

# Hyperform<sup>®</sup> HPN-20E

BY MILLIKEN



## NUCLEATING AGENT FOR POLYOLEFINS

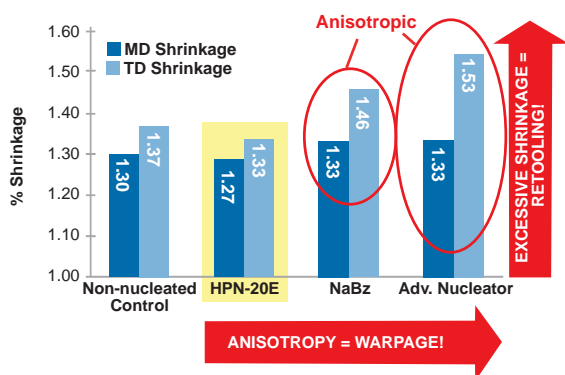
## Polypropylene

Hyperform<sup>®</sup> HPN-20E, a new additive chemistry from Milliken, performs in both polyethylene and polypropylene. Specifically in polypropylene, HPN-20E combines unique shrinkage characteristics, physical property balance, and crystallization effects to improve performance in manufacturing speed, product performance, and part specification compliance.

### UNIQUE SHRINKAGE CHARACTERISTICS

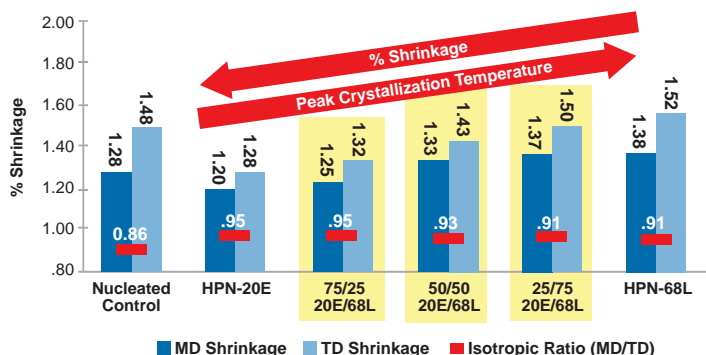
- Eliminates retooling needs
- Isotropic shrinkage to eliminate warpage
- Improved cycle times

#### Shrinkage Characteristics



#### Combining Innovative Technologies

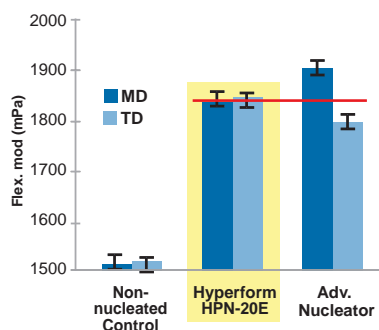
HPN-20E and HPN-68L can be Combined for Fast Crystallization, Isotropic Shrinkage, and Controlled Shrinkage



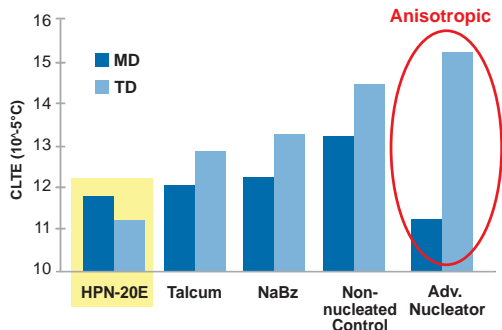
### PHYSICAL PROPERTY ENHANCEMENTS

- Excellent bidirectional stiffness enhancements
- Optimum CLTE performance
- Improved stiffness/impact balance

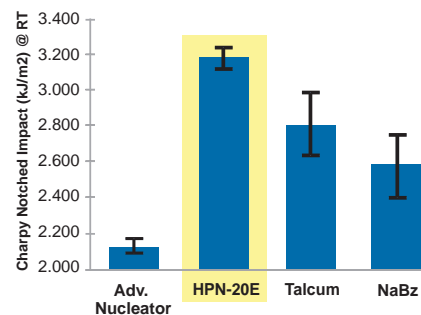
#### Bidirectional Stiffness



#### Coefficient of Linear Thermal Expansion (CLTE) (20°C - 75°C) (ASTM E831/ISO-11359)



#### Charpy Notched Impact (kJ/m<sup>2</sup>) @ RT



HPP, 12MFR, (80mm x 10mm x 4mm mold after 2 days)



COMPATIBILITY WITH COMMON CO-ADDITIVES

✓+ Highly Recommended ✓ Recommended ✗ Not Recommended		NUCLEATION PERFORMANCE (Tc)	RESIN COLOR PERFORMANCE (YI)	HAZE PERFORMANCE (% HAZE)
ACID NEUTRALIZERS	Ca Stearate	✓	✓	✓+
	Na Stearate	✓	✗	✓+
	Li Stearate	✓+	✗	✓+
	Zn Stearate	✓+	✓	✓
	Ca Lactate (Paticonic 1230, Paticoinc 1240)	✓	✓+	✗
	Ca Steroyl Lactylate (Paticonic 930, Paticonic 940)	✗	✓+	✗
	Synthetic Hydrotalcite (DHT-4A)	✓+	✓+	✓+
	Mg Stearate	✓	✗	✓
PRIMARY ANTI-OXIDANTS	Hindered Phenol 1 (Irganox 1010)	✓	✓	✓
	Hindered Phenol 2 (Irganox 1076)	✓	✓	✓
	Hindered Phenol 3 (Ethanox 330)	✓	✓	✓
	Hindered Phenol 5 (Cyanox 1790)	✓	✗	✓
SECONDARY ANTI-OXIDANTS	Phosphite 7 (Irgafos 168)	✓	✓	✓
	Phosphite 8 (Irgafos 12)	✓	✓+	✓+
	Phosphite 9 (Ultranox 641)	✓	✓+	✓+
	Diphosphite 10 (Ultranox 626)	✓	✓+	✓
	Diphosphite 12 (Doverphos 9228)	✓	✓+	✓+
	Diphosponite 13 (Sandostab P-EPQ)	✓	✓+	✓
	Thio Ester 14 (Witco DSTDP)	✓	✓	✓
	Thio Ester 15 (Witco DLTDP)	✓	✓	✓
	Hydrazine 16 (Irganox MD 1024)	✓	✓	✗
	Amine Oxide 18 (without primary AO) (Genox EP)	✓	✓+	✓

Hyperform Product Types

- HPN-20E
- HPN-68L
- HI5-5 (5% HPN-68L Concentrate)
- HL3-4 (4% HPN-20E Concentrate)

Typical applications

- Automotive
- Appliances
- Closures
- DVD cases
- Thermoformed parts
- And many more!

