

# CELANESE 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.



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

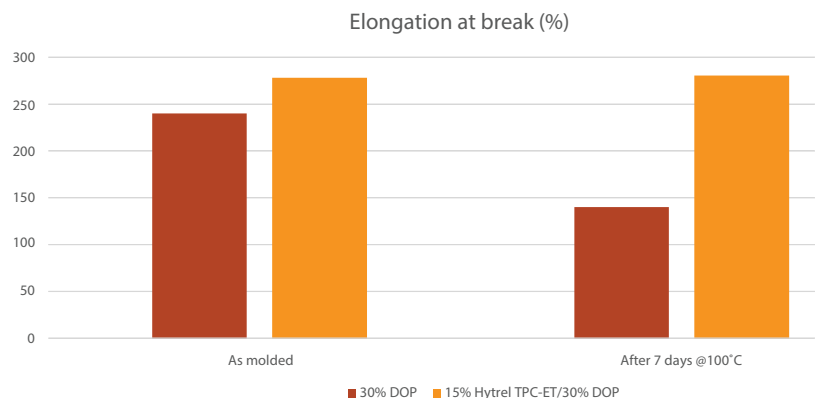
## SOLUTIONS FOR ADDING FLEXIBILITY WITHOUT PLASTICIZER

For wire and cable PVC formulations, the benefits of Hytrel® TPC-ET 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® TPC-ET 4056 (%)	0	15	25
DOP plasticizer (%)	30	30	30
Hardness (shore A)	94	85	80
Brittle point (°C)	-22	-34	-60

Elongation at break (%)



# SOLUTIONS FOR DESIGNING HIGHLY FLEXIBLE OIL- AND HEAT-RESISTANT ELASTOMER COMPOUNDS FOR -40°C+ TO +160°C

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

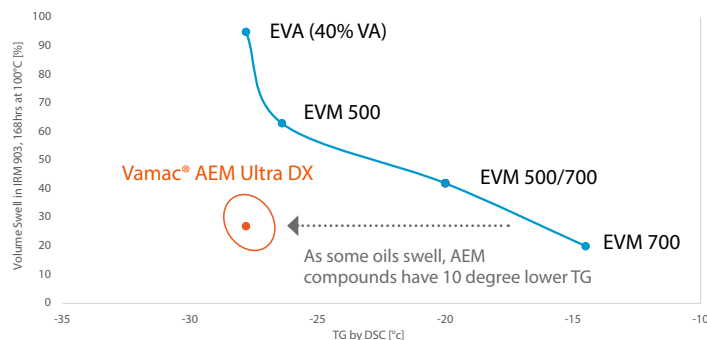
Vamac® AEM is used in applications requiring heat, chemical resistance, low-temperature flexibility, and critical safety requirements for flammability, toxicity, and smoke density.

Vamac® AEM 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® AEM vs. ethylene-vinyl acetate rubber (EVM)



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