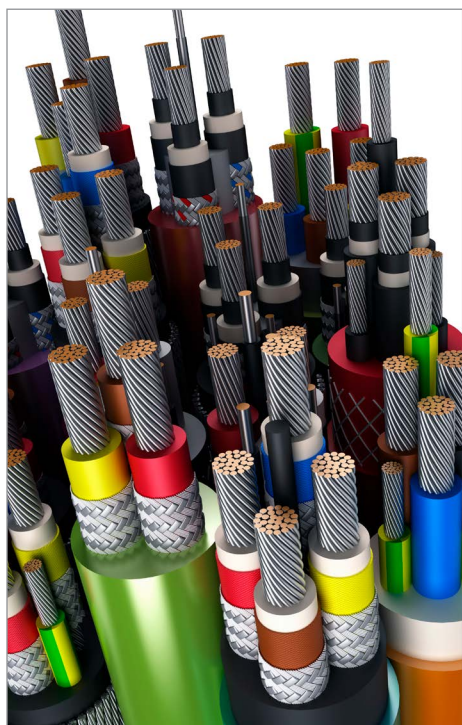


# DuPont Solutions for Wire and Cable Formulations

## Industry needs

The wire and cable market is highly diversified by application and technical requirements. Compounders also must design innovative and differentiated solutions while addressing evolving trends and regulations including digitalization, electrification, sustainability, and safety. Complying with the industry standards can be complex and expensive.



DuPont™ MULTIBASE™ and Hytrel® additive solutions, as well as Vamac® resins, enable our customers to design best-in-class wire and cable compounds to respond to these demanding industry performance requirements.

## Solutions for halogen-free flame retardant (HFFR) formulations

MULTIBASE™ thermoplastic additives are silicone masterbatches that allow optimized rheological conditions to enable a smooth extrusion process in highly-filled polyolefin-based HFFR compound formulations (containing high loadings of ATH/MDH, >65%).

Key benefits of MULTIBASE™ additives in HFFR compounds:

### During Cable Extrusion Process

- Higher throughput
- Lower energy consumption
- Reduced torque
- Die pressure reduction

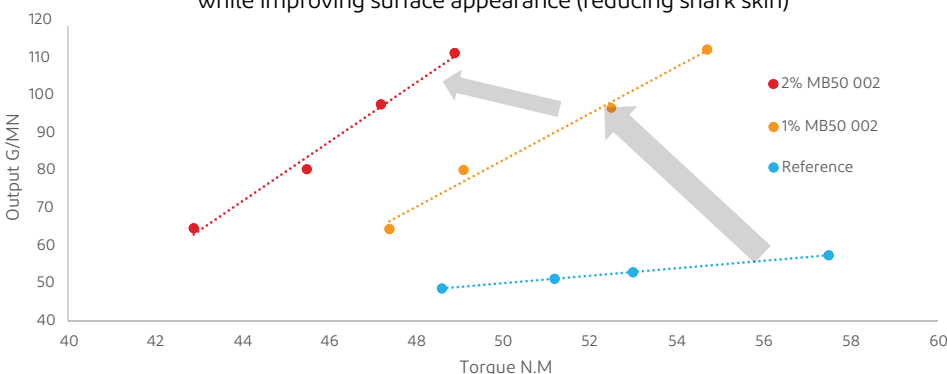
### On the Cable

- Smooth cable surface (reduced melt fracture)
- Better cable performance due to good filler dispersion
- Low order of toxicity (no toxic fumes while burning)
- Permanent low coefficient of friction

## Recommended grades

HFFR compound	Solution (1-2% use rate)
PE-based	MB50-002, MB25-502
EVA-based	MB50-320

MULTIBASE™ additives help reduce torque at given throughput speeds while improving surface appearance (reducing shark skin)

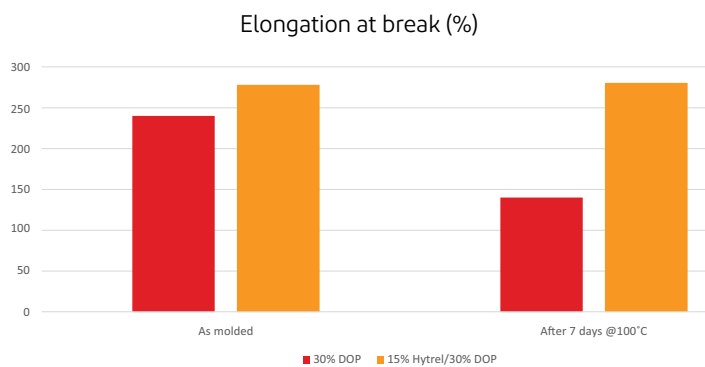


## Solutions for adding flexibility without plasticizer

For wire and cable PVC formulations, the benefits of Hytrel® thermoplastic elastomers include:

- Softens PVC without migration of plasticizer
- Improves mechanical properties across a wide range of temperatures
- Demonstrates better impact strength and improvement of flexibility at low temperature
- Exhibits consistent performance over time
- Improves chemical resistance, specifically oil resistance

Formulation	A	B	C
PVC (%)	100	85	75
Hytrel® 4056 (%)	0	15	25
DOP plasticizer (%)	30	30	30
Hardness (shore A)	94	85	80
Brittle point (°C)	-22	-34	-60



## Solutions for designing highly flexible oil- and heat-resistant elastomer compounds for -40°C+ to +160°C

Vamac® ethylene acrylic elastomers offer wide compounding variability with curatives, fillers, anti-degradants, plasticizers, and process aids to meet a broad range of different requirements. DuPont offers support in formulation development and selection of additives.

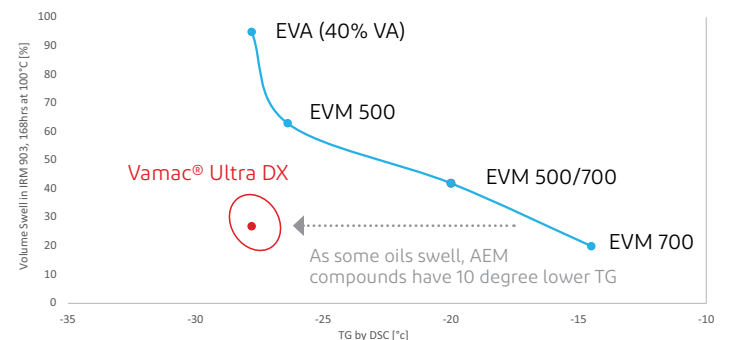
Vamac® is used in applications requiring heat, chemical resistance, low-temperature flexibility, and critical safety requirements for flammability, toxicity, and smoke density.

Vamac® dipolymers are halogen-free polymers and can be compounded with high loadings of non-halogenated flame-retardant fillers like aluminum or magnesium hydroxide without negatively impacting compound viscosity.

Benefits for wire and cable compound applications:

- Low smoke and toxicity compounds
- Broad temperature range: - 40°C to 160°C, Peak>200°C
- Excellent chemical and oil resistance
- Superior low-temperature flexibility
- Lighter weight due to thinner wall cable construction
- Low levels of off-gases

Comparison oil swell and glass transition temperature (Tg) of Vamac® vs. ethylene-vinyl acetate rubber (EVM)



Vamac® compounds have a ca. 10°C lower Tg at a comparable oil swell to EVM. They also demonstrate a ~20-30% better oil resistance at the same Tg as EVM.

Vamac® HFFR compounds are frequently blended with thermoplastic polymers, mainly to improve processing and physical properties. Suitable thermoplastics include Hytrel® and thermoplastic EVAs.

Dupont.com

DuPont™, the DuPont Oval Logo, and all trademarks and service marks denoted with ™, SM or ® are owned by affiliates of DuPont de Nemours, Inc. unless otherwise noted. © 2021 DuPont.

The information set forth herein is furnished free of charge and is based on technical data that DuPont believes to be reliable and falls within the normal range of properties. It is intended for use by persons having technical skill, at their own discretion and risk. This data should not be used to establish specification limits nor used alone as the basis of design. Handling precaution information is given with the understanding that those using it will satisfy themselves that their particular conditions of use present no health or safety hazards. Since conditions of product use and disposal are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information. As with any product, evaluation under end-use conditions prior to specification is essential. Nothing herein is to be taken as a license to operate or a recommendation to infringe on patents.



Electrical and Electronics