

DuPont™ Nomex® 455 (NOMEX III) Aramid Staple Fiber

Category : Other Engineering Material , Composite Fibers , Polymer , Thermoset , Aramid

Material Notes:

Type 455 staple of NOMEX, a patented blend of NOMEX and KEVLAR brand fibers, was introduced to fill the need for higher performance thermal protective apparel. Type 450 staple. However, because of its lower crystallinity, it produces yarn and fabrics that are slightly lower in strength than those produced from Type 450 staple. Advantages versus Type 450 include: Increased resistance to break open under thermal load. The presence of 5% KEVLAR inhibits thermal shrinkage, thus reducing the probability of break-open and the subsequent loss of the protective barrier. Easier dyeability. Type 455 NOMEX can be uniformly dyed in fabric or yarn form to the many colors required for civilian protective apparel. Type 455 NOMEX is sold as a dye merged staple. Fabric Appearance. Crease retention and wrinkle resistance can be imparted to NOMEX III or NOMEX IIIA by autoclaving pressed garments at 30 psig steam pressure. Although not as strong as the provide significant advantages in appearance and ease unautoclaved garments. General NOMEX Information: Nomex® is a family of aromatic polyamide (aramid) fibers. This family consists of staple fibers, continuous filament yarns, paper, and spunlaced fabrics. Uses for staple, yarn, and spunlaced fabrics include apparel fabrics to protect against flash fire and electric arcs exposure; firefighter garments; fabrics and spun yarns for filtration applications; insulation in fire resistant thermal protective apparel; rubber reinforcement; and in transportation textiles such as airline carpeting. Some uses for paper product include insulation in electric motors and transformers, wire wrapping, and honeycombed strength members in many aircraft. Nomex® brand fibers are inherently flame resistant: the flame resistance is a polymer property and does not diminish with the life of the fiber. The fiber's low stiffness and high elongation give it textile-like characteristics which allow processing on conventional textile equipment. Nomex® meta-aramid, poly(meta-phenyleneisophthalamide), is prepared from meta-phenylenediamine and isophthaloyl chloride in an amide solvent. It is a long chain polyamide in which at least 85% of the amide linkages are attached directly to two aromatic rings. The meta oriented phenylene forms bends in the polymer chain, reducing chain rigidity as compared to the para orientation in the chemically similar Kevlar® chain. This flexible polymer chain gives Nomex® more textile-like qualities while retaining high temperature properties similar to Kevlar®. Information provided by DuPont.

Order this product through the following link:

http://www.lookpolymers.com/polymer_DuPont-Nomex-455-NOMEX-III-Aramid-Staple-Fiber.php

Physical Properties	Metric	English	Comments
Water Absorption	8.3 %	8.3 %	As shipped; Typical moisture levels on fiber as shipped. Equilibrium moisture levels are dependent on humidity and processing conditions.
Moisture Absorption at Equilibrium	4.5 %	4.5 %	Billed (Commercial, ASTM)

Mechanical Properties	Metric	English	Comments
Tensile Strength, Ultimate	310 MPa	45000 psi	Calculated from tenacity
Elongation at Break	21 %	21 %	Filament yarn tested at 3 TPI, 10" gauge length and 60%/minute extension rate. DuPont Test Method 12002.
Tenacity	0.229 N/tex	2.60 g/denier	Straight test - filament yarn tested at 3 TPI, 10 inch gauge length and 60%/min extension rate. DuPont Test

Mechanical Properties	Metric	English	Method 12002 Comments
Thermal Properties	Metric	English	Comments
CTE, linear	18.0 $\mu\text{m}/\text{m}\cdot^\circ\text{C}$	10.0 $\mu\text{in}/\text{in}\cdot^\circ\text{F}$	
	@Temperature 20.0 $^\circ\text{C}$	@Temperature 68.0 $^\circ\text{F}$	
Specific Heat Capacity	0.260 J/g- $^\circ\text{C}$	0.0621 BTU/lb- $^\circ\text{F}$	A Instruments Model 2920 modulated DSC, ASTM TM E1269.
Shrinkage	0.500 %	0.500 %	in water
	@Temperature 100 $^\circ\text{C}$	@Temperature 212 $^\circ\text{F}$	

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