time to solution.



INDUSTRIAL DESIGN AND PROCESSING SUPPORT

When you work with GEON, you also benefit from access to leading-edge design services through IQ Design Labs, a group of highly experienced industrial designers and project engineers. Whether it's performing mold flow analysis, tooling

design, part design, or 3D prototyping, we can help you streamline your efforts and offer cost-effective solutions. We also offer part and mold design engineering guides, processing guides, troubleshooting and product lifecycle management. Choose from on-site or phone-based technical consultations with our global team.



NO SURPRISES PLEDGE

At GEON[®], we are committed to helping you grow your business with safe and environmentally sound solutions. This commitment is exemplified by our No Surprises PledgeSM which we make to all customers and markets, across the globe.

- You can be confident that, in formulating and manufacturing our materials, we use sustainable practices to provide long-term product viability and sound environmental stewardship
- You can expect that the materials we produce contain only ingredients that conform to accepted legal and regulatory compliance guidelines
- You can trust that GEON materials meet the rigorous quality and safety management standards required across the globe
- You can be certain that GEON meets or exceeds the material safety data reporting requirements of your country or region
- When you choose GEON, you can be confident our products will help you meet or exceed today's stringent compliance standards



The outstanding weatherability of GEON® vinyl makes it an excellent choice for outdoor cell tower antenna caps. Our wide product range, combined with our global service and support, are key reasons why customers choose GEON for their demanding applications.



MEMBER ORGANIZATIONS



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