

# STRONG+ SUSTAINABLE

NORYL™ RESINS

Flexible wire coating resins



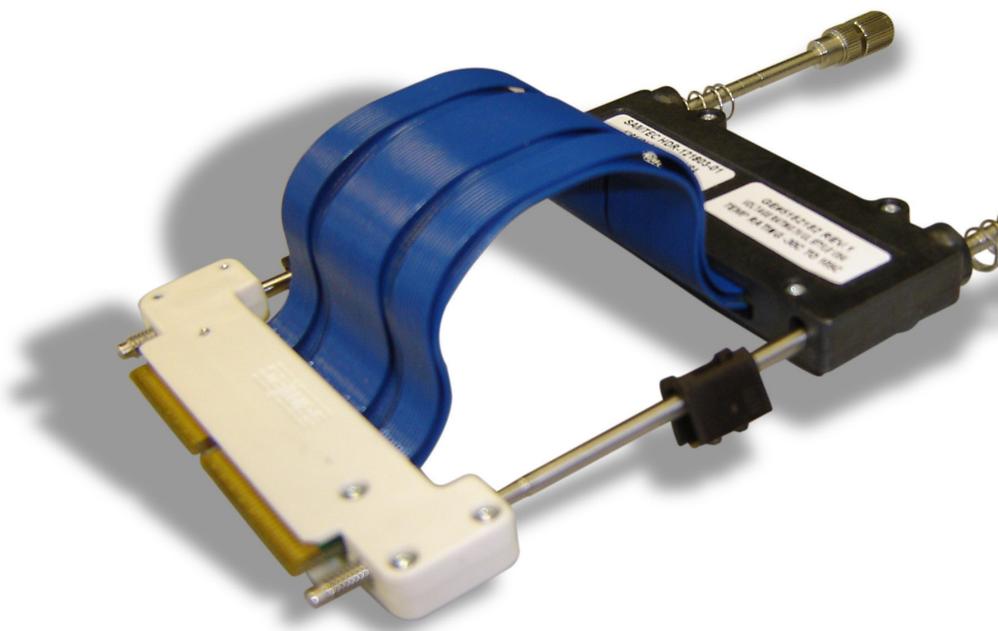
# NORYL FLEXIBLE WIRE COATING RESINS

---

## Recognizing industry needs

Because wire and cable are often tucked out of sight, the increasing volume of their application in our lives is easily overlooked. Yet the lack of suitable methods of disposal and recycling of the most widely used materials for wire and cable have caused a buildup of pressure on the industry to find new solutions.

Ecologically minded consumers and government bodies alike have voiced their concerns about the impact of conventional PVC wire coatings on the environment, which are non-recyclable and can release toxins during incineration. Manufacturers have been slow to respond to these concerns due to the incomparable performance of most alternatives.



---

## Delivering effective solutions

Responding to the significant need for a change in the status quo, SABIC offers NORYL resins. These recyclable thermoplastics combine a smaller carbon footprint with the flexibility and processing performance of PVC. Exceeding the demands of the industry, NORYL resins also offer low specific gravity, faster processing and improved abrasion resistance.

### CONVENIENT

NORYL resin is compatible for use in similar extruders used to process PVC and other conventional materials, eliminating the need for major equipment overhauls by consumers wishing to make the switch.

### VERSATILE

The non-halogenated, non-brominated, lead-free flame resistance of NORYL wire coating resins makes them ideal for consumer electronics applications.

### LIGHTER

The advanced technology of SABIC's NORYL resins enables manufacturers to respond to consumer demands for feature-loaded electronics with smaller, lighter components. Thin- and ultra-thin wire coating with performance similar to that of PVC, FRPE, FRTPEs and XLPE are now possible with our wire coating materials.

### FASTER

Our thermoplastics for flexible wire coating can offer a wider processing window than XLPE materials, enabling easier processing and faster throughput.

### RECYCLABLE

Technology should improve our lives, not harm our planet. That's why we offer several flame-retardant grades that meet halogen, chlorine, and lead-free requirements, as well as having the potential for recyclability.



# FLEXIBLE NORYL WIRE COATING RESINS ARE CLEANER, STRONGER, AND LIGHTER

---

The application of our advanced resin technology opens up the possibility for a more efficient future for the automotive and consumer electronics industries.

In the last three decades, the composition of automotive wire coatings has deviated very little from the norm. PVC materials are used for about 60 percent of automotive applications, with XLPE resins bringing enhanced high-heat performance where needed. With today's vehicles requiring more than two and a half kilometers of wire, the environmental impact of these materials through dioxins and non-recyclability can be devastating.

In the absence of a cost-effective, high-performing alternative, the automotive industry has struggled to improve its environmental record without sacrificing the quality of its products. With NORYL resins, manufacturers are no longer obligated to choose between a reputation of quality and a reputation of environmental consciousness - they can have both.

Flexible NORYL wire coatings are made with modified polyphenylene ether (mPPO) thermoplastic resin, an inherently lighter, tougher material than PVC. The specific gravity of NORYL resin is 1.03, which is lower than that of both PVC and XLPE. These superior qualities enable the creation of more compact wire bundles as well as significant weight savings in your application even when used in identical wire configurations. One tier 1 automotive supplier was able to reduce overall vehicle wire weight by as much as 25 percent.

Wire coated with certain flexible NORYL resin can meet the requirements for ISO 6722 class A, B, and C wire heat aging, and exhibits pinch and abrasion resistance up to 10 times better than wire coatings made from PVC. These high-performance materials also offer easier processing and faster throughput than XLPE, because they do not require cross-linking.

Not only does wire coating made from flexible NORYL resin outperform PVC and XLPE, it is also easier on the environment. NORYL resin provides non-halogenated flame resistance, and won't release dioxins when burned like PVC. Unlike XLPE resins - which are effectively thermoset materials - wire coating made from flexible NORYL resin can be easily reclaimed, reground and has the potential for recyclability like many other thermoplastics.



---

### CONSUMER ELECTRONICS BENEFITS

From cell phones to refrigerators, consumer electronics have relied for decades on flame retardant PVC and polyethylene-based wire coating. Recently, the potential environmental and health hazards of these materials have become more and more evident. In addition to the toxins released when halogenated and/or brominated wire coatings burn, many conventional wire coatings may also contain potentially carcinogenic plasticizers.

Non-halogenated, flame-retardant flexible NORYL resin for wire coating is non-brominated, meets heavy metal free requirements and has the potential to be recycled. In addition to meeting existing regulations, such as RoHS and WEEE, the material has certifications under UL1581 specification for 80°, 90° and 105° C. Several customers are already testing flexible NORYL resin wire and have acquired style pages with the UL758 standard.

Just as the automotive industry stands to gain reduced vehicle weight from NORYL resin, the consumer electronics industry can enjoy comparable or better processing performance than conventional wire coating materials and halogen-free alternatives. Our wire coating materials also make the process of switching from PVC as easy as possible for our customers, as they can be extruded on existing equipment with little or no investment under appropriate conditions.

### HOT WIRING THE FUTURE

We realize that all aspects of technology are continuously evolving, which is why we are committed to the continued development of advanced wire coatings. In addition to our flexible NORYL resin wire coating technology, we also offer SILTEM™ resin, a high-heat PEI/siloxane copolymer based on SABIC's ULTEM™ polyetherimide resin.

SILTEM resin is non-halogenated, generates very low smoke when burned and exhibits low corrosivity and toxicity – all qualities essential for plenum and other infrastructure applications. Together, these and other SABIC technologies open new opportunities for innovative wire coating applications.



# DISTINCT QUALITY, LONG-STANDING EXPERTISE

Backed by nearly half a century of development and experience, SABIC offers one of the most comprehensive and leading-edge selections of engineering materials and technical support for OEMs and suppliers worldwide.

After years of building a portfolio of advanced materials and expertise, we at SABIC are glad to offer technical support and share industry-leading solutions with wire and cable manufacturers. We strive to enable improvement in this market in the areas of design flexibility, ease of new product introduction, and cost.

Our products deliver cutting-edge performance, enabling our customers to succeed in their respective industries. Reliability can be just as crucial as performance in the quality of a product however, and at SABIC we find it imperative to offer ample support to our consumers to ensure maximum performance over the typical lifecycle of their products. We go above and beyond by providing excellent field technical support, a variety of online tools and manufacturing excellence to help ensure new designs will endure.

## FLEXIBLE NORYL RESIN PROPERTIES

PROPERTIES	UNIT	STANDARD	WCD801A	WCD855	WCD883	WCA875	WCV072
<b>MECHANICAL</b>							
Hardness	Shore A	ASTM D 2240	80	85	88	87	72(D)
Tensile stress at break	MPa	ASTM D 638	12	16	13	16	41
Tensile strain at break	%	ASTM D 638	120	260	200	180	83
Flexural modulus	MPa	ASTM D 790	80	60	50	40	1550
<b>ELECTRICAL</b>							
Volume resistivity (100V)	Ohm-cm	IEC 60093	3.80E+15	1.90E+16	5.20E+15	1.00E+17	1.25E+17
Dielectric strength	kV/mm	IEC 60243	23	25	23.7	22.8	38.5
Dissipation factor	1MHz	IEC 60250	0.004	0.007	0.002	0.0035	0.001
<b>PHYSICAL</b>							
Specific gravity	—	ASTM D 792	1.1	1.01	1.16	1.03	1.03
Flame	—	VW-1 UL1581	Pass	Pass	(EN50265-2-1 Pass)	Pass	(ISO6722 pass)

Flame may differ depending on wall thickness. For further information, please contact SABIC's engineers.



## GLOBAL SUPPLY

---

With over 100 locations in over 35 countries, SABIC can help wire coating designers and manufacturers meet their production deadlines on time and on target. In the interest of passing benefits on to our customers, we have invested in dedicated process development wire lines in China and Japan, enabling our customers to optimize processing line speed, extruder temperatures, and down-stream equipment.

## WORLDWIDE SUPPORT

---

With over 9,000 employees worldwide and Global Technology and Innovation Centers in China, India, Japan, Korea, The Netherlands, and the United states, SABIC has the global reach to ensure that help is never far from our customers. Our employees are highly qualified and trained to find innovative solutions and create growth opportunities for customers around the world.



## CONTACT US

### Middle East and Africa

SABIC Global Headquarters  
PO Box 5101  
Riyadh 11422  
Saudi Arabia  
T +966 (0) 1 225 8000  
F +966 (0) 1 225 9000  
E [info@sabic.com](mailto:info@sabic.com)

### Americas

2500 CityWest Boulevard  
Suite 100  
Houston, Texas 77042  
USA  
T +1 713 430 2301  
E [productinquiries@sabic.com](mailto:productinquiries@sabic.com)

### Technical Answer Center

T +1 800 845 0600

### Europe

Plasticslaan 1  
PO Box 117  
4600 AC  
Bergen op Zoom  
The Netherlands  
T +31 164 292911  
F +31 164 292940

### Technical Answer Center

T (0) 0 800 1 238 5060  
T2 00 36 1 238 5060  
E [webinquiries@sabic.com](mailto:webinquiries@sabic.com)

### Asia Pacific

2550 Xiupu Road  
Pudong  
201319 Shanghai  
China  
T +86 21 2037 8188  
F +86 21 2037 8288

DISCLAIMER: THE MATERIALS, PRODUCTS AND SERVICES OF SAUDI BASIC INDUSTRIES CORPORATION (SABIC) OR ITS SUBSIDIARIES OR AFFILIATES ("SELLER") ARE SOLD SUBJECT TO SELLER'S STANDARD CONDITIONS OF SALE, WHICH ARE AVAILABLE UPON REQUEST. INFORMATION AND RECOMMENDATIONS CONTAINED IN THIS DOCUMENT ARE GIVEN IN GOOD FAITH. HOWEVER, SELLER MAKES NO EXPRESS OR IMPLIED REPRESENTATION, WARRANTY OR GUARANTEE (i) THAT ANY RESULTS DESCRIBED IN THIS DOCUMENT WILL BE OBTAINED UNDER END-USE CONDITIONS, OR (ii) AS TO THE EFFECTIVENESS OR SAFETY OF ANY DESIGN OR APPLICATION INCORPORATING SELLER'S MATERIALS, PRODUCTS, SERVICES OR RECOMMENDATIONS. UNLESS OTHERWISE PROVIDED IN SELLER'S STANDARD CONDITIONS OF SALE, SELLER SHALL NOT BE RESPONSIBLE FOR ANY LOSS RESULTING FROM ANY USE OF ITS MATERIALS, PRODUCTS, SERVICES OR RECOMMENDATIONS DESCRIBED IN THIS DOCUMENT. Each user is responsible for making its own determination as to the suitability of Seller's materials, products, services or recommendations for the user's particular use through appropriate end-use and other testing and analysis. Nothing in any document or oral statement shall be deemed to alter or waive any provision of Seller's Standard Conditions of Sale or this Disclaimer, unless it is specifically agreed to in a writing signed by Seller. Statements by Seller concerning a possible use of any material, product, service or design do not, are not intended to, and should not be construed to grant any license under any patent or other intellectual property right of Seller or as a recommendation for the use of any material, product, service or design in a manner that infringes any patent or other intellectual property right.

SABIC and brands marked with <sup>TM</sup> are trademarks of SABIC or its subsidiaries or affiliates.  
© 2016 Saudi Basic Industries Corporation (SABIC). All Rights Reserved.